The Efficient Diversification of Multi Asset-Class Portfolios
A User’s Guide to Strategic Asset Allocation
# Contents

Foreword ................................................................. 1
Introduction ............................................................. 3

I. Theory ...................................................................... 6
   Investors Facing Uncertainty: Investing before Modern Portfolio Theory (MPT) ......................... 7
   Diversification and Efficiency: Subtly Different, Significantly Important ................................. 9
   Risk and Return: Selecting Optimal Portfolios ................................................................. 12

II. Application ............................................................ 16
   1st Global Asset Allocation Model Development: The MPT Investment Process .................. 17
      Evaluation and Selection of Asset Classes ................................................................. 18
      The Characteristics and Portfolio Contributions of Selected Asset Classes ..................... 19
         High-Quality Fixed Income ................................................................................. 19
         U.S. Large Capitalization Equities ...................................................................... 21
         U.S. Small Capitalization Equities ...................................................................... 22
         International Equities ......................................................................................... 23
         Real Estate ......................................................................................................... 26
         Commodities ........................................................................................................ 28
      The Evaluation of an Asset Class: Fixed Income ......................................................... 30
      Return Expectations ............................................................................................... 33
      Asset Class Risk and Relationship Expectations ....................................................... 34
      Capital Markets Expectations ................................................................................ 40
      Portfolio Optimization ............................................................................................ 40
      Resampled Optimization: Dealing with the Uncertainty of Expectations .................... 42
      Portfolio Constraints: Incorporating Judgment ........................................................ 43
      Portfolio Selection ................................................................................................... 46
   1st Global’s Asset Allocation Models .............................................................................. 47

III. Practice ................................................................. 48
   An Evaluation of 1st Global Model Characteristics ......................................................... 49
   Implementing Efficient Portfolios ................................................................................ 52
   Maintaining Portfolio Efficiency Through Time ............................................................ 54
   Conclusion .................................................................................................................. 58
   Disclosures .................................................................................................................. 59
Foreword

The best-laid schemes o’ mice an’ men
Gang aft agley,
An’ lea’e us nought but grief an’ pain
For promised joy! – Robert Burns

This White Paper presents the assumptions and procedures behind 1st Global’s risk-return tradeoff curve and its associated “efficient portfolios.” Not all human risk is financial, and not all financial risk is portfolio; but the latter is an important source of human risk, and the financial advisor should help her or his client understand it as best as possible.

In particular, the financial advisor should help the client understand that “there is no free lunch,” and that there is a tradeoff between less volatility in the short run versus greater growth in the long run. One of the most important tasks of the financial advisor is to help the client choose the right combination of risk and return: “right,” that is, for the specific client given his, her or their wealth, age(s), financial needs and objectives, risk-tolerance and the like.

We (i.e., 1st Global and the present writer, who serves as a consultant to the firm) believe that a financial advisor will use the risk-return tradeoff curve of Modern Portfolio Theory (MPT) more effectively if the advisor knows, in general, the assumptions behind MPT, and the specific assumptions and procedures behind the particular product in hand. For example, contrary to views expressed by some MPT critics, the inputs to a MPT analysis are not supposed to be historical average returns, volatilities and correlations. Rather they should be forward-looking estimates. But what specific forward-looking adjustments to historical quantities has 1st Global made for their current MPT analysis, and why? Correlations or covariances are an important input to an MPT analysis. In the first instance we should start by examining historical covariances. But what is the proper procedure for estimating the entries of a covariance matrix when some return series are shorter than others? This White Paper seeks to answer such questions, generically and specifically, as directly as possible.

Despite our best efforts, it is always possible that an event will happen comparable to the farmer’s plough destroying the poor field mouse’s nest in Robert Burns’ poem. But that does not mean that field mice should not prepare nests, or that financial advisors should not help clients plan. A mutant field mouse couple (who lived in Scotland rather than Southern California) who did not prepare a nest for the winter for themselves and their children would have their genes deleted from the field (a.k.a. the European wood) mouse gene pool by spring. While it is true that the well-advised investor may encounter unanticipated hardships, the ill-advised investor courts almost certain disaster.

The oft quoted couplet by Burns that heads this Foreword does not end the poem. It is followed by:

Still thou art blest, compared wi’ me;
The present only toucheth thee;
But och! I backward cast my e’e,
On prospects drear!
An’ forward, tho’ I canna see,
I guess an’ fear!

It may be that mankind’s ability to look back and its instinct to try to look forward may sometimes be dreary and fearful. But it is what makes a man a man and not a mouse. True, a man or woman is taller and heavier than a mouse, and has opposable thumbs; but an elephant is taller and heavier still, and the great apes have opposable thumbs. But these beasts are not threatening man’s extinction by encroaching on his natural habitat. It is vice versa, because of man’s ability to think, speak, read and write, control fire and use tools like spears, bows and arrows, cannons, aircraft carriers, telephones, the internet, and efficient frontiers.
We should view past errors and adversities as learning opportunities; plan as best as we can; look to the future with joy and hope; but remember the words of Ecclesiastes 9:11 from the Bible:

[\text{T]he race is not to the swift,}  
\text{Nor the battle to the strong,}  
\text{Neither bread to the wise,}  
\text{Nor yet riches to men of understanding,}  
\text{Nor yet favor to men of skill;}  
\text{But time and chance happeneth to them all.}

Some may find it significant that the chapter and verse of this prophetic passage is “nine eleven.”

Harry M. Markowitz, Ph.D.
Introduction

“The future is uncertain, so we can never know what will happen. Indeed, risk would not exist if we could correctly anticipate the future.”

One of the most important realities of successful investing is that the future is unknown. While this statement may appear obvious, investors often fail to fully appreciate the uncertainty they face. A thoughtful assessment of many of the most catastrophic chapters in the history of financial markets shows that these events can be attributed to investors believing that some segment of the markets provided a reliable source of outsized returns that could be exploited into the “foreseeable” future. Indeed, market “bubbles” would not exist without a group of market participants willing to inflate asset prices well beyond any reasonable intrinsic value. From tulips in the 1720s to Internet stocks in the 1990s to real estate in the 2000s, market excesses and their resulting declines are all similar in that they are driven by a common belief that specific investments would continue to rise. Stated differently, investors believed the future was more certain than it actually turned out to be. All of these periods eventually resulted in a massive destruction of investor wealth, especially for those least grounded in the concepts of sound investing. Those foolish enough to believe that the future was knowable have consistently set themselves up for disappointment and loss.

Investors who have met financial ruin have often been those who have failed to consider uncertainty in their investment decisions. While investors have long been able to develop expectations about the returns that could be achieved from the investments they considered, they did not always have a way to understand or compare the uncertainty presented by those investments. This meant that risk was always a fairly undefined concept that investors simply had to accept in pursuing returns. Investors remained at the mercy of the unknown.

In 1952, Dr. Harry Markowitz provided a framework for how investors could most effectively face uncertainty in his first published article titled “Portfolio Selection.” In his 1959 book titled Portfolio Selection: Efficient Diversification of Investments, Markowitz more fully expanded on his ideas and focused on making the concepts of portfolio theory accessible to all investors, not just those with advanced degrees in mathematics. These works provided the definition of risk that is most commonly used in the financial industry today. His insights into the development of efficient portfolios provided a process by which investors could achieve the greatest return for the amount of risk they were willing to accept. Not only had Markowitz defined risk, he gave investors the ability to choose just how much risk they would accept. Investors were no longer at the mercy of the unknown.

The concepts of portfolio selection presented by Markowitz have since become known as Modern Portfolio Theory (MPT). Today, his ideas are a ubiquitous part of the modern financial landscape. MPT is applied by some of the world’s largest institutions and is the most commonly used investment approach in helping individuals plan their financial futures. Considering the impact that his ideas have had on the financial world and on the lives of investors, it is not surprising that Markowitz was awarded the Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel in 1990.

As part of an ongoing commitment to providing sound investment guidance firmly based in academic research, 1st Global engaged Markowitz as a consultant to 1st Global's Investment Management Research Group (IMRG) and as an advisor to its investment committee. As part of a comprehensive review of 1st Global’s asset allocation models, IMRG had the privilege of exploring the concepts and methodologies that are the basis of efficient portfolio construction with Markowitz. This paper is presented as a documentation of those efforts, but also as a means by which to share the insights regarding MPT gained through that collaboration. The paper has been organized into three parts to serve as an easy reference for practitioners. Each focuses on a distinct part of understanding the MPT investing process: theory, application and practice.

The first part, theory, provides a brief history of MPT and presents the foundational concepts that are necessary to understanding why investors should use MPT and how it works. The second part, application, details 1st Global’s efforts in applying the concepts of MPT in the development of its model portfolios. The final part, practice, affords practitioners insights regarding the characteristics of portfolio efficiency and provides guidance for maximizing efficiency at portfolio implementation and maintaining efficiency through time.

While many of the processes that make up MPT presented in this paper are deeply rooted in mathematics, the rationale for their use is based on very human concepts that explain how investors “ought” to act when faced with an uncertain future. Ultimately, MPT explains how investors facing uncertainty can most effectively incorporate their beliefs and convictions about the future into their investment decisions. It is 1st Global’s hope that this paper provides practitioners and investors alike with a deeper understanding of the ideas that are integral to MPT. This understanding should not only serve to make for better practitioners and investors, but also to allow them to become greater beneficiaries of MPT.
This page intentionally left blank.
I. Theory
Investors Facing Uncertainty:
Investing before Modern Portfolio Theory (MPT)

“Nothing more deeply divides us from the world before 1952 than the belated recognition of risk as the dominant element in portfolio management.”

Without the benefit of a reliable crystal ball to peer into the future, investors have always had to contend with making decisions about their investments without the information necessary to provide certainty about future outcomes. One of the ways that investors have dealt with this inevitable uncertainty and the risks it presents is diversification. Diversification is one of the most fundamental concepts of investing. It simply means not putting all of your eggs in one basket or, in investing terms, keeping the fortunes of any single investment from having a significant impact on the entirety of your own fortune. The idea of not putting all of your eggs in one basket, however, fails to provide insight into how to diversify. While it is clear that the notion of diversification existed well before the development of modern portfolio construction processes, what was missing was a clear understanding of how investors should approach the process of diversification. Consider this quote from a 1945 text:

“An examination of some fifty books and articles on investment that have appeared during the last quarter of a century shows that most of them refer to the desirability of diversification. The majority, however, discusses it in general terms and does not clearly indicate why it is desirable.”

Indeed, investors often applied diversification crudely, relying on haphazard deliberation, improvised strategies, intuition or even hunches to make their investment decisions. The result for investors was that they often exposed themselves to unnecessary or unintended risks. Consider an investor that chose to invest in a railroad stock. The investor, concerned about what might occur at the railroad company could choose to diversify his investment by purchasing the stock of a second, third or even fourth railroad company. While this approach certainly diversified company specific risks, other risks, including those that would affect the railroad industry as a whole, were not addressed.

Rather than look at diversification at the individual security level, Harry Markowitz approached it from a different perspective. He understood that diversification needed to be viewed at the portfolio level. If investors were attempting to diversify the first security they owned with a second, then the third security purchased needed to consider not only the first, but also the second. As additional securities were added, so did the complexity of the decisions investors had to make. It was clear that diversification was not just a single security problem, but a complex problem that needed to consider all of the other securities that make up an investor’s portfolio.

Markowitz’s 1952 Journal of Finance article titled “Portfolio Selection” provided investors with the answer as to how they should approach diversification. The paper described a theory and methodology for the efficient diversification of portfolios. The theory began with the recognition that investors facing uncertain outcomes have always had to make investment decisions based on their beliefs about the future of the investments they selected.

---

In fact, the first three lines of the article explained that “the process of selecting a portfolio may be divided into two stages. The first stage starts with observation and experience and ends with beliefs about the future performances of available securities. The second stage starts with the relevant beliefs about future performances and ends with the choice of portfolio.”

![Figure 1: The Fundamentals of the Portfolio Selection Process](image)

It is both evident and intentional from the very introduction of the concept of asset allocation that the beliefs we hold are at the core of the portfolio selection process. In this sense it is important to understand that the process represents not only a diversification of assets or asset classes, but also a diversification of the beliefs regarding the expected returns and risks of those investments or asset classes.

While investors had already developed several methods for arriving at a security’s expected return, there was no common or specific measure of investment risk. For this, Markowitz recommended that risk be measured in terms of a portfolio’s variance. Variance, however, is expressed in terms of units squared. Risk in these terms is difficult for investors to conceptualize, so it is useful to express it in the same units as expected returns. This conversion can be done easily by taking the square root of variance.

**Equation 1: Conversion of Variance to Standard Deviation**

\[
\text{Standard Deviation}_A = \sqrt{\text{Variance}_A} \quad \text{or} \quad \sigma_A = \sqrt{\sigma^2_A}
\]

Variance expressed in these terms is known as standard deviation. Standard deviation describes how far, on average, a security’s return deviates from the security’s average or mean return. This provides a much more intuitive way of understanding the uncertainty surrounding a security’s or asset class’ expected return. Because of this, standard deviation has become one of the most commonly used expressions of a security’s or a portfolio’s risk. This measure also incorporates information about the probability of deviations occurring. Once an investor has formed expectations about a security’s return, standard deviation utilizes observed returns to provide insight as to the probabilities of that return occurring as the investor expects. Risk, expressed in this manner, is the equivalent to the risk of return outcomes not turning out as expected. An investment with no risk means that return outcomes for that investment are certain. Our expectations of both returns and the variability of those returns (standard deviation) form what are known as our “probability beliefs.” As rational investors facing uncertainty, it only makes sense that we should utilize these beliefs in making investment decisions.

---

One important item to note regarding risk is the distinction between the financial industry’s common use of this term and the more impactful and real meaning of this term to investors. While the term “risk” will be used throughout this paper to describe the volatility of returns, as measured through standard deviation, we recognize two very real facts. First, risk is not confined to any single number. Second, risk for investors is not just the volatility of security, asset class or portfolio returns, but rather, it represents the circumstance of not being financially capable to honor the promises they make. Risk for investors is not being able to fund their child’s college education, or being unable to provide themselves and their spouse with a retirement defined by sustaining the power of choice. These are the risks that have a very real impact on the lives of investors. While increased volatility manifests itself in financial plans as a reduced probability of achieving specific financial outcomes, we understand that the real meaning of risk is something far more significant than changes to account values. Our use of the more standardized term throughout this paper is not intended to diminish the understanding of risk as a much broader concept.

**Diversification and Efficiency: Subtly Different, Significantly Important**

"Not only does the [Expected Return-Variance] hypothesis imply diversification, it implies the 'right kind' of diversification for the 'right reason.'"  

The selection of variance as a representation of investment risk was not a coincidence. In deliberating variance as a measure of risk, Markowitz looked to a statistical text titled “Introduction to Mathematical Probability” by J.V. Uspensky to determine the method for calculating the variance of a portfolio of assets. The equation revealed that portfolio variance depends not only on the variances of the securities held in the portfolio, but also on the covariances or co-movements, that reflect the relationships between securities.

**Equation 2: Variance for a Two-Security Portfolio**

\[
\text{Var}(\text{Portfolio}_{A,B}) = w_A^2 \text{Var}(A) + w_B^2 \text{Var}(B) + 2w_A w_B \text{Cov}(A,B)
\]

Where:

- \(w_A = \text{The weight of security A in the portfolio}\)
- \(w_B = \text{The weight of security B in the portfolio}\)

Covariance describes how two securities move in relation to one another. As with variance, it is often useful to express co-movement in different, more intuitive terms. A common expression of co-movement is correlation. The conversion of covariance to correlation can be done with the equation below:

**Equation 3: Conversion of Covariance to Correlation**

\[
\text{Correlation}_{A,B} = \frac{\text{Covariance}_{A,B}}{\text{Standard Deviation}_A \text{Standard Deviation}_B} \quad \text{or} \quad \rho_{A,B} = \frac{\sigma_{A,B}}{\sigma_A \sigma_B}
\]

Correlation tells us how closely one security moves in relation to another security and has a value that ranges between 1 and -1. A value of 1 indicates that the two securities move perfectly in tandem. When one security goes up, the other security also goes up. A value of -1 indicates that the two securities move perfectly opposite to one another. When increased volatility manifests itself in financial plans as a reduced probability of achieving specific financial outcomes, we understand that the real meaning of risk is something far more significant than changes to account values. Our use of the more standardized term throughout this paper is not intended to diminish the understanding of risk as a much broader concept.

