

BETA, Risk and Mutual Funds

(all you ever wanted to know about Beta but were afraid to ask)

Joe Killoran, the well-known Investor Advocate, is a strong believer in Investor Education. The quote below, which he sent me, is the basis on which this paper is written.

"My experience is that individual investors -- to paraphrase an old and tired cliché -- have little interest in learning how to fish and are most interested in having fish served to them perfectly deboned."

--Laszlo Birinyi Jr., Forbes Magazine, page 331, July 15, 1996

Introduction

From time to time we hear the term "Beta" on ROBTv, CNBC, in fund literature and in the press. What exactly is it and how can it be helpful in decision-making? Simply put Beta (designated by the Greek letter β) is the sensitivity of a fund's pre-tax returns to the returns on some market index benchmark (e.g., S&P 500). **Benchmarks are a reasonable but imperfect surrogate for the general movements in the economy, sector or asset class which are not otherwise available on a day-to-day basis.** Remember when Nortel was 28 % of the TSE 300? (See Appendix I) Note that not all fund managers choose the most appropriate benchmark, sometimes perhaps setting a lower standard (the S&P 500 is only one of dozens of available benchmarks). The role of the active portfolio manager is to manage the fund in accordance with the fund mandate (Objective) defined in the Prospectus. His/her goal is to provide unitholders with positive superior returns compared to a pre-defined relevant benchmark, other similar funds and what a reasonably informed investor could do on their own. Here is where the idea of risk gets important. Rational investors want the highest returns for the least risk and the minimum risk for any level of expected return. (For non-registered accounts, fund portfolio turnover and taxation is another issue)

A Word about Risk

"Risk is a most slippery and elusive concept. It's hard for investors, -let alone economists-to agree on a precise definition. The American Heritage Dictionary defines risk as the possibility of harm or loss.... Once academics accepted the idea that risk for investors, is related to the chance of disappointment in achieving a expected security returns, a natural measure suggested itself-the probable variability or dispersion of future returns. Thus, financial risk has generally been defined as the variance or standard deviation of returns....."

-Burton G. Malkiel (A Random Walk Down Wall Street)

Every investment involves risk, and it's important to determine how much risk is appropriate for any fund that you are considering. Risk means making less than your planned return or even losing capital. Research by behavioral economists suggests that most people feel twice the pain over a financial loss as they do pleasure in an equivalent gain.

Although not exactly ideal, the standard deviation (dispersion around the mean return) is generally accepted as a measure of risk. Unlike the standard deviation, Beta measures the volatility of a fund relative to a benchmark index. Funds of the same type can have significantly different levels of risks. For example, funds that put in the best performances throughout the bull market of the 1990s, such as technology and Internet sector funds, usually are ranked very low in terms of risk-adjusted performance. Put another way, investors were exposed to an extreme level of volatility in return for those stellar returns. Fund-rating services such as Morningstar and Value Line rank risk in terms of Beta, a measurement of how volatile a fund is in comparison to a benchmark market indicator, such as the Standard & Poor's 500-stock index. A fund with a Beta of higher than 1.0 (1.0 = the benchmark index) would be expected to outperform the market, while one below that figure would likely underperform. But a Beta of greater than 1.0 also means the fund is volatile. In bear markets, the value of these funds may fall much more than the major market indexes.

Beta, a component of Modern Portfolio Theory statistics, is a measure of a fund's sensitivity to market movements. It measures the relationship between a fund's excess return over T-bills and the excess return of the benchmark index. Betas are typically, but not always, calculated over the last 36 months. A broad-based index for the U.K. economy is the Financial Times all share index. In the U.S., equity funds are typically compared with the S&P 500 index; bond funds are compared with the Lehman Brothers Aggregate Bond index. Canadian equity fund Betas are typically calculated relative to the TSX/S&P family of indexes and Canadian bond fund Betas are typically calculated relative to the Scotia Capital Markets Universal bond index.