---

6 Asset allocation and diversification do not guarantee a profit nor do they eliminate the risk of loss of principal. There is no guarantee that any investment strategy will be successful.
one goes up, the other goes down. Values that fall between 1 and -1 indicate the degree to which two securities move in relation to one another. A value of 0 indicates that there is no relationship between the movements of the two securities. This relationship between securities can have a significant impact on a portfolio’s volatility and is a critical insight that is central to understanding how diversification works.

Let’s examine a portfolio of two securities with equal risk, measured in terms of their standard deviations. Figure 2 illustrates how different degrees of correlation between the two securities affect the volatility of portfolios made up of different weights of the two securities.

![Figure 2: Correlation and Portfolio Risk – (An Examination of a Portfolio of Two Assets with Equal Risk)](image)

For a two-security portfolio, the point at which the maximum correlation benefit can be seen is where the two securities are equally weighted (50 percent security A/50 percent security B). We can see that adding a second security that is highly correlated (correlation = 1) provides no risk reduction benefit to a portfolio. When we think back to our previous railroad stock example, we understand how adding a second railroad stock diversified business-specific risk, but this is not likely to reduce portfolio risk in terms of standard deviation, as railroad securities as a whole would likely demonstrate a very high degree of correlation.

Now consider the correlation benefit to the investor of adding a second security that has a correlation of 0.5. In this instance, portfolio volatility is reduced by nearly 15 percent. If the second security was not correlated to the first (correlation = 0), portfolio volatility would be reduced by nearly 30 percent. If both security A and B had the same expected return, it becomes clear how an investor, with careful analysis, could potentially achieve the return provided by both A and B with lower risk than either A or B. This illustrates that it is possible to construct portfolios whose risk...
is smaller than the sum of its individual parts! This also makes clear that the act of diversifying a portfolio of securities is much more than simply adding more securities. Indeed, there is a “right kind” of diversification that provides the “right reason” for adding additional securities or asset classes to a portfolio.

This concept dramatically changed the investment process. It indicates that rather than start with purchasing a single security that an investor believed provided the highest expected return and then diversifying to reduce risk, investors should begin by conducting a portfolio analysis to identify the diversified portfolios made up of the securities being considered that provide the greatest expected return for each level of expected risk and then select from these portfolios. Put another way, investors no longer have to take risks haphazardly in seeking returns. With a thoughtful application of their beliefs about the future, they can maximize their expected returns for the risk they are willing to accept.

The analysis of portfolios, however, can be a highly intensive computational process that increases in complexity as the number of investments increase. The process requires establishing return expectations for each investment being considered, forming probability beliefs about the investments and determining expectations for the relationships between the investments. This information is then used in a portfolio analysis to identify the set of portfolios from which investors should select.

The two-security example that showed how the risk of different portfolios made up by different weights in whole percentages of the two securities required at least 100 calculations. A portfolio analysis that is not limited to whole percentages made up of multiple securities or asset classes could easily require an increasingly large number of computations to determine all of the possible portfolios made up of all of the possible security or asset class combinations used in the analysis.

Markowitz, however, greatly simplified the portfolio analysis process by introducing the “critical line method” for deriving efficient portfolios. This method eliminated the need to calculate returns and risk for all possible combinations of investments being considered, as it directly solves for the set of portfolios with the highest expected returns for given levels of risk - that is, the set of efficient portfolios.

Figure 3 illustrates what the results of a portfolio analysis might look like. In the chart on the left, each dot represents a unique portfolio made up of some combination of securities or asset classes, each with its own risk and return characteristics. Each dot shown is, in fact, a diversified portfolio. The green line shows the set of portfolios identified using Markowitz’s critical line method. This set of portfolios is often referred to as the “efficient frontier” because these portfolios provide the highest return for a given level of risk.

In the chart to the right in Figure 3, we can see an example of two portfolios. Both Portfolio A and Portfolio B have the same amount of expected risk; however, Portfolio A provides a higher expected return for the given level of risk. In fact, Portfolio A is part of the set of portfolios that formed the efficient frontier. This means that for that level of risk, there is no other portfolio that provides a higher expected return. Portfolio A is the most efficient portfolio for that given level of risk.


This does not represent an actual portfolio analysis and is for illustration purposes only.
This example illustrates the difference between diversification and efficiency. The important distinction is that diversification merely explains an idea about how to reduce risk, while efficiency represents the maximum expression of diversification based on an investor’s expectations about the future. This distinction applies to portfolios of asset classes as well as portfolios of securities. Many portfolios are diversified, few are efficiently diversified. This example also shows how many investors can fail to make the most of the return opportunities available to them for the amount of risk they are taking.

**Risk and Return: Selecting Optimal Portfolios**

The use of risk and return for selecting portfolios is based on the assumption that investors are risk-averse. This means that given the choice between two investments offering the same expected return, an investor would choose the investment that provides the lowest risk. This is an important distinction because it is the dividing line between the idea that investors simply attempt to maximize expected return and the idea that investors consider risk in making their investment decisions. We can assess a situation in which investors are faced with two investments, one of which offers a high return as well as high risk, and another investment that offers a lower return, as well as a lower degree of risk. If investors merely sought to maximize expected return they would simply place all of their assets in the first investment regardless of the risk implications. In no case would they seek a diversified portfolio, as doing so would reduce expected return. This notion, however, is in direct contradiction with the empirical evidence that investors do, in fact, diversify their assets. We must then reject the idea that investors approach investing with the singular objective of return maximization. Empirically, we can confirm the idea that investors consider risk in their investment decisions and that they are, indeed, risk-averse, and we can use this as a reasonable assumption in understanding how they make investment decisions.

What about investors faced with more than two investment options? What about an investor faced with a selection from an efficient frontier like those presented from a portfolio analysis, which could be made up of hundreds if not thousands of possible portfolios? How should the investor select from this set of portfolios? This is where MPT moves beyond statistics and probability theory and into financial economic theory, which describes how investors act when faced with two or more choices. The economic “theory of choice” employs the use of utility functions. A utility function is a process whereby a numerical value is assigned to all possible choices. Utility functions are often defined in the form of a mathematical equation.

---

With regard to investor behavior, a utility function serves to describe an investor’s preferences over perceived risk and expected return. Incorporating these preferences when selecting investments that have different expected outcomes is helpful as it provides an understanding of how an investor might behave under different circumstances. It also aligns the investment process with the idea that investors consider both risk and return in their investment decisions. This is why Markowitz suggested that rather than seeking to maximize expected return, investors should seek to maximize their expected utility, or rather, seek the greatest amount of return given their preferences for risk. Figure 4 illustrates what an investor’s graphed utility function might look like. In this particular case, it shows how an investor’s utility, or preference, for a negative return decreases at a much faster rate than their preference for positive returns. A utility curve like this describes an investor who is risk averse or one that dislikes losses more than they like gains.

**Figure 4: An Example of an Investor’s Utility Function**

It should come as no surprise that every investor is unique in their willingness to bear risk. This means that every investor also has a unique utility function. Unfortunately, the process of precisely describing risk and return preferences in the form of a mathematical equation is not, for most investors, a feasible endeavor. A discussion regarding the creation of investor utility functions is academic, as it is likely that most investors will never precisely know their utility functions in mathematical terms. What is important to understand is that risk-averse investors, as a whole, demonstrate very similar preferences when it comes to risk and return; they prefer diversified portfolios and they require greater return in order to take on greater risk. It is in these similarities that we return to our discussion of MPT.

In his 1959 book *Portfolio Selection: Efficient Diversification of Investments*, Markowitz provided an example of three investors, each with their own utility function. He demonstrated how if each investor examined an efficient frontier and then selected the portfolio most appropriate to his needs based only on risk and return (mean and variance), each would obtain a portfolio almost as good as the very best available to them. Later, in several academic papers, Markowitz provided additional support for the idea that MPT provides investors a very simple and effective way to maximize their expected utility. The important thing to note about what Markowitz has demonstrated is that an investor using only risk and return can select a portfolio that is “as suitable as a portfolio can be,” even if they do not know their utility function.

---

13 While an investor’s utility function may not be ascertained with exact precision, there are processes such as computerized risk assessments that are useful in allowing investors to identify portfolios that closely match their preferences for bearing risk.
1st Global is focused on providing the necessary resources to help investors understand their preferences or tolerance for risk. 1st Global’s risk assessment process guides investors through a carefully selected set of questions to assess their preferences for risk and return. The information gathered is then used to provide a recommendation of a portfolio that is appropriate for their risk and return preferences, and which seeks to maximize their expected utility.
This page intentionally left blank.
II. Application
1st Global Asset Allocation Model Development: 
The MPT Investment Process

Up to this point, our discussion has served to provide an overview of the concepts that support the use of MPT as a sound approach to investing. This included:

1. An understanding that our beliefs about investing are at the core of MPT and how a rational investor should make investment decisions based on those beliefs;
2. An overview of what makes diversification work;
3. The significant difference between diversification and efficiency;
4. An understanding of how maximizing expected utility is a reasonable approach to describing how investors should invest; and lastly,
5. How MPT provides investors a simple and effective approach to maximizing their own expected utility.

We will now focus on the application of those concepts in practice. Specifically, we will proceed through the development of 1st Global’s model portfolios, providing details on specific segments of the process as they are presented. Figure 5 provides an overview of 1st Global’s asset allocation model development process and will serve as a guide for our discussion regarding portfolio development.

![Figure 5: 1st Global Asset Allocation Model Development Process](image)

We will begin our discussion with the evaluation and selection of the asset classes to be included in 1st Global’s model portfolios and then proceed to discuss our process for forming beliefs about the future for the selected asset classes based on our observations and experiences. Specifically, we will focus on the primary inputs necessary for an MPT portfolio analysis:

1. Return expectations (mean return);
2. Risk expectations (variance/standard deviation); and
3. Expectations for relationships between asset classes (covariance/correlation coefficients).

Once forward-looking expectations are developed, we will describe the optimization process and the role of constraints in portfolio development. Finally, we will discuss how portfolios are selected from the derived efficient frontier.

---

Evaluation and Selection of Asset Classes

In the development of a portfolio of securities or asset classes, investors are faced with the reality of having to make the best use of a finite pool of assets. Our discussion regarding the difference between diversification and efficiency highlights the effective use of assets that are not highly correlated. Unfortunately, there are not many asset classes that exhibit low correlations, so it is necessary to carefully evaluate asset classes to determine which to include in the investment universe from which portfolios are developed.

Generally, asset classes can be evaluated by focusing on three characteristics: return, risk and correlation. Utilizing these three key characteristics as a basis for evaluating asset class portfolio benefits provides a common framework to deal with the inevitable and necessary trade-offs in selecting asset classes. While we can observe quantitative data in making decisions, it is also necessary to understand qualitatively why an asset class exhibits its particular risk, return and correlation characteristics, as well as how those characteristics are related to other asset classes that are included in a portfolio. In addition, it is useful to understand the underlying economic factors that drive an asset class’ return and also those factors that present a risk.

Developing this understanding is part of the process of being able to formulate expectations about the future. It is not enough to observe that an asset class has performed well recently. An understanding of why the asset class has performed well is more important in forming beliefs. Portfolios should include asset classes that react differently to different economic environments and that can withstand unexpected geopolitical events. The evaluation and selection of asset classes is a critical consideration in the development of efficient portfolios. Asset classes should be distinct, clearly defined, and provide specific benefits to portfolios. Inclusion of asset classes that do not have distinct risk, return, or diversification characteristics can lead to suboptimal portfolios. To this end, 1st Global carefully evaluated a broad set of asset classes based on the following criteria:

- Does the asset class have distinct risk and return characteristics?
- Will the asset class have a defined role in portfolios?
- Does the asset class provide a benefit to portfolios?
- Can we formulate long-term beliefs about the asset class?

The asset classes and the representative return series selected for inclusion in 1st Global’s model portfolios are shown in Table 1 below. A detailed discussion of the rationale and specific role each asset class plays within portfolios follows.

<table>
<thead>
<tr>
<th>Asset Class</th>
<th>Benchmark</th>
<th>Inception Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>High-Quality Fixed Income</td>
<td>Barclays Capital Aggregate Bond</td>
<td>January 1976</td>
</tr>
<tr>
<td>U.S. Large Capitalization Equity</td>
<td>S&amp;P 500</td>
<td>December 1926</td>
</tr>
<tr>
<td>U.S. Small Capitalization Equity</td>
<td>Ibbotson Small Company Stock</td>
<td>December 1926</td>
</tr>
<tr>
<td>International Developed Market Equity</td>
<td>MSCI EAFE</td>
<td>January 1970</td>
</tr>
<tr>
<td>Real Estate</td>
<td>FTSE NAREIT Equity REIT</td>
<td>January 1972</td>
</tr>
<tr>
<td>Commodities</td>
<td>S&amp;P GSCI</td>
<td>January 1970</td>
</tr>
</tbody>
</table>
The Characteristics and Portfolio Contributions of Selected Asset Classes

It is in the careful deliberation of asset class selection that we must focus on the idea of adding the right kind of diversification for the right reason. Unfortunately, there are not many asset classes that can provide significant correlation benefits to portfolios. Asset classes with limited diversification benefits, however, can still play an important role in portfolios. Many have unique qualitative characteristics that can be beneficial to investors.

Asset classes selected for inclusion in 1st Global’s model portfolios all have a specific purpose and are intended to provide specific portfolio benefits. The following information is intended to provide insight as to the characteristics and portfolio contribution benefits of the asset classes used in 1st Global’s model portfolios and also to provide guidance as to the implementation of portfolios in practice. Practitioners who have a clear understanding of the specific characteristics that provide the basis for the inclusion of asset classes are better able to evaluate investments to be used in the effective implementation of multi-asset class portfolios. Table 2 on the following page provides a summary of the distinct characteristics, defined portfolio roles, and specific portfolio benefits provided by selected asset classes.

High-Quality Fixed Income

Bonds represent debt obligations issued by either governments or corporations. These debt obligations include contractual requirements regarding when debt is to be repaid as well as the amount and timing of interest payments that issuers must pay owners of the debt obligations. Bonds are often referred to as “fixed income” because they generally provide a series of fixed interest payments along with a final principal payment. The quality of fixed income is determined by the issuer’s ability to pay interest payments and return principal at the maturity of the bond.

High-quality fixed income can play an extremely important role in portfolios for investors. A review of Table 3 shows that it exhibits low correlations to nearly every asset class included in 1st Global’s model portfolios. This makes it one of the most useful asset classes available in providing significant diversification benefits to portfolios. Few investments can reduce portfolio volatility as effectively.

Table 3: Historical Monthly Correlations of High-Quality Fixed Income with Selected Asset Classes

<table>
<thead>
<tr>
<th>Asset Class</th>
<th>Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S. Large Capitalization Equity</td>
<td>0.24</td>
</tr>
<tr>
<td>U.S. Small Capitalization Equity</td>
<td>0.12</td>
</tr>
<tr>
<td>International Developed Markets Equity</td>
<td>0.16</td>
</tr>
<tr>
<td>International Emerging Markets Equity</td>
<td>0.01</td>
</tr>
<tr>
<td>Real Estate</td>
<td>0.17</td>
</tr>
<tr>
<td>Commodities</td>
<td>-0.02</td>
</tr>
</tbody>
</table>

Past performance does not guarantee future results.

High-quality fixed income has a lower expected return than equity asset classes; however, its inclusion in portfolios is not intended to increase returns. It is included in portfolios to reduce risk. More importantly, if the asset class is implemented properly, it can help protect investor portfolios in times of financial crisis. Investors seeking the maximum benefit from this asset class should look to non-callable U.S. government securities and the highest-quality non-callable corporate and municipal bonds. In fact, in times of crisis, government bonds have provided the greatest degree of protection to investor portfolios. As such, the primary role of fixed income in 1st Global’s model portfolios is to reduce overall portfolio volatility and to protect investor portfolios in times of financial crisis.
### Table 2: A Summary of 1st Global Asset Class Characteristics, Roles and Benefits

<table>
<thead>
<tr>
<th>Asset Class</th>
<th>Distinct Characteristics</th>
<th>Defined Portfolio Role</th>
<th>Specific Portfolio Benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>High-Quality Fixed Income</td>
<td>Fixed income represents a debt obligation of issuers that provides a contractual payment of interest and principal. Fixed income generally offers lower expected returns than equity asset classes.</td>
<td>Diversification; Preservation of capital during periods of financial stress; Income</td>
<td>Volatility reduction; Preservation of capital during periods of financial stress.</td>
</tr>
<tr>
<td>U.S. Large Capitalization Equity</td>
<td>Access to some of the world's largest, most well-known businesses. (equity risk premium)</td>
<td>Return</td>
<td>Access to some of the world's largest, most well-known businesses; Long-term inflation hedge</td>
</tr>
<tr>
<td>U.S. Small Capitalization Equity</td>
<td>Smaller companies tend to have higher costs of capital. Over the long term, small company equities have provided higher rates of return than large company equities, at greater risk. (equity risk premium and size premium)</td>
<td>Return</td>
<td>Possibility of higher rates of return than large company equities, with greater risk.</td>
</tr>
<tr>
<td>International Developed Markets Equity</td>
<td>Expands investment opportunity set to include international developed markets; Foreign currency exposure.</td>
<td>Return; Diversification</td>
<td>Expanded investment opportunity set; Access to some of the world's largest, most well-known businesses domiciled outside of the U.S.</td>
</tr>
<tr>
<td>International Emerging Markets Equity</td>
<td>Expands investment opportunity set to include international emerging markets; Foreign currency exposure.</td>
<td>Return; Diversification</td>
<td>Expanded investment opportunity set; Access to one of the fastest growing segments of the global markets.</td>
</tr>
<tr>
<td>Real Estate</td>
<td>Returns driven by long-term lease rates. Rents tend to be more stable than corporate earnings.</td>
<td>Return; Diversification</td>
<td>Risk reduction; Long-term inflation hedge.</td>
</tr>
<tr>
<td>Commodities</td>
<td>Returns driven primarily by supply and demand. Changes in commodity prices can affect corporate earnings and the global economy.</td>
<td>Diversification</td>
<td>Risk reduction; Inflation hedge; “Event risk” hedge.</td>
</tr>
</tbody>
</table>

Investing in fixed income securities involves special risks not typically associated with equity securities. These risks include credit risk, which is the risk of potential loss due to the inability to meet contractual debt obligations, and interest rate risk, which is the risk that an investment’s value will change due to a change in the level of interest rates. Additionally, there is an inverse relationship between bond prices and interest rates specific to fixed income securities. As interest rates rise, bond prices fall and, conversely, as interest rates fall, bond prices rise.

Investing in micro, small or mid-sized companies may involve risks not associated with investing in more established companies. Since equity securities of smaller companies may not be traded as often as equity securities of larger, more established companies, it may be difficult or impossible for the securities to sell.

International investing presents certain risks not associated with investing solely in the United States. These include, for instance, risks relating to fluctuations in the value of the U.S. dollar relative to the values of other currencies, custody arrangements made for foreign holdings, political risks, differences in accounting procedures and the lesser degree of public information required to be provided by non-U.S. companies.

Investing in emerging markets involves greater risk than investing in more established markets. Such risks include exchange rate changes, political and economic upheaval, the relative lack of information about these companies, relatively low market liquidity, and the potential lack of strict financial and accounting controls and standards.

An investment in commodity-linked derivative instruments may be subject to greater volatility than investments in traditional securities and are not suitable for all investors.
Unfortunately, many investors unwittingly give up the benefits of the low correlations provided by high-quality fixed income in the pursuit of the higher returns provided by lower-quality segments of the fixed income markets. The portfolio benefits provided by the asset class quickly diminish the further an investor strays from the higher quality segments of the markets, especially in times of financial crisis. Table 4 on the following page illustrates this point. It shows cumulative returns for different types of bonds during periods in which large company stocks fell more than 20 percent.

**Table 4: Fixed Income Performance During Market Declines of Greater than 20%**

<table>
<thead>
<tr>
<th>Periods of Market Declines Greater Than 20 Percent</th>
<th>Cumulative Asset Class Returns</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S. Large Company Equity</td>
<td>High-Yield Bonds</td>
</tr>
<tr>
<td>August 1929 - June 1932</td>
<td>-83.41%</td>
</tr>
<tr>
<td>May 1946 - November 1946</td>
<td>-21.76%</td>
</tr>
<tr>
<td>December 1961 - June 1962</td>
<td>-22.28%</td>
</tr>
<tr>
<td>November 1968 - June 1970</td>
<td>-29.23%</td>
</tr>
<tr>
<td>December 1972 - September 1974</td>
<td>-42.62%</td>
</tr>
<tr>
<td>August 1987 - November 1987</td>
<td>-29.53%</td>
</tr>
<tr>
<td>August 2000 - September 2002</td>
<td>-44.73%</td>
</tr>
<tr>
<td>October 2007 - February 2009</td>
<td>-50.95%</td>
</tr>
</tbody>
</table>

The above are unmanaged indexes of common stocks, bonds, or other securities.

- U.S. Large Company Equity - S&P 500 Index
- High-Yield Bonds - Barclays Capital U.S. High-Yield Index
- High-Quality Fixed Income - Barclays Capital U.S. Aggregate Bond Index

An investment cannot be made directly in an index. Past performance does not guarantee future results.

In every period of decline greater than 20 percent since 1926, government bonds posted positive returns. In contrast, bonds rated below investment grade, often referred to as high-yield or junk bonds, fell in all but one of the periods shown and provided investors with little protection as the market declined. Investors implementing the fixed income component of their portfolios with lower-quality bonds underestimate the risk this adds to their portfolios. Not only do they add the risks inherent in lower-quality bonds, but they also give up the substantial risk-reduction benefits provided by high-quality fixed income.

**U.S. Large Capitalization Equities**

One of the most commonly followed indicators of U.S. equity market performance is the S&P 500 Index. This index is made up of the 500 largest U.S. companies and today includes companies like ExxonMobil, Apple, Microsoft, General Electric, Proctor & Gamble, Johnson & Johnson, Coca-Cola and McDonalds, among many others. Large capitalization U.S. equities represent some of the world’s biggest, most well-known businesses. For many U.S. investors, an investment that includes these types of companies, like an S&P 500 Index mutual fund or exchange-traded fund (ETF), is the principal method of accessing the returns provided by the equity markets.

The returns from equities differ from the returns provided by fixed income. While fixed income generally represents a debt obligation that provides a periodic interest payment, owning equity means actually owning a portion of a company. Equity ownership allows investors to benefit from the earnings generated by a business as well as expectations for future profits. Equity returns have two components: dividends and capital appreciation. Dividends represent an equity owner’s interest in company profits paid out in either cash or additional shares. Capital appreciation represents an increase in the value of a company, which can be either real or perceived. Company earnings and expectations for future earnings growth can be affected by any number of factors, including general economic conditions, labor costs, the quality of company management, regulations, taxes, lawsuits and many other...
business-specific risks. Additionally, equity interests are subordinate to debt obligations. In light of these risks, the returns provided by equities tend to be more volatile than those provided by fixed income.

Return expectations tend to be greater for equities than fixed income. This is a function of how much it costs a company to access new funds to invest in their business, also known as a company’s cost of capital. As companies evaluate their needs for additional capital, they weigh the cost of accessing additional funds against the expected profits that will be generated from deploying those assets. If a company can earn a return that is greater than its cost of capital, then it makes sense to invest more in their business. Otherwise, accessing new capital would generate a loss. This provides a fundamental reason for owning equities and also highlights the importance of capable company management in effectively utilizing corporate capital over time to generate returns above the cost of capital.

The risks and returns provided by equities can be summarized in the concept of an equity risk premium, which is defined as the amount of return in excess of the risk-free rate that equities are expected to provide investors for accepting the risks of owning equities. Including U.S. large capitalization equities in portfolios provides access to the equity risk premium. Additionally, the understanding that equity ownership also represents a way of accessing the entrepreneurship and ingenuity of business managers helps to explain why equities are also considered a long-term inflation hedge. Well-run companies are able to adapt to inflationary pressures by more effectively managing capital as well as by raising the prices of the goods and services they provide.

U.S. Small Capitalization Equities

The inclusion of U.S. small capitalization companies in 1st Global model portfolios is based on the empirical evidence that, over the long term, smaller companies have provided investors with higher rates of return for accepting the additional risk of investing in smaller companies. Smaller companies tend to have a higher cost of capital than larger, established businesses. This supports the expectations for higher returns from smaller companies relative to larger companies. The relationship between company size and returns has been documented in several academic studies, initially by Rolf W. Banz in his 1981 study in the *Journal of Financial Economics* titled “The Relationship Between Return and Market Value of Common Stocks,” and later by Eugene Fama and Kenneth French in their 1992 study in the *Journal of Finance* titled “The Cross-Section of Expected Stock Returns.” These studies showed that, on average, smaller companies tend to have higher rates of return than larger companies. This excess return is known as the “size premium,” which is defined as the difference between small and large company returns.

The evidence suggests that the greatest benefits from investing in smaller companies are achieved by investing in the smallest companies in the market (the bottom two deciles). This phenomenon has been shown to apply across the market capitalization spectrum. In general, the size premium is greater the further an investor moves down in market capitalization. Investors seeking to exploit the size premium should seek to invest in the smallest segments of the markets (small and micro caps) and should also understand that these smaller companies can experience prolonged periods of underperformance relative to large companies.

While the main purpose of including small company stocks within portfolios is the expectation for greater returns, it should be noted that both the greater return benefit and the greatest diversification benefits provided by the asset class are achieved by investing in the smallest segments of the market. Figure 6 shows the differences between small and mid-sized companies in terms of their correlations to U.S. large capitalization equities over five-year rolling time periods since January 1979.

---

International Equities

International markets, both developed and emerging, have become an increasingly important part of the global landscape, and there is ample evidence that investors can gain considerable benefits from taking a global view of investing. Figure 7 shows the makeup of the global equity markets by market capitalization, which is the market value (number of shares outstanding times price per share) of the companies in each specified segment.

This chart highlights the fact that the U.S. equity market does not represent the complete investment opportunity set available to investors. U.S. based investors who choose to exclude foreign investments are ignoring the majority of opportunities available across the globe. As illustrated above, developed markets represent an opportunity set
equivalent in size to that of the U.S. market. Emerging markets, while a much smaller portion of global markets, also represent a notable portion of global opportunity set. What makes emerging markets compelling today is that these markets are expected to experience the fastest rates of economic growth within the global markets. Figure 8 on the following page shows historical and forward-looking estimates of Gross Domestic Product (GDP) as a percentage of the world total GDP for advanced economies and emerging/developing economies.

When the size of the emerging markets relative to developed markets (which include the U.S.) is taken into consideration, the significant difference in economic growth becomes evident. This growth comes from the process of developing the physical, commercial and financial infrastructure within the emerging economies – a process that generates an enormous amount of wealth. Additionally, as GDP per capita increases, consumers within these economies begin to demand products and services that previously had been inaccessible. As these economies evolve so will the preferences of their consumers. Another important factor that differentiates emerging markets is that many emerging economies today are in a better fiscal condition than many of the developed markets. Much of the developed world today finds itself heavily burdened with ongoing deficits and increasing debt. This will have significant implications for future economic growth within the developed world.

Figure 8: Gross Domestic Product (GDP) as a Percentage of World Total

Based on Purchasing Power Parity (PPP)

Source: International Monetary Fund, World Economic Outlook Database, April 2010


22 Advanced economies as defined by the International Monetary Fund: Composed of 33 countries: Australia, Austria, Belgium, Canada, Cyprus, Czech Republic, Denmark, Finland, France, Germany, Greece, Hong Kong SAR, Iceland, Ireland, Israel, Italy, Japan, Korea, Luxembourg, Malta, Netherlands, New Zealand, Norway, Portugal, Singapore, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Taiwan Province of China, United Kingdom and United States.

Emerging and developing economies as defined by the International Monetary Fund: Composed of 149 countries: Republic of Afghanistan, Albania, Algeria, Angola, Antigua and Barbuda, Argentina, Armenia, Azerbaijan, The Bahamas, Bahrain, Bangladesh, Barbados, Belarus, Belize, Benin, Bhutan, Bolivia, Bosnia and Herzegovina, Botswana, Brazil, Brunei Darussalam, Bulgaria, Burkina Faso, Burundi, Cambodia, Cameroon, Cape Verde, Central African Republic, Chad, Chile, China, Colombia, Comoros, Democratic Republic of Congo, Republic of Congo, Costa Rica, Côte d’Ivoire, Croatia, Djibouti, Dominica, Dominican Republic, Ecuador, Egypt, El Salvador, Equatorial Guinea, Eritrea, Estonia, Ethiopia, Fiji, Gabon, The Gambia, Georgia, Ghana, Grenada, Guatemala, Guinea, Guinea-Bissau, Guyana, Haiti, Honduras, Hungary, India, Indonesia, Islamic Republic of Iran, Iraq, Jamaica, Jordan, Kazakhstan, Kenya, Kiribati, Kuwait, Kyrgyz Republic, Lao People’s Democratic Republic, Latvia, Lebanon, Lesotho, Liberia, Libya, Lithuania, Former Yugoslav Republic of Macedonia, Madagascar, Malawi, Malaysia, Maldives, Mali, Mauritania, Mauritius, Mexico, Moldova, Mongolia, Montenegro, Morocco, Mozambique, Myanmar, Namibia, Nepal, Nicaragua, Niger, Nigeria, Oman, Pakistan, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Poland, Qatar, Romania, Russia, Rwanda, Samoa, São Tomé and Príncipe, Saudi Arabia, Senegal, Serbia, Seychelles, Sierra Leone, Solomon Islands, South Africa, Sri Lanka, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Sudan, Suriname, Swaziland, Syrian Arab Republic, Tajikistan, Tanzania, Thailand, Democratic Republic of Timor-Leste, Togo, Tonga, Trinidad and Tobago, Tunisia, Turkey, Turkmenistan, Uganda, Ukraine, United Arab Emirates, Uruguay, Uzbekistan, Vanuatu, Venezuela, Vietnam, Republic of Yemen, Zambia, and Zimbabwe.
These structural economic differences, along with the significant differences in growth expectations, provide a compelling case for viewing emerging market equities as a unique asset class. The opportunity presented by the inclusion of emerging market equities within portfolios is participation in economies that are both structurally different from developed economies and an increasingly important portion of global economic activity. The quantitative benefits of including emerging markets in portfolios can be seen in Figure 9, which shows the rolling five-year correlations between U.S. large capitalization equities (S&P 500) and both developed and emerging market equities. The differences between emerging and developed markets are reflected in the portfolio diversification benefits provided by each of the two asset classes. While correlations have increased in recent history, there are fundamental reasons that support the notion that investing internationally will continue to provide risk-reduction benefits to portfolios.

Figure 9: Historical Rolling Five-Year Correlations of Selected Asset Classes with U.S. Large Capitalization Equities
(January 1979 – August 2010)

![Correlation Graph]

The above are unmanaged indexes of common stocks, bonds or other securities.

- U.S. Large Capitalization Equity - S&P 500 Index
- Developed Market Stocks - MSCI EAFE Index
- Emerging Market Stocks - MSCI Emerging Markets Index

An investment cannot be made directly in an index. Past performance does not guarantee future results.

When considering international equities for inclusion in a portfolio, a distinction should be made regarding the differences in owning U.S.-based multinational companies that derive a large part of their revenues from foreign markets and owning companies that are based in foreign markets. While the ownership of U.S.-based multinational corporations does provide an opportunity to benefit from their access to foreign markets, the performance of these companies is more closely tied to U.S. equity markets than international markets. This means that the use of U.S.-based multinational corporations as a method of gaining exposure to international markets within portfolios fails to consider one of the key benefits of investing internationally. Even though these types of companies might derive a majority of their revenues from foreign markets, they provide minimal risk-reduction benefits to portfolios. To participate in the full range of opportunities that are available in the global markets as well as to benefit from the diversification provided by international investments, it is necessary for investors to own interests in foreign companies based in both developed and emerging markets.

As global markets have become more integrated, foreign companies have increasingly begun to compete for global business opportunities. Specialization within global markets by countries and companies with specific competitive advantages has made many products more affordable to a greater number of consumers than ever before. This also means that competition for the profits derived from sales to global consumers has continued to increase. This competition has defined many of the economies within the global landscape and has been a key driver of change for other economies. This specialization can be observed in the dominance demonstrated by certain countries and/or regions in particular industries or goods. Japanese companies have become globally dominant in automobiles and consumer electronics; Taiwan has become the world capital of the semiconductor industry; east and south Asia manufactures most of the world’s clothing; and China, Brazil and South Korea now represent a large concentration of the steel industry, an industry which had previously been a dominant fixture of the U.S. economy. 24 Indeed, competition is a dynamic process that focuses innovation and efficiencies on opportunities to increase wealth.

Economic theory explains that as global competition drives countries to specialize around their competitive advantages, the makeup of economies will differ from one another. As a result, changes in global economic factors will affect individual countries differently. Even if global markets become increasingly integrated, ongoing competition will be a persistent force in maintaining the diversification benefits of investing internationally.

Structural differences in the drivers of economic growth between different countries also manifest themselves for U.S.-based investors in the fluctuations seen in the value of foreign currencies relative to the U.S. dollar. Part of owning international companies is accepting the risks associated with the specific currencies of the countries in which those companies are based. Currency fluctuations are a component of international investments that can act as an important portfolio diversifier. They can also represent a significant risk if the majority of international investments within a portfolio are tied to the value of a single economy or region. Just as it is prudent to invest in a broadly diversified group of international companies, it is equally important that the currency exposures represented by those companies also be broadly diversified across multiple economies.

**Real Estate**

Real estate represents ownership of property such as apartments, condominiums, commercial real estate and undeveloped land. The purchase, maintenance and ownership of individual properties can be an expensive and time-consuming endeavor for individual investors. Direct property ownership can also force investors to accept limited liquidity for assets used to purchase properties. Fortunately, accessing real estate for inclusion in investor portfolios today does not require such a burdensome commitment. One of the simplest and most liquid ways of accessing a diversified mix of real estate assets is through equity real estate investment trusts (REITs). Equity REITs are companies that purchase, operate and finance properties to generate income. REITs generally focus on different types of properties like office buildings, apartments, shopping centers or other commercial properties. Because the management and investment aspects of property ownership are handled by another party, REITs allow individual investors to avoid the time-consuming and expensive nature of owning real estate directly but still benefit from the nature of the returns the asset class provides. Investors can best implement this for their portfolios through the use of ETFs or open-end mutual funds that represent a diversified basket of publicly traded equity REITs.

The inclusion of real estate in portfolios can have some very real benefits to investors. One of the key benefits is its low correlation to other asset classes. Table 5 below shows historical correlations of real estate with other asset classes. Unlike most other asset classes, real estate does well in diversifying both equity and fixed income asset classes.

---

Table 5: Historical Monthly Correlations of Real Estate with Selected Asset Classes  
(January 1972 – December 2010)

<table>
<thead>
<tr>
<th>Asset Class</th>
<th>Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>High-Quality Fixed Income</td>
<td>0.17</td>
</tr>
<tr>
<td>U.S. Large Capitalization Equity</td>
<td>0.57</td>
</tr>
<tr>
<td>U.S. Small Capitalization Equity</td>
<td>0.64</td>
</tr>
<tr>
<td>International Developed Markets Equity</td>
<td>0.45</td>
</tr>
<tr>
<td>International Emerging Markets Equity</td>
<td>0.42</td>
</tr>
<tr>
<td>Commodities</td>
<td>0.08</td>
</tr>
</tbody>
</table>

Past performance does not guarantee future results.

While the diversification benefits of real estate are evident quantitatively, an understanding of the sources of its returns and the characteristics of those sources helps to provide a qualitative understanding for how the asset class behaves.

In most cases, equity REITs generate their returns from the cash flows provided by rents on properties in which they invest. This is different from the returns generated by equities, which rely on capital gains. The long-term nature of many leases results in rents being more stable than the corporate earnings that drive equity returns. Additionally, REITs are generally in the business of managing properties for income. They are not required to develop new technologies or bring different products or services to the market like many corporate entities looking to generate earnings. This means that REITs generally face lower levels of business risk than typical businesses. This is not to say that there are fewer risks in real estate, just that there are differences in the types of risks faced by property owners. This is what makes real estate unique. It provides diversification in the types of risks investors accept.

Another key benefit of incorporating real estate into a portfolio is that the asset class can be viewed as a hedge against inflation. This aspect of real estate begins with the concept of replacement cost. In other words, what would it cost to replace an existing property or to build something equivalent to an existing property? As the costs of the materials used to build a property increase, so should the value of the property. Additionally, a property owner’s ability to adjust rents is an important aspect in understanding real estate as a long-term inflation hedge. As leases expire, property owners can increase rents to pass through inflationary pressures to tenants. Therefore, the sensitivity to inflation demonstrated by different REITs is a function of the lengths of the leases within the REITs.

As mentioned earlier, investing in REITs does not come without its risks. Because equity REITs are in the business of purchasing and operating properties, they do incur costs. In some cases, cash used for operations may cause cash distributions to be deferred or decreased permanently. Alignment of interests may also present a risk as affiliates of a particular REIT may be involved in the management of other partnerships with similar objectives that may present conflicts in allocating their time and in the selection of properties among the REITs they manage. Additional risks include, but are not limited to, the adverse consequences of economic, market, and regulatory changes that can impact the real estate market generally and can negatively impact the value of a REIT investment.

Commodities

Broadly defined, commodities are principal raw or semi-finished goods used by producers and consumers. Some of the most common examples of commodities include crude oil, copper, gold, sugar, corn, and live cattle. A unique characteristic of commodities is that they are undifferentiated. Oil extracted from the U.S. Gulf Coast is just as useful to producers and consumers as oil extracted from the Middle East. Corn from the U.S. Midwest is just as useful as corn grown in Asia. This has the effect of making commodity prices equivalent across the world. This characteristic also means that commodity prices are driven primarily by global supply and demand.

Commodity prices have a very direct impact on consumers as they are a source of inflation. An increase in the prices of both corn and wheat, for example, would affect the prices of any goods that are made from those commodities and any products derived from those commodities. In this case we would expect the prices of goods like corn flakes and bread to be affected. An increase in the price of oil would likely lead to an increase in the cost of transporting goods, which would also result in a price increase to consumers of a broad range of goods. Changes in commodity prices can also have a real effect on corporate earnings, as increases in production and transportation costs could lead to lower earnings. These examples show how commodities and commodity prices play a very important role in the lives of investors as well as the world economy.

As an asset class, commodities have unique characteristics that can make them a valuable addition to investor portfolios. First, commodities have a low (and sometimes negative) correlation to traditional asset classes such as stocks and bonds. Second, as a source of price increases they have a high correlation to inflation. This means that the addition of a diversified mix of commodities to a portfolio can provide investor portfolios with risk reduction benefits as well as a hedge against inflation.

Table 6 shows the calendar years where year over year (YOY) changes in inflation were greater than 25 percent and how commodities, high-quality fixed income and large-company stocks performed during those years. The best-performing asset class is highlighted in green and the worst-performing asset class is highlighted in red. In periods of rising inflation, commodities have outperformed traditional assets. In periods of declining inflation, commodities underperformed traditional assets. This makes evident both the inflation hedging and the diversification benefits provided by commodities.

---

### Table 6: Changes in Annual Rate of Inflation and Corresponding Annual Asset Class Returns

#### Years of 25 Percent or Greater Increase in Inflation

<table>
<thead>
<tr>
<th>Year</th>
<th>Change in Inflation</th>
<th>Commodities</th>
<th>High-Quality Fixed Income</th>
<th>Large Capitalization Stocks</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>292.22%</td>
<td>13.48%</td>
<td>5.93%</td>
<td>26.47%</td>
</tr>
<tr>
<td>1987</td>
<td>290.27%</td>
<td>23.77%</td>
<td>2.76%</td>
<td>5.23%</td>
</tr>
<tr>
<td>2004</td>
<td>73.40%</td>
<td>17.28%</td>
<td>4.34%</td>
<td>10.87%</td>
</tr>
<tr>
<td>1999</td>
<td>66.46%</td>
<td>40.92%</td>
<td>-0.82%</td>
<td>21.04%</td>
</tr>
<tr>
<td>2007</td>
<td>60.63%</td>
<td>32.67%</td>
<td>6.97%</td>
<td>5.49%</td>
</tr>
<tr>
<td>2002</td>
<td>53.55%</td>
<td>32.07%</td>
<td>10.26%</td>
<td>-22.10%</td>
</tr>
<tr>
<td>1990</td>
<td>31.40%</td>
<td>29.08%</td>
<td>8.96%</td>
<td>-3.17%</td>
</tr>
<tr>
<td>1996</td>
<td>30.71%</td>
<td>33.92%</td>
<td>3.65%</td>
<td>23.07%</td>
</tr>
<tr>
<td>2000</td>
<td>26.49%</td>
<td>49.74%</td>
<td>11.63%</td>
<td>-9.11%</td>
</tr>
</tbody>
</table>

#### Years of 25 Percent or Greater Decline in Inflation

<table>
<thead>
<tr>
<th>Year</th>
<th>Change in Inflation</th>
<th>Commodities</th>
<th>High-Quality Fixed Income</th>
<th>Large Capitalization Stocks</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>-25.73%</td>
<td>-15.09%</td>
<td>4.33%</td>
<td>15.80%</td>
</tr>
<tr>
<td>1981</td>
<td>-27.90%</td>
<td>-23.01%</td>
<td>6.25%</td>
<td>-4.91%</td>
</tr>
<tr>
<td>1997</td>
<td>-48.80%</td>
<td>-14.07%</td>
<td>9.65%</td>
<td>33.36%</td>
</tr>
<tr>
<td>1991</td>
<td>-49.92%</td>
<td>-6.13%</td>
<td>16.00%</td>
<td>30.55%</td>
</tr>
<tr>
<td>2001</td>
<td>-54.28%</td>
<td>-31.93%</td>
<td>8.44%</td>
<td>-11.88%</td>
</tr>
<tr>
<td>1982</td>
<td>-56.71%</td>
<td>11.56%</td>
<td>32.62%</td>
<td>21.41%</td>
</tr>
<tr>
<td>1986</td>
<td>-70.03%</td>
<td>2.04%</td>
<td>15.26%</td>
<td>18.47%</td>
</tr>
<tr>
<td>2008</td>
<td>-97.79%</td>
<td>-46.49%</td>
<td>5.24%</td>
<td>-37.00%</td>
</tr>
</tbody>
</table>

The above are unmanaged indexes of common stocks, bonds or other securities.

- Inflation – Ibbotson Associates SBBI U.S. Inflation Index
- Commodities – S&P GSCI
- High-Quality Fixed Income – Barclays Capital U.S. Aggregate Bond Index
- U.S. Large Capitalization Equity – S&P 500 Index

An investment cannot be made directly in an index. Past performance does not guarantee future results.

1st Global has chosen to represent the commodities asset class with the S&P GSCI Index, which includes energy, livestock, agricultural, industrial and precious metal commodities. The index is world-production weighted, which means that the amount of each of the commodities in the index is based on how much of each commodity is produced globally. This weighting methodology indirectly links production with consumption in that it assumes that the amount produced of any commodity is related to the demand for that commodity. Consumption drives demand, which in turn drives production. Therefore, price changes for the commodities within the index are also weighted in relation to their impact on the global economy. This weighting methodology provides the most direct offset to changes in economic growth caused by changes in commodity prices.

The most effective way to gain the benefits of investing in commodities is through investments that offer direct exposure to commodity prices. Most commonly, this is accomplished through commodity futures or commodity-linked notes. Currently, investors can most easily access these types of commodities investments through a limited number of offerings including ETFs, exchange-traded notes (ETNs) and open-end mutual funds. Unfortunately, commodity ETFs may have more burdensome tax-filing requirements (Schedule K-1), and ETNs expose investors to the underlying credit risks of the banks issuing the notes. While these types of securities can provide an excellent way of accessing commodities, investors should be aware of the implications that come with their use. In terms of including commodities in portfolios, open-end mutual funds represent one of the simplest ways for investors to access a direct exposure to commodity prices. However, investors must be careful in selecting the most appropriate funds to represent the commodities asset class.
Commodity or natural resource mutual fund investments fall into two categories: those that provide indirect exposure to commodities prices and those that provide direct exposure to commodities prices. The majority of natural resource or commodity funds are essentially sector equity funds that provide an indirect exposure to commodities prices. This means that they invest primarily in the stocks of companies that are commodity producers, or whose revenues are tied to commodities. A good example of this type of company is ExxonMobil, a company that, among other things, has a focus on oil exploration, production and refining. While it is true that ExxonMobil’s revenues are driven partially by oil prices, there are many other factors that can affect the price of the stock.

Factors not related to the prices of commodities that can affect a commodity company’s stock price include environmental risks (i.e., oil spills), risk of the expropriation of property by a foreign government or the risk of the renegotiation of contracts with foreign governments. In fact, common business risks such as labor costs, the quality of company management, regulations, taxes, lawsuits and even what are called “event risks” are all factors that can have an effect on company outcomes.

Event risks are unexpected events that can have a large impact on the value of a company’s stock. In the case of commodity producers, these would include political instability in regions where commodities are being extracted, war, disruptions to oil supplies, summers or winters that are longer than normal (either could affect energy prices) and weather (agricultural companies are often affected by droughts, floods and crop freezes). All of these would likely cause a commodity producer’s stock price to fall and the price of the affected commodity to rise.

Commodity producers understand these risks well, which is why they often hedge away the price risk of the commodities they produce. Studies have found that, on average, oil firms hedge away approximately 33 percent of the price risk for the following year’s oil production.\textsuperscript{28} Many other commodities companies engage in this same practice, which reduces precisely the price exposure that an investor is looking for from a commodity investment.

An additional benefit of being an owner of commodities-related investments whose prices rise as a result of the negative impacts of unexpected events is that they may also serve to provide a hedge against natural and geopolitical risks.

**The Evaluation of an Asset Class: Fixed Income**

We have now detailed the characteristics and specific portfolio benefits provided by each of the asset classes selected for inclusion in 1st Global’s model portfolios. The next step in the portfolio development process is to establish our forward-looking beliefs about what we expect from each of the asset classes in terms of their risks, returns and relationships with other asset classes. The following section provides an example of the evaluation efforts necessary to develop forward-looking expectations. We do so by detailing 1st Global’s evaluation of the high-quality fixed income asset class. Figure 10 on the following page is a return histogram that provides an analysis of the returns for U.S. long-term government bonds.

Return histograms provide a way of forming probability beliefs about the future. In this case we are evaluating fixed income returns. The horizontal axis shows different ranges of returns, and the vertical axis shows the number of times the index’s monthly returns fell within a specified range of returns. Consider a hypothetical series of 100 monthly returns: if 85 of the 100 returns fall within a specified range, it could be expected that approximately 85 percent of future returns would fall within a similar range, depending on the time-period used. The histogram in Figure 10 shows the monthly returns of long-term U.S. government bonds for the time period beginning January 1926 and ending June 2010. A quick review of the returns would seem to indicate that they are normally distributed over the time period. Additionally, the time period of the data is long enough to provide a representative sampling of fixed income returns through different economic environments, as well as through several significant geopolitical events. While it seems reasonable to review this information and use it to form forward-looking expectations, doing so would fail to recognize that long-term U.S. government bonds underwent a significant structural change as a result of a particular historical event that occurred in 1971. Figure 11 shows a return histogram for monthly returns beginning on January 1926 through August 1971.
The chart shows that monthly returns for long-term U.S. government bonds generally fell within a narrow range of returns for this time period. This describes a fixed income market that exhibits relatively low risk. Now consider the time period from September 1971 through June 2010.

The variability of returns is significantly different in the fixed income markets for this time period, and describes a fixed income market that is significantly more volatile than that seen in the preceding period. The differences between the return histograms in Figures 11 and 12 illustrate the structural changes in the financial markets that occurred as a result of the dissolution of the Bretton Woods system that prevailed from after World War II to the early 1970s. Bretton Woods allowed the conversion of U.S. dollars for gold at a fixed price. The implication was that the U.S. dollar, and any currencies that were pegged to it, had a set value in terms of gold. In August 1971, President Richard Nixon ended the direct convertibility of the dollar to gold and consequently the Bretton Woods system. The U.S. dollar and other currencies that were pegged to the U.S. dollar would no longer be formally linked to or implicitly backed by gold. The impact on the asset class was significant. Table 7 shows these differences in terms of annualized return and standard deviation.

<table>
<thead>
<tr>
<th>Long-Term U.S. Government Bonds</th>
<th>Geometric Mean</th>
<th>Arithmetic Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>January 1926 – August 1971</td>
<td>2.95%</td>
<td>3.09%</td>
<td>5.30%</td>
</tr>
<tr>
<td>September 1971 – June 2010</td>
<td>8.68%</td>
<td>9.30%</td>
<td>11.67%</td>
</tr>
</tbody>
</table>

A comparison of the statistics for the two time periods shows that risk, as measured by standard deviation, is more than twice as great in the most recent time period as compared to the period before the dissolution of the Bretton Woods agreement. Not accounting for these differences can cause forward-looking expectations to be inconsistent with reality. 1st Global’s estimates for fixed income standard deviations and correlations are based on the post-Bretton Woods time period, which more closely reflect expectations for fixed income risk and return. Including earlier data would present a more conservative view of fixed income than today’s economic reality implies.
Return Expectations

The development of return expectations should begin with the understanding that there is no way of predicting future returns with certainty. In making investment decisions, however, it has always been necessary to have a belief about the future performance of specific investments. And so, it is necessary to establish a reasonable foundation on which to build return expectations. The use of historical returns as forward-looking estimates of asset class returns is neither prudent nor recommended, as it would only help to develop portfolios that might have performed well in the past. Any estimate of returns expected in the future should incorporate beliefs about the future. There are several common methods that allow for the incorporation of beliefs about the future in establishing forward-looking estimates of asset class returns, including complex economic models, risk premium approaches and equilibrium models. The development of 1st Global’s return expectations incorporated two methodologies. The first is a risk premium/building blocks approach, which is based on empirically observable data. The second is a survey of forecasts approach that incorporates a number of different methodologies from some of the largest and most recognized financial institutions and market participants.

The risk premium/building blocks approach is one of the most common approaches used by financial institutions for deriving expected returns, and is based on expectations for the future return relationships between asset classes. It begins with the determination of a forward-looking risk-free rate, which is used as the foundation of expected returns to which risk premiums, estimated from empirical data, are added. The risk-free rate used is dependent on the time horizon for which expected returns are being estimated. 1st Global used a 10-year horizon for all of our forward-looking return expectations, which makes the relevant risk-free rate the yield on a 10-year Treasury note. This is the return an investor would expect to receive for an investment in a 10-year Treasury note that is held to maturity. The risk-free rate incorporated into 1st Global’s return estimates was based on expectations for the 10-year Treasury note provided by the Livingston Survey. This is the oldest continuous survey of economists’ expectations, which summarizes forecasts of economists from industry, government, banking and academia.29

Once a risk-free rate is determined, risk premiums for different segments of the capital markets are then estimated. A risk premium is the amount of return in excess of the risk-free rate that an investor expects to receive for accepting risk. Risk premiums are estimated using historical data and represent the arithmetic or simple average of excess returns for a specified time period. The most common risk premium is known as the “equity risk premium,” which represents the amount of return that an investment in equities has provided investors in excess of the risk-free rate. The “size premium” is another risk premium, which represents the amount of return that an investment in small-company equities has provided investors in excess of the returns provided by large company equities. These premiums are then added to the risk-free rate to “build” a forward-looking return expectation. For example, the expected return on small-company stocks is made up of the risk-free rate plus the equity risk premium plus the size premium.


Securities offered through 1st Global Capital Corp. Member FINRA/SIPC
Investment Advisory Services offered through 1st Global Advisors Inc.
Building expectations for fixed income uses a similar process, but rather than build on the risk-free rate, fixed income asset classes build on the cash rate, which is the return on Treasury bills. Fixed income incorporates premiums for default and horizon risk. Default or credit risk is the risk that a debt issuer fails to pay interest or return principal as promised. Horizon risk represents the additional risk of holding longer-term fixed income, which has a greater sensitivity to changes in interest rates (interest rate risk) and also ties up capital for a greater period of time. These premiums are then added to the cash rate to determine forward-looking return expectations.

In addition to the return estimates derived internally using the building blocks methodology, 1st Global also incorporated a survey of asset class forecasts. Survey data was collected by LCG Associates and included 10-year asset class forecasts from more than 20 financial institutions. These forecasts were then aggregated by calculating the harmonic mean of participant expectations. This provided the most conservative estimate of the aggregate of forecasts. The incorporation of this information allowed for the inclusion of a number of different return estimate methodologies utilized by independent market participants. The combination of internally generated market-observable expectations and independent external expectations provides an unbiased foundation for the return estimates used to develop 1st Global’s asset allocation models. Final return expectations were then compared to information provided by other independent resources.

**Asset Class Risk and Relationship Expectations**

The understanding of the risks presented by individual asset classes and the relationships between asset classes is crucial in the development of risk-efficient portfolios. A common practice in establishing risk and asset class relationship expectations is to utilize historical data. This provides useful insights regarding the risk of different asset classes in terms of the variability of their returns, how asset classes moved in relation to one another, and how asset

---

LCG Associates 2010 Capital Markets Consensus Survey Respondents: Franklin Templeton Investments; Evergreen Investments; Victory Capital Management; Deutsche Bank; JP Morgan Chase; Mesriow Financial; UBS; Credit Suisse; Alliance Bernstein; BlackRock; Mellon Capital Management; Duff & Phelps Investment Management Company; Goldman Sachs; Pacific Investment Management Company (PIMCO); Western Asset Management Company (WAMCO); Private Advisors, LLC; GMO, Fort Washington; Brandywine Global; Metropolitan Real Estate Management; DuPont; AEW Capital Management, LP; Guggenheim Real Estate.
classes reacted to common economic, market and geopolitical events. Historical information provides observable data on which to base risk and asset class relationship information.

One of the challenges with using historical data is in the selection of the time period that is utilized to establish those expectations. An analyst who believes the next 10 years are going to look like a particular 10-year time period in the past might use that time period to derive expectations for risk and asset class relationships. First, this approach immediately limits the amount of information used in the analysis. Statistically speaking, the precision of an estimate is directly related to the amount of data used to obtain the estimate; the greater the amount of data, the greater the precision of the estimate. A review of the annual returns for the S&P 500 Index illustrates this point. The chart on the next page provides the year a specific return fell within a specific range of returns shown in 10 percent increments. We can see the last time investors experienced a return like what was seen in 2008 was 1937. An analysis that did not include 1931 or 1937 returns could underestimate the risk, or rather the probability, of a 2008 return. Clearly it was probable as it fell within a normally distributed range of returns.

Second, this approach introduces the analyst’s bias for what the future might hold. The further the analyst’s expectations are from future outcomes, the less likely it is that portfolios created using those expectations prove to be efficient.

Another challenge in using historical data to establish risk and relationship expectations is that some asset classes have a very limited history that in turn limits the value of the historical information. Historical information for an asset class that does not reflect the same economic or geopolitical events as those experienced by other asset classes that will make up a portfolio does not provide useful or relevant comparison of the asset class’s risk and correlation characteristics. Imagine an analyst evaluating two very similar asset classes, one with 20 years of historical data and one with 10 years of historical data. Now imagine that a market crash occurred 15 years ago. In examining the risk characteristics for the two asset classes based on the entirety of the data available, only one would incorporate information relating to the market crash. The asset class that did not have data extending back 15 years would appear

---

less risky only because it lacked the data that included the market decline. This makes a comparison of the risks presented by each asset class useless.

The international emerging markets equity asset class is an example of an asset class that has a very limited history and therefore makes asset class comparisons difficult. One of the longest data series available for emerging markets is the MSCI Emerging Markets Index, which begins in January 1988. The return series inception dates in Table 1 (page 17) indicate when the data series used to represent each asset class began. These starting points illustrate the conundrum faced when attempting to establish forward-looking expectations. Some asset classes have data that extend as far back as 1926, while others have much shorter-lived data. Because asset class risk and relationship information should be gathered based on a common time period, it is necessary to find another way of extracting additional information from the data available.

The method that 1st Global employed to adjust for short-lived data and to benefit from as much of the available information as possible is the process of conducting multi-factor regressions. A multi-factor regression is a statistical method of describing one data series in terms of one or several other data series. Equation 4 illustrates how this process works. Returns for $r_i$ are defined in terms of four factors ($F_1, F_2, F_3, F_4$). The beta ($\beta$) coefficient before each factor indicates the weighting, or amount, of each factor used in describing $r_i$.

Equation 4: General Form Four-Factor Regression Equation

\[ r_i = \alpha_i + \beta_{i1}F_1 + \beta_{i2}F_2 + \beta_{i3}F_3 + \beta_{i4}F_4 + \epsilon_i \]

The regression process ultimately identifies the equation that best describes a particular data series using other selected data series, or factors, over a specified time period. In the equation above, the $\alpha_i$ term is known as the intercept term. This term provides information regarding expected return. It does not, however, provide information specific to determining asset class variances and covariances. Since we have used a different methodology for determining our return expectations, the intercept term is not useful in our efforts to develop models of asset class risks and relationships. The $\epsilon_i$ term in the equation is known as the idiosyncratic term, which is the part of a return that could not be explained by factors used in the regression. We will expand later on the importance of this term. Proper specification of regressions is important as the factors selected should be useful in describing the given data series. 1st Global conducted our regressions using the following four factors.

<table>
<thead>
<tr>
<th>Asset Class</th>
<th>Return Series</th>
</tr>
</thead>
<tbody>
<tr>
<td>$F_1$ Treasury Bills</td>
<td>Ibbotson Associates 30-Day T-Bill Total Return</td>
</tr>
<tr>
<td>$F_2$ Long-Term Government Bonds</td>
<td>Ibbotson Associates Long-Term Government Bond Total Return</td>
</tr>
<tr>
<td>$F_3$ U.S Large Capitalization Equities</td>
<td>Standard &amp; Poor’s 500 Total Return</td>
</tr>
<tr>
<td>$F_4$ U.S. Small Capitalization Equities</td>
<td>Ibbotson Associates SBBI Small Company Stock Total Return</td>
</tr>
</tbody>
</table>

These four factors are representative of key segments of the capital markets that are affected differently by various economic factors. Additionally, these factors are useful in that they have data beginning in 1926.

The returns of the short-lived series (MSCI Emerging Markets Index) were regressed against the returns of the factors above to determine the factor weights that would best replicate the actual return series. These regressions then provide information as to how accurately they were able to replicate the return series. In particular, the R-Squared ($R^2$) statistic from our regression output tells us how much of an asset class’ variance is explained by the factors used in the regressions.
Figures 15 and 16 provide examples of both numerical and graphical regression output for a one-factor regression of the MSCI EAFE Index against the S&P 500 Index (F1) from January 1970 through February 2010.

**Figure 15: Example of Numerical Regression Output**

Dependent Series: MSCI EAFE

<table>
<thead>
<tr>
<th></th>
<th>Degrees of Freedom</th>
<th>Sum of Squares</th>
<th>Mean Square</th>
<th>F-Statistic</th>
<th>F-Critical Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>1</td>
<td>0.44127</td>
<td>0.44127</td>
<td>283.2159</td>
<td>3.84</td>
</tr>
<tr>
<td>Error</td>
<td>483</td>
<td>0.75256</td>
<td>0.00156</td>
<td>1/483, =0.05</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>484</td>
<td>1.19384</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Root MSE 0.03947
Dependent Mean 0.009
Coefficient of Variation 4.38717
Durbin-Watson 1.96139

R-Squared 0.36963
Adjusted R-Squared 0.36832
Number of Observations 485
1st-Order Autocorrelation 0.01578

<table>
<thead>
<tr>
<th>Parameter Estimate</th>
<th>Standard Error</th>
<th>T-Statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>0.00312</td>
<td>0.00183</td>
</tr>
<tr>
<td>IA S&amp;P 500 TR USD</td>
<td>0.66866</td>
<td>0.03973</td>
</tr>
</tbody>
</table>

IA S&P 500 TR USD 0.03682

Durbin-Watson Critical Values dl Du 4-du 4-dl =0.05, n=480, k=1 1.84596 1.85431 2.14569 2.15404

**Figure 16: Example of Graphical Regression Output**

\[ y = 0.6687x + 0.0031 \]

\[ R^2 = 0.3696 \]
The numerical output provides the necessary information to test for the statistical significance of the factors in describing specific asset classes, as well as to test for multiple other aspects that could render the information provided by the regressions unreliable. Specific asset class regressions may not utilize all four factors.

Regressions conducted on the commodities asset class presented an interesting situation. None of the four factors proved useful in describing the asset class. Regressions showed that the asset class could not be described by any of the four factors alone or in combination. This result, however, confirms our understanding of the asset class as one that demonstrates low or no correlation to other asset classes. In other words, the asset class is unique in how it acts and could prove useful in lowering portfolio level risk.

Once asset class regressions were conducted and tested, the process of deriving expected risk and asset class relationships could begin. The regression equations provided specific beta ($\beta$) coefficients, or weights, for each of the four factors used in the regressions. While regressions were limited by the amount of return data available for each asset class, they provided models that described the relationship between each asset class and each of the four factors. These asset class models could then be used to determine risk and asset class relationship information that extended back to 1926.

Earlier we discussed asset class risk in terms of standard deviation, which describes how far, on average, a security’s return deviates from the security’s average or mean return. Standard deviation is the more intuitive concept, whereas variance is easier to work with in mathematical terms. As such, the process of deriving risk expectations began with an extension of the variance equation presented earlier in this paper. In this particular instance, however, this formula contains $Var(u_i)$, which is an idiosyncratic variance term that is used to define the variance that could not be explained by the factors used in the regression. The weights of each of the four factors are defined in the asset class regression equation by the beta ($\beta$) coefficients. The remaining information necessary to calculate variance could be determined from the actual historical variances and covariances of the four factors used in the regressions, all of which extend back to 1926. Equation 5 is used for regressions that include all four-factors. This equation is modified based on the number of factors that proved to be significant in the regression process.

**Equation 5: Four-Factor Variance Equation**

$$Var(y_i) = \beta_{11}^2 Var(F_1) + \beta_{12}^2 Var(F_2) + \beta_{13}^2 Var(F_3) + \beta_{14}^2 Var(F_4) + 2\beta_{11}\beta_{12} Cov(F_1, F_2) + 2\beta_{11}\beta_{13} Cov(F_1, F_3) + 2\beta_{11}\beta_{14} Cov(F_1, F_4) + 2\beta_{12}\beta_{13} Cov(F_2, F_3) + 2\beta_{12}\beta_{14} Cov(F_2, F_4) + 2\beta_{13}\beta_{14} Cov(F_3, F_4) + Var(u_i)$$

The $Var(u_i)$ term in this equation is the only part of the equation we are missing. The importance of this term is that it defines the amount of the variance that is not explained by any of our factors. To get the information necessary to establish our expectations of an asset class’s risk, we must solve for this term.

If we assume that the ratio between the variance explained by our factors and the variance that is unexplained in the regression holds constant, we can solve for total variance given that we have the variance explained by our factors as
well as the $R^2$ term from our regression output that tells us how much of the total variance that represents. Finally we must convert variance, which is expressed in terms of units squared, to standard deviation, which provides risk information in the same units as our return expectations and is a much more intuitive way of understanding risk. The conversion is accomplished using Equation 1 (page 7) presented earlier in this paper.

Deriving correlations, or asset class relationships, utilizes the same information gathered from regressions to calculate variance and is similar to the calculation of total variance. You will recall that covariance describes how two securities move in relation to one another, and so we begin the process in this instance with the calculation of covariance using an equation like Equation 6 that is modified to account for the appropriate number of factors used in the asset class regression.

**Equation 6: Four-Factor Covariance Equation**

\[
\text{Cov}(r_i, r_j) = 
\beta_{i1}\beta_{j1}\text{Var}(F_1) + \beta_{i2}\beta_{j2}\text{Var}(F_2) + \beta_{i3}\beta_{j3}\text{Var}(F_3) + \beta_{i4}\beta_{j4}\text{Var}(F_4) \\
+ (\beta_{i1}\beta_{j2} + \beta_{i2}\beta_{j1})\text{Cov}(F_1, F_2) \\
+ (\beta_{i1}\beta_{j3} + \beta_{i3}\beta_{j1})\text{Cov}(F_1, F_3) \\
+ (\beta_{i1}\beta_{j4} + \beta_{i4}\beta_{j1})\text{Cov}(F_1, F_4) \\
+ (\beta_{i2}\beta_{j3} + \beta_{i3}\beta_{j2})\text{Cov}(F_2, F_3) \\
+ (\beta_{i2}\beta_{j4} + \beta_{i4}\beta_{j2})\text{Cov}(F_2, F_4) \\
+ (\beta_{i3}\beta_{j4} + \beta_{i4}\beta_{j3})\text{Cov}(F_3, F_4) 
\]

Because covariance is scaled in terms of the standard deviations of the two assets being compared, it is convenient to convert it to correlation, which provides us with an absolute and more intuitive measure of the degree to which two asset classes move together. The conversion of covariance to correlation is achieved by applying Equation 3 presented earlier in this paper.

As discussed previously, the commodities asset class presented an interesting challenge in developing expectations, as the multi-factor regression process demonstrated that none of the four factors used were useful in describing the asset class. The exercise, however, did serve to confirm the asset class’s usefulness as a portfolio diversifier. A review of the historical risk and asset class relationships we had available served as the basis for forward-looking expectations. The results of a historical analysis showed that almost all correlations between commodities and other asset classes fell near zero. This result was in line with our understanding of the asset class and was also confirmed by the results of the regressions. International emerging market equity, however, was the one exception, with a correlation to commodities of 0.222. This result also makes sense, as a part of the growth seen in emerging markets historically had come from the sale or export of their natural resources. This result meant that commodities would be less effective at diversifying emerging market equity risk than it would be for other asset classes. Our forward-looking risk expectations for commodities would have to be based on historical data and our asset class relationship expectations would be based on the combination of historical data and the beliefs that were confirmed by the results of our regressions. We adjusted historical correlations that were less than 0.1 to zero and incorporated historical data for the relationship between international emerging markets equity and commodities.

We have now described in detail the process for developing asset class risk and relationship expectations that are consistent with the longest data series at our disposal. It should be noted how the equations utilized in this process relied on the risk and return characteristics of the four factors selected for use in asset class regressions. We have also provided detailed information about the structural changes that occurred in the fixed income markets since 1926.
This was important in that it affected one of the four factors used in the asset class regressions that played an integral role in the development of forward looking expectations. This highlights the importance of the careful analysis of not only the asset classes used but also the time periods considered. Failing to discern the fundamental changes in the fixed income markets might very well have achieved results that were mathematically correct, yet fundamentally incorrect. Experience and observations are critical in the development of the beliefs used in portfolio analysis.

Capital Markets Expectations

We have detailed the process used in the development of the inputs necessary for conducting a portfolio optimization: expected returns, expected risk and expected relationships. The following provides a summary of the information gathered from our efforts. Risk and return information were purposely graphed out to provide a final method of reviewing expectations for asset class risk and returns. This allows us to understand if our asset class expectations make sense when taken together. While we have included our beliefs into the processes and the mathematics used to arrive at this point, we must ensure that the collective outputs also coincide with our beliefs. Figure 17 on the following page provides a summary of 1st Global’s capital market expectations. A review of the Expected Return/Risk chart indicates an alignment with the expected risks for each asset class as well as the belief that riskier asset classes should compensate investors with higher expected returns for accepting the higher level of risk. From left to right, asset class risks and returns are in line with our beliefs about the future. Commodities is the only asset class that falls outside of the linear risk and return relationship seen from the other asset classes included in our analysis. This does not represent an error. The exercise of graphing risk and return relationships in this manner allows us to re-evaluate and reconfirm our belief that commodities are included primarily for portfolio-level risk-reduction benefits provided by the asset class’ low correlation to most other asset classes, and not necessarily to enhance portfolio returns.

Portfolio Optimization

Having collected the necessary portfolio analysis inputs, we are able to move to the next step in the asset allocation model development process: portfolio optimization. Portfolio optimization is the computational process of identifying efficient portfolios made up of a specified set of investments given an investor’s expectations of return, risk and the relationships between those investments. The process separates efficient portfolios from inefficient portfolios with the end result of identifying the efficient frontier, which is the optimal set of portfolios that has the highest expected return for each possible level of risk. While portfolio optimization may seem like a strictly mathematical endeavor, it requires a great deal of professional judgment in its application. 1st Global’s Investment Management Research Group had the benefit of working with Dr. Harry Markowitz throughout the optimization process and utilized specialized portfolio optimization software that provided for ongoing statistical analysis of output data. Additionally, 1st Global utilized multiple portfolio optimization methodologies: traditional mean variance optimization (MVO) and resampled mean variance optimization.
Figure 17: 1st Global’s Capital Markets Expectations

<table>
<thead>
<tr>
<th>10-Year Return and Risk Expectations</th>
<th>Expected Return (Arithmetic Average)</th>
<th>Expected Risk (Standard Deviation)</th>
</tr>
</thead>
<tbody>
<tr>
<td>High-Quality Bond</td>
<td>4.05%</td>
<td>6.25%</td>
</tr>
<tr>
<td>Municipal Bond</td>
<td>3.65%</td>
<td>7.42%</td>
</tr>
<tr>
<td>U.S. Large Company Equity</td>
<td>8.56%</td>
<td>21.41%</td>
</tr>
<tr>
<td>U.S. Small Company Equity</td>
<td>10.83%</td>
<td>34.12%</td>
</tr>
<tr>
<td>International Developed Markets Equity</td>
<td>9.01%</td>
<td>23.55%</td>
</tr>
<tr>
<td>International Emerging Markets Equity</td>
<td>12.37%</td>
<td>37.26%</td>
</tr>
<tr>
<td>Real Estate</td>
<td>9.76%</td>
<td>26.78%</td>
</tr>
<tr>
<td>Commodities</td>
<td>5.56%</td>
<td>22.39%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Derived Asset Class Correlations</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>High-Quality Bond</td>
<td>1</td>
<td>0.546</td>
<td>-0.005</td>
<td>0.033</td>
<td>-0.003</td>
<td>-0.059</td>
<td>0.016</td>
<td>0.000</td>
</tr>
<tr>
<td>Municipal Bond</td>
<td>0.546</td>
<td>1</td>
<td>-0.003</td>
<td>0.026</td>
<td>-0.002</td>
<td>-0.042</td>
<td>0.013</td>
<td>0.000</td>
</tr>
<tr>
<td>U.S. Large Company Equity</td>
<td>-0.005</td>
<td>-0.003</td>
<td>1</td>
<td>0.825</td>
<td>0.608</td>
<td>0.659</td>
<td>0.586</td>
<td>0.000</td>
</tr>
<tr>
<td>U.S. Small Company Equity</td>
<td>0.033</td>
<td>0.026</td>
<td>0.825</td>
<td>1</td>
<td>0.501</td>
<td>0.650</td>
<td>0.642</td>
<td>0.000</td>
</tr>
<tr>
<td>International Developed Markets Equity</td>
<td>-0.003</td>
<td>-0.002</td>
<td>0.608</td>
<td>0.659</td>
<td>0.650</td>
<td>0.400</td>
<td>0.471</td>
<td>0.222</td>
</tr>
<tr>
<td>International Emerging Markets Equity</td>
<td>-0.059</td>
<td>-0.042</td>
<td>0.659</td>
<td>0.650</td>
<td>0.400</td>
<td>0.471</td>
<td>0.222</td>
<td>0.000</td>
</tr>
<tr>
<td>Real Estate</td>
<td>0.016</td>
<td>0.013</td>
<td>0.586</td>
<td>0.642</td>
<td>0.356</td>
<td>0.471</td>
<td>1</td>
<td>0.000</td>
</tr>
<tr>
<td>Commodities</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.222</td>
<td>0.000</td>
<td>1</td>
</tr>
</tbody>
</table>

These capital market assumptions/expectations are subject to change. The estimated expected return rates are forward looking projections based on empirical market data and a survey of forecasts from more than 20 financial institutions. While historical information has been used as part of the input to generate standard deviation and correlation assumptions, past performance may not reflect and does not guarantee future performance. Estimated expected return rates should not be construed as projecting or predicting actual returns of any specific investments. The future continues to be uncertain.

33 Estimated Expected Returns, Standard Deviations and Correlations as of July 2010.
Resampled Optimization: Dealing with the Uncertainty of Expectations

“Uncertainty is a consequence of the irrationalities in human nature.”

We began this paper with the fundamental reality that the future is unknown. We then detailed the development of the necessary inputs for mean variance analysis. These efforts resulted in very specific expectations for returns, standard deviations and asset class correlations. However, the unknown is not likely to be so precise. If we accept the notion that the future is uncertain, we must also accept the idea that despite the efforts put forth in deriving expectations, it is unlikely that future outcomes will precisely match those estimates. One way of accounting for the inevitable uncertainty in forward looking expectations is to use a process called resampling. Resampling deals with this uncertainty by incorporating simulated outcomes into the optimization process. These simulations are based on the information provided by our derived asset class assumptions.

While our assumptions may provide very specific information, it should be understood that they define our expectations about the future, on average. Return assumptions express what we expect an asset class to return on average, not necessarily the return we expect in any particular year. Risk assumptions tell us how far, on average, returns can be expected to deviate from the asset class’s expected average return. Correlation expectations then provide the information regarding how asset classes act in relation to one another on average. Resampling uses this information to generate numerous sets of simulated asset class outcomes. Those outcomes are then used to determine asset class inputs (returns, standard deviations and correlations) that are then optimized to generate an efficient frontier specific to each set of outcomes. Conceptually, each simulation can be viewed as one possible outcome. This process is repeated multiple times to generate multiple efficient frontiers. Frontiers generated from the sets of simulated outcomes are then averaged to create a final efficient frontier known as the resampled efficient frontier. The resampled efficient frontier is ultimately the result of incorporating multiple possible outcomes that are all a function of our original asset class expectations.

In the process of generating our final resampled efficient frontier, 1,000 efficient frontiers were generated using 1,000 sets of 60 period (month) simulations for each of the asset classes selected to be included within 1st Global model portfolios. The number of periods simulated can be viewed as a natural parameter for expressing confidence in the accuracy of risk and return estimates. The lower the number of simulated data points, the lower the confidence. While 1st Global’s use of 10-year inputs might indicate the use of 120 simulated periods, we opted for the use of 60-period simulations in the resampling process. This decision is not intended as an expression of confidence in the accuracy of the derived inputs, but rather a method of aligning the resampling process with 1st Global’s policy of reviewing asset allocation inputs annually and formally reviewing models on a five-year interval (or every 60 months). This approach incorporates information about the uncertainty regarding five-year outcomes that is indicated by our asset class expectations.


Portfolio Constraints: Incorporating Judgment

“Judgment (among its other applications) must be used to decide what refinements are worth incorporating into the analysis.”

The portfolio optimization process is more than simply computing the logical results of given asset class inputs. Unconstrained optimization output can provide a mathematically correct solution to the problem posed, but the blind acceptance of the output without assessing its real-world implications for investors is not advisable. Indeed, judgment is a critical component in the optimization process. There are factors that are not incorporated into optimization calculations that must be considered before accepting optimization output as an appropriate course for investing. These factors can include estimation errors, return outliers, investor behavior, client objectives, regulatory limitations and tax implications. Consider, for example, the most aggressive point on an efficient frontier provided by an unconstrained optimizer. This is the point that maximizes expected return. It is also the point of maximum risk. An investor selecting this point would have to be unconcerned with risk and must be willing to accept it at its highest degree. Additionally, this most aggressive point is likely to be made up entirely of the one investment or asset class with the highest return and the highest risk. Using 1st Global’s risk and return expectations, the unconstrained optimizer provided a portfolio made up entirely of emerging market equities for the most aggressive point on the efficient frontier. While this output is mathematically correct, it may not be feasible to consider such a solution. What about the wide swings in portfolio value over time an investor would have to endure? Indeed, such a portfolio would be behaviorally intolerable for most investors. What about U.S. investors who have long-term financial goals that will be funded with U.S. dollars? Is it reasonable or prudent to have all of their assets tied to foreign rates of inflation and currency fluctuations? These questions provide only a few examples of investment considerations that should be incorporated into the evaluation of optimizer output. The portfolio optimizer should never be viewed as a substitute for professional judgment. Ultimately, the optimization process should consider issues beyond those indicated by risk and return. Constraining the optimizer is one way of addressing these issues.

It is in the application of constraints to the optimization process where mathematical logic and professional judgment are combined to create portfolios that may be better suited to investor objectives and behavioral biases. A constraint can be as simple as limiting the amount of an asset class that an optimizer is allowed to incorporate on an absolute basis (e.g., emerging market stocks can be no more than 20 percent of a portfolio). Constraints can be set on a relative basis as well, such as limiting the amount of one or more asset classes relative to the amount of one or more other asset classes (i.e., international stocks should be less than or equal to 40 percent of all stocks held in a portfolio). There is a great deal of flexibility setting constraints for the optimization process. Defining appropriate constraints, however, is a highly iterative and time-consuming process as every constraint has an effect on the makeup of the portfolios within the optimal portfolio set (the efficient frontier). The optimizer provides a specific efficient frontier for each given set of constraints. The application of each constraint requires the careful evaluation of the composition of the entire efficient frontier to understand the specific consequences of constraining the optimizer. Applying constraints can have unintended consequences where addressing one issue presents issues with the composition of other parts of the efficient frontier. Such a situation would require a reassessment of the constraint applied. As such, the process of defining the appropriate set of constraints may require working through several hundred iterations. The identified set of constraints should effectively allow the optimizer the freedom necessary to identify efficient portfolios that also respect the investment considerations guided by judgment. Ideally, this should be achieved with the fewest and least restrictive set of constraints.

Figure 18 on the following page presents the composition of efficient frontiers for each step in the evolution of 1st Global’s model portfolios: unconstrained, constrained with traditional optimization and constrained with resampled optimization. Each chart shows the composition of the portfolios over the possible range of risk indicated by the optimization. A quick review of the unconstrained optimization shows a portfolio set that includes many portfolio mixes having asset class concentrations that would be unpalatable for most investors, including some portfolios that contain absolutely no U.S. equities. The set also demonstrates a much higher degree of risk in the more aggressive portfolios. The exercise of beginning with an unconstrained optimization provides an understanding of the optimizer’s biases given the inputs it has been provided and presents areas where judgment is merited. Developing this understanding is also useful in defining constraints that respect the benefits attainable through optimal diversification.

The final output of the optimization process is the identification of the efficient frontier that is based on our beliefs and convictions about the future and that addresses the needs and concerns incorporated into the analysis. Figure 19 provides the final output for 1st Global’s optimization process and includes both the traditional mean variance efficient frontier and the resampled efficient frontier. A review of the two efficient frontiers provides a basis for comparison of the output of both approaches. The red line is the efficient frontier identified by traditional mean variance optimization. The blue line below it is the efficient frontier identified by the resampled optimization process. At first glance it would appear that traditional MVO is more efficient than resampled MVO. This is not necessarily the case. Both frontiers have provided the optimal set of portfolios for the given inputs. Traditional MVO provided a solution for the specific inputs that we developed. This can be viewed as the one right answer given the specific inputs provided. Resampling provided the solution that incorporated the outcomes of thousands of asset class simulations using the inputs we developed.

While the resampled frontier may seem similar to the traditional frontier, Figure 18 shows that there are some notable differences in the composition of the portfolios. Either frontier provides an appropriate set of portfolios. The difference between the two is that the resampled frontier can be viewed as providing a solution that reflects information uncertainty. That is, traditional MVO uses inputs as if they represented precisely what future outcomes will be, while resampled MVO uses inputs in a way that generalizes possible future outcomes. Relative to the traditional mean variance frontier, the resampled frontier presented only small differences in expected outcomes. As such, 1st Global elected to incorporate resampling into the development of our model portfolios.

---

Figure 18: The Evolution of an Optimization

Frontier Composition Chart - Unconstrained Optimization

Expected Risk (Standard Deviation)

Frontier Composition Chart - Optimization with Constraints

Expected Risk (Standard Deviation)

Frontier Composition Chart - Resampled Optimization

Expected Risk (Standard Deviation)

- High-Quality Fixed Income
- U.S. Large Cap Equities
- U.S. Small Cap Equities
- International Emerging Equities
- International Developed Equities
- Real Estate
- Commodities
Portfolio Selection

The final component of the asset allocation model development process is the selection of portfolios from the optimal set of choices provided by the optimization process. Previously we discussed how an investor examining an efficient frontier could select a portfolio that maximizes his or her preferences for accepting risk using only risk and return as the basis for his or her decision. We now have an efficient frontier from which to select portfolios. Depending on how well investors are able to define their preferences for taking risk in the pursuit of return, the frontier we have identified contains any number of portfolios from which an investor can select. In practice, however, it can be a daunting endeavor for an investor to select from such a broad set of investment options. This process can be simplified by identifying a smaller, but differentiated, set of portfolios on the efficient frontier from which investors can select. It is important that selected portfolios reflect distinct risk and return characteristics as it is on those two factors that investors will base their investment decisions. 1st Global has elected to identify five portfolios to represent five distinct risk profiles from which advisors and clients can select. The portfolios were selected based on judgment regarding portfolio composition (the ratio of equity to fixed income) as well as portfolio risk and return characteristics. The five specific risk profiles are: Ultra Conservative, Conservative, Moderate, Growth and Aggressive Growth.

Once the five portfolios were identified, allocations within portfolios were rounded to five percent increments to allow for ease in implementation. This required a careful analysis of the impact of rounding on each portfolio’s risk and return characteristics. The rounding analysis considered asset-class-specific risk premiums as well as expected portfolio risk to determine portfolio allocations. Ultimately, differences resulting from the rounding process were insignificant, allowing 1st Global to maintain the balance between implementation considerations and intellectual integrity. Figure 20 shows the portfolios selected from the efficient frontier as compared to rounded portfolios.
1st Global’s Asset Allocation Models

We have now progressed through the MPT process of identifying efficient portfolios, beginning with the selection of asset classes, continuing through the development of expectations based on beliefs, to the optimization process, to concluding by identifying a specific set of model portfolios. As Markowitz explains, “The results of a portfolio analysis are no more than the logical consequences of its information concerning securities.” 38 Table 9 provides the logical conclusion of our efforts and provides specific asset class weightings for each of the distinct portfolios.

Table 9: 1st Global’s Model Portfolios

<table>
<thead>
<tr>
<th></th>
<th>Ultra Conservative</th>
<th>Conservative</th>
<th>Moderate</th>
<th>Growth</th>
<th>Aggressive Growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>High-Quality Fixed Income</td>
<td>70%</td>
<td>55%</td>
<td>35%</td>
<td>15%</td>
<td>-</td>
</tr>
<tr>
<td>U.S. Large Company Equity</td>
<td>10%</td>
<td>15%</td>
<td>25%</td>
<td>35%</td>
<td>20%</td>
</tr>
<tr>
<td>U.S. Small Company Equity</td>
<td>-</td>
<td>5%</td>
<td>10%</td>
<td>15%</td>
<td>30%</td>
</tr>
<tr>
<td>International Developed Market Equity</td>
<td>10%</td>
<td>10%</td>
<td>15%</td>
<td>15%</td>
<td>15%</td>
</tr>
<tr>
<td>International Emerging Market Equity</td>
<td>-</td>
<td>5%</td>
<td>5%</td>
<td>10%</td>
<td>20%</td>
</tr>
<tr>
<td>Real Estate</td>
<td>5%</td>
<td>5%</td>
<td>5%</td>
<td>5%</td>
<td>10%</td>
</tr>
<tr>
<td>Commodities</td>
<td>5%</td>
<td>5%</td>
<td>5%</td>
<td>5%</td>
<td>5%</td>
</tr>
<tr>
<td></td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

III. Practice
An Evaluation of 1st Global Model Characteristics

Now that specific model portfolios have been identified, we are able to evaluate the risk and return characteristics of the model portfolios using historical data. Rather than simply reviewing trailing time period returns, we believe it is more useful to understand the characteristics of the portfolios over rolling five-year holding periods. This approach avoids the endpoint bias that is often misleading with trailing statistics. It also provides a sense for how portfolios acted in different market environments. We believe that a five-year holding period is a suitable time frame for evaluation purposes as it matches 1st Global’s asset allocation review policy, provides adequate time for asset classes to demonstrate their diversification characteristics and represents a reasonable time period for investors to evaluate portfolios in practice.

The analysis used as much historical data as was available. The inclusion of emerging markets in portfolios meant that we would be limited to data beginning in January 1988, the inception date of the MSCI Emerging Markets Index. This is the shortest data series within our model portfolios. Additionally, we assumed that portfolios were rebalanced annually on calendar year-end. Transaction costs were not incorporated. Beginning January 1988, five-year (60-month) periods were identified by moving forward monthly. Each month began a new 60-month holding period. In all, there were 213 five-year portfolio holding periods within the available data set. Five-year risk and return was calculated for each period available. Holding period risk and returns for asset classes included in model portfolios were also calculated.

We first evaluated the risk characteristics of our five model portfolios to determine if they exhibited distinct risk profiles over different time periods. Figure 21 shows that portfolios demonstrated risk that was commensurate with the degree of equity risk within each of the models. Furthermore, portfolios maintained distinct risk characteristics that remained scaled according to risk profile over all of the time periods evaluated.

*Figure 21: Rolling Five-Year Holding Period Risk for 1st Global Model Portfolios (213 Five-Year Holding Periods Between January 1988-August 2010)*

Past performance does not guarantee future results.
Table 10 provides summary information for model portfolio five-year return outcomes. The portfolio return outcomes show that model portfolios provided, on average, returns that were scaled according to risk profiles. More aggressive portfolios achieved higher five-year returns, on average, than more conservative portfolios. The range of return outcomes (the difference between highest and lowest) demonstrated by different portfolio models matched expectations in that outcomes were narrower for more conservative portfolios and wider for more aggressive portfolios. This difference in the variability of portfolio outcomes illustrates what risk, in terms of standard deviation, can mean to investors. As investors select more aggressive portfolios, investment outcomes become less predictable. Another element of portfolio risk that is important to investors is the possibility of experiencing negative returns. Characteristics between model portfolios also showed that outcomes matched risk profiles. More aggressive portfolios demonstrated a greater likelihood of experiencing a negative five-year return than more conservative portfolios.

Table 10: Summary of Annualized Rolling Five-Year Holding Period Returns for 1st Global Model Portfolios (213 Five-Year Holding Periods Between January 1988-August 2010)

<table>
<thead>
<tr>
<th></th>
<th>Ultra Conservative</th>
<th>Conservative</th>
<th>Moderate</th>
<th>Growth</th>
<th>Aggressive Growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highest Return</td>
<td>12.15%</td>
<td>13.29%</td>
<td>15.08%</td>
<td>18.57%</td>
<td>24.05%</td>
</tr>
<tr>
<td>Lowest Return</td>
<td>2.28%</td>
<td>1.38%</td>
<td>-0.74%</td>
<td>-2.81%</td>
<td>-4.28%</td>
</tr>
<tr>
<td>Average Return</td>
<td>7.98%</td>
<td>8.86%</td>
<td>9.45%</td>
<td>10.29%</td>
<td>11.44%</td>
</tr>
<tr>
<td>Average Volatility</td>
<td>4.83%</td>
<td>6.52%</td>
<td>9.10%</td>
<td>12.28%</td>
<td>15.86%</td>
</tr>
<tr>
<td># of Positive Returns</td>
<td>213</td>
<td>213</td>
<td>212</td>
<td>210</td>
<td>208</td>
</tr>
<tr>
<td># of Negative Returns</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>3</td>
<td>5</td>
</tr>
</tbody>
</table>

Past performance does not guarantee future results.

Table 11 provides summary information of five-year return outcomes for the asset classes included in 1st Global’s model portfolios. A comparison of five-year return outcomes for model portfolios and the asset classes that make up those portfolios provides some very pertinent information regarding the benefits of efficient diversification, specifically in terms of experiencing negative returns. These outcomes show that asset classes experienced negative returns much more frequently than model portfolios.

Table 11: Summary of Annualized Rolling Five-Year Holding Period Returns for Selected Asset Classes (213 Five-Year Holding Periods Between January 1988-August 2010)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Highest Return</td>
<td>11.87%</td>
<td>28.55%</td>
<td>25.02%</td>
<td>24.05%</td>
<td>40.31%</td>
<td>25.16%</td>
<td>21.30%</td>
</tr>
<tr>
<td>Lowest Return</td>
<td>3.48%</td>
<td>-6.64%</td>
<td>-8.89%</td>
<td>-6.86%</td>
<td>-10.19%</td>
<td>-8.64%</td>
<td>-11.67%</td>
</tr>
<tr>
<td>Average Return</td>
<td>7.10%</td>
<td>10.07%</td>
<td>12.74%</td>
<td>6.40%</td>
<td>11.96%</td>
<td>12.07%</td>
<td>6.79%</td>
</tr>
<tr>
<td>Average Volatility</td>
<td>4.07%</td>
<td>15.19%</td>
<td>22.05%</td>
<td>17.06%</td>
<td>26.07%</td>
<td>16.68%</td>
<td>21.56%</td>
</tr>
<tr>
<td># of Positive Returns</td>
<td>213</td>
<td>168</td>
<td>197</td>
<td>185</td>
<td>163</td>
<td>203</td>
<td>170</td>
</tr>
<tr>
<td># of Negative Returns</td>
<td>0</td>
<td>45</td>
<td>16</td>
<td>28</td>
<td>50</td>
<td>10</td>
<td>43</td>
</tr>
</tbody>
</table>

Past performance does not guarantee future results.
This illustrates a key point that investors should understand. Holding efficiently diversified portfolios does not mean that the individual parts of the portfolio are less likely to experience a loss. Indeed, the summary data shows that the asset classes that make up 1st Global’s model portfolios do experience losses. It is only when these asset classes are taken together, as a portfolio, that diversification benefits become evident. This makes clear that investors should approach ongoing portfolio reviews with the idea of focusing primarily on the portfolio as a whole rather than the individual components that make up the portfolio which will experience losses from time to time. It is often in the efforts to move away from these losses that investors deviate from efficient implementation by shifting assets to areas that performed well in the recent past. This can increase portfolio risk by reducing the diversification benefits provided by investments that were intended to perform differently than others in the portfolio. Investors lose long-term portfolio benefits not only through the reduction in portfolio efficiency, but also through the practice of selling low and buying high.

A final view of the results of our analysis provides additional insights as to the benefits of efficiently diversified portfolios. Figure 22 provides a graphical summary of the average five-year risk and return outcomes for model portfolios and the asset classes included in 1st Global’s model portfolios. What is evident from this chart is that model portfolios, on average, provided returns commensurate with their equity allocations at risk levels below many of the equity asset classes included in the portfolios.

![Figure 22: Average of Annualized Five-Year Holding Period Risk and Return for 1st Global Model Portfolios and Selected Asset Classes](image)

Past performance is no guarantee of future results. The chart above is for informational purposes only and does not predict the future performance of any investment. The results indicated above were calculated by means of the retroactive application of the static blend of asset class indexes indicated by each of 1st Global’s model portfolios rebalanced annually at calendar year end. The information compiled cannot be considered as an indication of the investment ability of 1st Global Advisors, Inc. and does not result from actual investment decisions by the firm. The investment results of 1st Global Advisors, Inc. clients may be materially different from the results portrayed in the models. THESE RESULTS ARE NOT THE ACTUAL PERFORMANCE FIGURES FOR ANY OF THE FIRM’S CLIENTS, AND IT SHOULD NOT BE ASSUMED THAT RECOMMENDATIONS MADE IN THE FUTURE WILL BE PROFITABLE. The above figures do not take tax effects into consideration. These results do not represent actual trading and do not reflect the impact that material economic and market factors might have had on the firm’s decision-making if the firm were managing a client’s money. The client’s own objectives, risk tolerance and financial circumstances may change over time, causing a change in the investment allocation that is used to manage that particular client’s portfolio. Each of the allocation models above represents one possible asset allocation strategy, and other strategies may have performed better or worse than the above portfolios over the same time period.
This analysis allows for a better understanding of the risk and return characteristics of 1st Global’s model portfolios. In the context of historical return data, model portfolios corresponding to specific risk profiles provided distinct risk and return characteristics that were maintained through multiple five-year holding periods that included a variety of market environments. Additionally, it has served to illustrate some key risk concepts, set investor expectations for portfolio constituents and highlight the benefits of efficiently diversified portfolios.

**Implementing Efficient Portfolios**

We have discussed the theoretical foundations of MPT, walked through the development of efficient portfolios and presented the benefits of efficient diversification through our analysis of the risk and return characteristics of 1st Global’s model portfolios. However, this was all accomplished using market indexes as representations of asset classes. For these portfolio concepts to be useful, practitioners must use real-world investments. Indeed, the challenge of applying MPT to real-world situations that have very real implications on long-term investment outcomes falls squarely on the shoulders of the practitioner. Even within the guidance provided by portfolio models, it is not an endeavor that should be taken lightly. The proper translation of theory throughout the process of implementing portfolios using real-world investments is central to achieving the maximum benefits from MPT.

The implementation of efficient portfolios can be approached one of two ways:

1. Using actual investments in the process of identifying an appropriate and efficient portfolio; or
2. Using market indexes as proxies for portfolio components, then implementing with actual investments.

There are pros and cons to each approach. The use of actual investments in developing efficient portfolios approaches efficiency from the perspective of its real-world applicability. Investors begin with a set of investments and work through the process of identifying the optimal mix of those investments. This approach presents investors with the problem of having limited information with which to form expectations for risk, return and the relationships between portfolio components. Additionally, the approach produces portfolios specific to the investments used in the analysis. If any single investment within a portfolio is changed, added or removed, a new analysis must be completed. Both of these aspects can be especially problematic when incorporating actively managed investments.

The practice of using market indexes to develop portfolios, which is the approach utilized by 1st Global, has the benefit of being able to incorporate a much greater amount of information in forming expectations for risk, return and relationships between portfolio components. Each asset class incorporated in the portfolios is represented by a market index that provides information about the specific asset class extending back as far as the index’s inception. Our model development process, for example, incorporates data extending back to 1926. This is much farther back than the expected natural life of any portfolio manager that might be included in a portfolio analysis and can provide an informational advantage in forming beliefs.

Unfortunately, investors cannot invest directly in market indexes. Instead, investors must choose investments that are representative of the market indexes used in the analysis. As such, this approach provides flexibility in the implementation of portfolios as investors can select from a number of investment options to implement portfolios in practice. This flexibility, however, presents considerable risk in the translation of theoretically efficient portfolios to efficient real-world investable portfolios. Proper implementation is critical to achieving the efficiency indicated by optimal portfolios made up of market indexes. Indeed, many of the criticisms that MPT receives when markets are
volatile are not a result of a failure of the theory, but rather indicate a failure in the implementation of the theory by practitioners who do not completely grasp the foundational concepts of portfolio efficiency.

Investors have many options available to them for implementing portfolios. For our discussion we will focus on two broad categories of investments that makeup the investment universe: passive investments and active investments. An investment is considered passive if its only objective is to replicate the return of a specific market index. Passive investments are expected to allow investors to achieve the returns available to them through participation in a particular segment of the market. For example, an investor choosing to invest in an S&P 500 Index fund has no expectations for that investment beyond achieving the return of the S&P 500 Index less any costs associated with the fund. Passive investments provide one of the lowest-cost approaches to achieving market-like returns. Some of the most common passive investments in use today are ETFs. These funds provide an inexpensive and tax-efficient way for investors to achieve market returns. This makes ETFs an excellent way of implementing efficient portfolios because they exhibit risk and return characteristics that are nearly identical to the indexes they are designed to track.

Active investments can be broadly defined as investments or strategies that seek to provide returns in excess of a specified market index or benchmark. The expectation of excess returns is based on the belief that a skilled investment manager, applying a particular strategy or actively selecting specific investments, can outperform an index. These types of investments are most commonly mutual funds that allow convenient access to professional money management. Investors are attracted to active investments because they offer the possibility of achieving returns greater than those provided by a passive investment. However, active investments should be considered carefully as the addition of management fees (portfolio managers expect to be compensated) and the impact of the tax consequences of trading portfolios frequently present formidable performance hurdles for active managers. Furthermore, these additional costs exist even when the investment is not performing as expected.

In the context of implementing efficient portfolios, the lure of higher returns promised by active strategies presents a dilemma for investors. An investment seeking to provide returns that are different or, more specifically, greater than those of a specified index, must necessarily be different than the index. The difference will be evident not only in terms of the active investment’s returns but also in its risk characteristics and its relationship to other investments in a portfolio. The degree to which an active mutual fund is dissimilar from a specified index is a function of the strategy being employed by the fund’s management. It is in the dislocation between funds and indexes that the gap between theory and practice begins to appear. The greater the difference between an investment strategy and its representative index, the wider this gap is likely to become. It is in this aspect of active management that many investors unwittingly diminish or even negate the benefits of portfolio efficiency. As we have detailed in this paper, a great deal of effort has gone into understanding the characteristics of the asset classes included in 1st Global’s portfolio models and in developing our expectations for risk, return and relationships between asset classes. These all play a significant role in determining portfolio efficiency. When choosing to implement portfolios with active investments, it is important that the investments selected have characteristics similar to those of the index they are intended to represent.

A common mistake investors make in selecting funds with which to implement efficient portfolios is to focus only on seeking the best-performing fund within each specific asset class without understanding the risks that are also a part of achieving the fund’s returns. How many investors fared in 2008, when equity markets experienced a significant drop, provides an excellent example of this. Many investors seeking the best-performing fixed income funds to implement the fixed income component of their asset allocation models discovered that much of the excess returns they had enjoyed previous to 2008 came as a result of their fixed income fund selection being exposed to riskier,
lower-quality segments of the fixed income markets. As the markets fell, the fixed income component of their portfolios that was supposed to provide an offset to their equity investments also fell. Many high-quality fixed income funds that had posted more subdued returns than their best-performing peers previous to 2008 provided positive returns as markets fell and served as an important portfolio diversifier. Many of the best-performing fixed income funds had achieved returns in excess of their high-quality fixed income benchmark by being different. In this case the difference was the additional risk they had taken on. While not evident when the markets were doing well, the risks became all too clear when both the markets and riskier fixed income investments fell. Investors focused only on achieving the highest returns may fail to recognize the additional risks they are taking. Unfortunately, poor implementation can have the effect of magnifying these additional risks in that it can also nullify much of the efficiency benefits inherent in optimal portfolios.

This fixed income example illustrates that investment characteristics play a crucial role in proper implementation of asset allocated portfolios. It should not, however, dissuade investors from also focusing on returns provided by active strategies. Returns are also an important aspect of achieving efficiency. While active investments may provide the opportunity for higher returns than their stated benchmark, underperforming active strategies can cause investors to miss out on market returns. Active investments can lag their stated benchmark for a variety of reasons, including high costs, inappropriate benchmark representation or even poor manager investment decisions. Regardless, an investment that persistently underperforms the objective of meeting or exceeding the returns of the index it is intended to represent should be scrutinized carefully.

Selecting appropriate active investments to populate a portfolio model can be a complicated endeavor requiring a great deal of time and effort. The incorporation of active investments also requires that investors monitor the active strategies over time to ensure that they continue to be representative of the index to which they are benchmarked in terms of both returns and risk. Our companion white paper titled “The 1st Global Investment Manager Due Diligence Process” provides insight as to the intellectual rigor and institutional processes that 1st Global utilizes to deliver investment managers and products for use within its discretionary model portfolios. 1st Global’s due diligence process provides the foundation for a disciplined investment management framework that utilizes both active investment managers and ETFs to directly implement 1st Global’s investment philosophy.

Proper portfolio implementation can provide investors the opportunity of achieving the highest returns available to them within their tolerance for risk. Improper implementation can revert the portfolio management process to the methods practiced before the introduction of MPT, which included haphazard deliberations, improvised strategies, intuition and even hunches. These methods do not provide a solid foundation for achieving financial goals that have very real implications for investors.

## Maintaining Portfolio Efficiency Through Time

A portfolio achieves the greatest diversification benefits by incorporating assets that exhibit low correlations and portfolio efficiency is achieved by diversifying those assets in the right proportions. This tells us that the assets that make up a portfolio are important, but also that the amount of each asset within the portfolio is what actually defines efficiency for a portfolio intended to demonstrate a specific risk profile. The inclusion of assets that exhibit low correlations within portfolios indicates that those assets are expected to provide their returns at different times. This also means that as a portfolio grows over time, the amount in each of the assets that make up the portfolio will deviate from its optimal weighting. We have explained how critical proper implementation is to establishing portfolio efficiency in that it provides a starting point that matches an investor’s tolerance for risk at the time the investment is...
made. But what about the effects over time of having purposefully selected investments that act differently from one another? We should expect the composition of the portfolio to change over time, which also means that we should expect the portfolio’s risk to also change. So, how do we keep our portfolio from losing efficiency over time, or even worse, presenting investors with risk that is beyond their ability to tolerate? This can be accomplished by incorporating a rebalancing methodology to the portfolio.

Rebalancing is the process of realigning a portfolio back to the indicated optimal portfolio weighting, and plays a central role in the portfolio management process. How frequently portfolios are rebalanced depends on the methodology an investor selects and should consider a number of factors including trading costs and taxes. A common practice is to set specific calendar intervals for rebalancing (i.e., monthly, quarterly or annually). This approach adds discipline to the investment process and also aligns investor expectations with trading activity. Another approach is to rebalance portfolios based on a specified absolute tolerance for portfolio deviations. This is generally done at the asset class level, meaning that if an asset class’ weighting in a portfolio deviates by more than a specified tolerance (say five percent) or decreases by the same tolerance, a portfolio rebalancing is triggered. For example, a portfolio is implemented with an optimal weighting in High-quality fixed income of 35 percent and an absolute rebalancing tolerance of five percent. Consider a scenario in which equity markets fall and high-quality fixed income increases in value. Fixed income becomes a larger portion of the portfolio not only because fixed income increased in value, but also because equities became a smaller part of the portfolio. At the point when fixed income becomes greater than 40 percent (35 percent + 5 percent), the portfolio is rebalanced with the result of selling fixed income and buying equities to get the portfolio back in line with its optimal weighting. Rebalancing with a specified tolerance has the benefit of limiting trading activity to times when rebalancing is clearly indicated.

Figure 23 on the following page illustrates a hypothetical investment in 1st Global’s Moderate portfolio model from January 1988 to August 2010 under two rebalancing scenarios: no rebalancing, and rebalancing annually at calendar year end. The composition of both portfolios over time is shown for comparison. In the portfolio that was not rebalanced, we can see wide deviations in asset class weightings, while the rebalanced portfolio shows asset class weightings more consistently in line with optimal portfolio weights.

Gaining an understanding of the differences in portfolio composition over time is one thing, but understanding its effects on portfolio efficiency is another. We previously described portfolio efficiency as being able to achieve the highest amount of return for a given amount of risk. Looking at the two portfolios in Figure 23, both began with the intention of providing investors with a moderate exposure to risk. One portfolio drifted with the changes in the capital markets while the other maintained its optimal weightings through rebalancing. How did each fare in terms of their efficiency?

A quick measure of efficiency is to determine how much return was achieved for the amount of risk taken. Each portfolio’s efficiency can be evaluated through a portfolio return-to-risk ratio, which can be calculated by taking each portfolio’s return and dividing it by its standard deviation, which is our defined measure of risk. The greater the ratio value, the greater the efficiency demonstrated by the portfolio. Figure 24 provides this analysis and illustrates the effects of changes in portfolio composition on portfolio efficiency over five-year rolling time periods for the two portfolios. Trading costs are incorporated in the analysis.

---

41 The analysis assumes a portfolio starting value of $100,000 and 14 trades per rebalance at $15.00 per trade. This represents a sale and a purchase for each of the seven asset classes included in 1st Global’s portfolio models at every rebalance. Actual rebalancing may incur greater or fewer trades depending on portfolio implementation and portfolio weights at each rebalance.
Figure 23: Historical Portfolio Composition Comparison of Rebalanced and Unrebalanced Portfolios

Unrebalanced Portfolio

Rebalanced Portfolio

Past performance does not guarantee future results.
The results of this analysis show that over the 216 rolling five-year time periods shown, the rebalanced portfolio was more efficient in 192 of those time periods. Put another way, the rebalanced portfolio provided greater rewards for the risk taken in over 90 percent of the instances even with trading costs taken into consideration.

Figure 25 provides a comparison of the risk experienced by both portfolios over time and shows that the rebalanced portfolio consistently exhibited a lower degree of risk. In fact, the unrebalanced portfolio at times would have exposed an investor to over 25 percent greater risk than the rebalanced portfolio. An investor willing to accept this degree of risk might be better served by an investment in a more aggressive portfolio that incorporates rebalancing. While the results above focused on 1st Global’s Moderate portfolio model, these analyses were also conducted on the remaining four 1st Global model portfolios with equally compelling results.
The significant impact that rebalancing can have on portfolio outcomes is remarkable. A distinction, however, must be made between implementing automated methodologies such as those described above and a strategy that relies on an investor to direct portfolio rebalancing intermittently. Such a manual approach introduces behavioral risk to the rebalancing process as it forces investors to act against the crowd. \textsuperscript{42} Rebalancing, by definition, requires the sale of portfolio assets that have performed well to purchase assets that have performed poorly. This can seem counterintuitive, especially in times of severe market stress when fear can paralyze investors and keep them from directing a portfolio to rebalance. An automated approach eliminates the influence of emotions and incorporates a disciplined “buy low, sell high” strategy to the portfolio management process.

Regardless of the methodology selected, rebalancing portfolios is one of the most critical components in the process of managing efficient portfolios over time. Investors failing to rebalance their portfolios expose themselves not only to the future uncertainty of the capital markets, but also to the failure of meeting expectations for risk and return established at the onset of the investment process. The dynamics of the capital markets will inevitably change the composition of portfolios over time. It is unreasonable for investors to expect a portfolio to demonstrate specific risk and return characteristics without establishing a method to address those changes.

**Conclusion**

1st Global continues its commitment to providing sound investment guidance firmly based on rigorous academic and intellectual standards. This commitment is demonstrated in our efforts to continuously improve the tools and resources that enable clients to honor the important promises they make. 1st Global’s model portfolios represent but one of these resources. The importance of these models as the cornerstone of our clients’ long-term financial goals lead us to our work with Dr. Harry Markowitz, the “Father of MPT.” Beyond merely providing a set of portfolios, we have sought to share the philosophical, mathematical and practical concepts that are the foundation of MPT so that investors can make the best use of them in practice.

This paper provides documentation of our efforts in developing 1st Global’s model portfolios, as well as the intensely deliberate application of discipline and process to every variable, for every efficient portfolio, which all represent our convictions about the future and our deeply held beliefs about investing. We have shared the details for every part of the development of 1st Global’s model portfolios from the fundamental concepts of portfolio theory to the contributions provided by selected asset classes, to portfolio optimization, to portfolio implementation and finally to maintaining portfolio efficiency over time. Wherever possible, we have also focused on providing empirical support for our beliefs. More so than providing a basis for confidence in a very deliberate application of the MPT process, this detail has been provided as a resource to serve as an anchor for the convictions of investors who must face an uncertain future in the achievement of their financial goals. Diversification is the admission that we do not know the future. Seeking portfolio efficiency is the practice of making the best use of what we do know in the context of our convictions about how the world works.

Disclosures

Higher-Yielding/Lower-Rated Corporate Bonds: These bonds, more commonly known as junk bonds, have a greater risk of price fluctuation and loss of principal and income than U.S. government securities such as U.S. Treasury bonds and bills, which offer a government guarantee of repayment of principal and interest if held to maturity.

Microcap, Small-Cap and Mid-Cap Equities: Investing in micro, small or mid-sized companies may involve risks not associated with investing in more established companies. Since equity securities of smaller companies may not be traded as often as equity securities of larger, more established companies, it may be difficult or impossible for the fund to sell.

International Equities: International investing presents certain risks not associated with investing solely in the United States. These include, for instance, risks relating to fluctuations in the value of the U.S. dollar relative to the values of other currencies, custody arrangements made for foreign holdings, political risks, differences in accounting procedures and the lesser degree of public information required to be provided by non-U.S. companies.

Emerging Markets Equities: Investing in emerging markets involves greater risk than investing in more established markets. Such risks include exchange rate changes, political and economic upheaval, the relative lack of information about these companies, relatively low market liquidity, and the potential lack of strict financial and accounting controls and standards.

The returns of the actual investments selected as part of your portfolio will vary. Before investing in any mutual fund, investors should carefully consider a fund’s investment objectives, risks, charges and expenses. Fund prospectuses contain this and other information about the funds and may be obtained from your financial advisor.

The Barclays Capital U.S. Aggregate Bond Index is a broad-based fixed income securities benchmark. The index covers the U.S. investment-grade fixed-rate bond market, including components for U.S. Treasuries, government-related securities, corporate securities, residential mortgage pass-through securities, commercial mortgage-backed securities and asset-backed securities.

The S&P 500® Index is a free-float market capitalization index of 500 large publicly held U.S.-based companies, capturing 75 percent coverage of U.S. equities. It is often used as a proxy for the American stock market.

The Ibbotson Associates Small Company Stock Index is made up of the smallest 20 percent of capitalization of publicly traded stocks within the NYSE universe.

The MSCI EAFE (Europe, Australasia, Far East) Index is a free float-adjusted market capitalization index that is designed to measure the equity market performance of developed markets, excluding the US and Canada. As of May 27, 2010, the MSCI EAFE Index consisted of the following 22 developed market country indices: Australia, Austria, Belgium, Denmark, Finland, France, Germany, Greece, Hong Kong, Ireland, Israel, Italy, Japan, the Netherlands, New Zealand, Norway, Portugal, Singapore, Spain, Sweden, Switzerland and the United Kingdom.

The MSCI Emerging Markets (EM) Index is a free float-adjusted market capitalization index that is designed to measure equity market performance of emerging markets. As of May 27, 2010, the MSCI Emerging Markets Index consisted of the following 21 emerging market country indices: Brazil, Chile, China, Colombia, Czech Republic, Egypt,
Hungary, India, Indonesia, Korea, Malaysia, Mexico, Morocco, Peru, Philippines, Poland, Russia, South Africa, Taiwan, Thailand and Turkey.

The FTSE NAREIT Equity REITs Index includes all equity REITs trading on the NYSE Euronext and the NASDAQ OMX. Equity REITs are defined as those firms that own, manage and lease investment-grade commercial real estate. Specifically, a company is classified as an equity REIT if 75 percent or more of its gross invested book assets is invested in real property.

The S&P GSCI® is a world-production weighted index based on the average quantity of production of each commodity in the index over the last five years of available data. It provides investors with a reliable and publicly available benchmark for investment performance in the commodity markets and is comprised of the principal physical commodities that are the subject of active, liquid futures markets.

S&P 500® and S&P GSCI® are registered trademarks of Standard & Poor’s Financial Services LLC.

The indexes illustrated in this paper are unmanaged indexes of common stocks, bonds or other securities. The volatility of the indexes may be materially different from the individual performance attained by a specific investor. In addition, an investor’s holdings may differ significantly from the securities that comprise the indexes.

It is not possible to invest directly in an unmanaged index.

©2010 1st Global Advisors, Inc.