By definition, the Beta of the market benchmark (in this case, an index) is 1.00. Accordingly, a fund with a 1.10 Beta has performed 10% better than its benchmark index--after deducting the T-bill rate--than the index in up markets and 10% worse in down markets, assuming all other factors remain constant. Conversely, a Beta of 0.85 indicates that the fund has performed 15% worse than the index in up markets and 15% better in down markets. The Beta calculation involves a bit of math, but the resulting number is very easy to understand.

Beta is only indicative for funds with a relatively high correlation with the index. In other words, the higher R-Squared is, the more relevant the fund's Beta. (See Appendix II)

The Beta Calculation Process

Here is an example showing the inner details of the Beta calculation process:

Suppose we collected end-of-the-month prices and any dividends for a stock and the S&P/TSX index for 36 months (0..36). We need $n + 1$ price observations to calculate n holding period returns, so since we would like to index the returns as 1...36, the prices are indexed 0.... 36. Also, professional Beta services use monthly data over a 36-month period.

Now, calculate monthly holding period returns using the prices and dividends. For example, the return for month 2 will be calculated as:

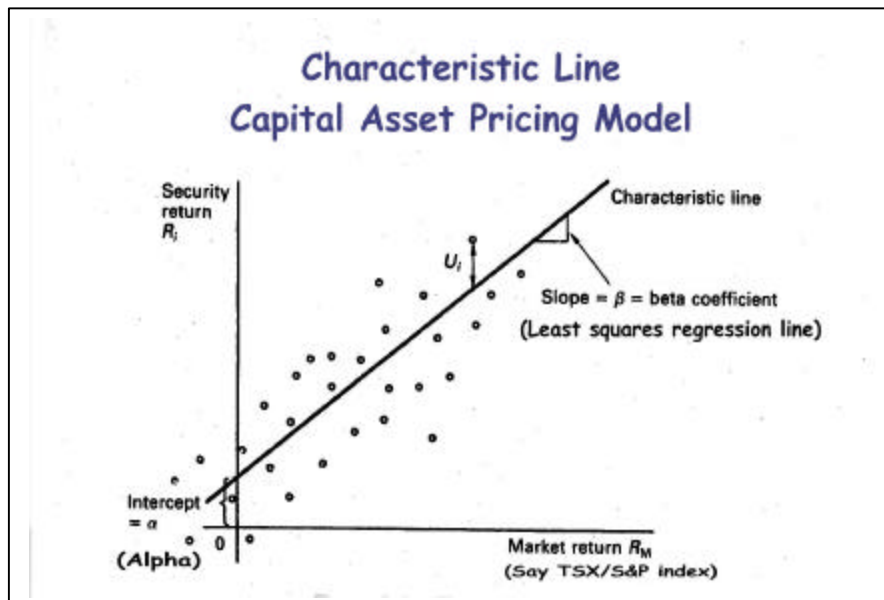
$$r_2 = (p_2 - p_1 + d_2) / p_1$$

Here r denotes return, p denotes price, and d denotes dividend. The following table of monthly data may help in visualizing the process. (Monthly data is preferred in the profession because investors' horizons are said to be monthly.)

<u>Nr.</u>	<u>Date</u>	<u>Price</u>	<u>Div. (*)</u>	<u>Return</u>
0	12/31/86	45.20	0.00	--
1	01/31/87	47.00	0.00	0.0398
2	02/28/87	46.75	0.30	0.0011
...
35	11/30/91	46.75	0.30	0.0011
36	12/31/91	48.00	0.00	0.0267

(*) Dividend refers to the dividend paid during the period. They are assumed to be paid on the date. For example, the dividend of 0.30 could have been paid between 02/01/87 and 02/28/87, but is assumed to be paid on 02/28/87.

So now, we'll have a series of 36 returns on the security and the index (1....36). Plot the returns on a graph and fit the best-fit line (using the least squares regression curve fitting process):

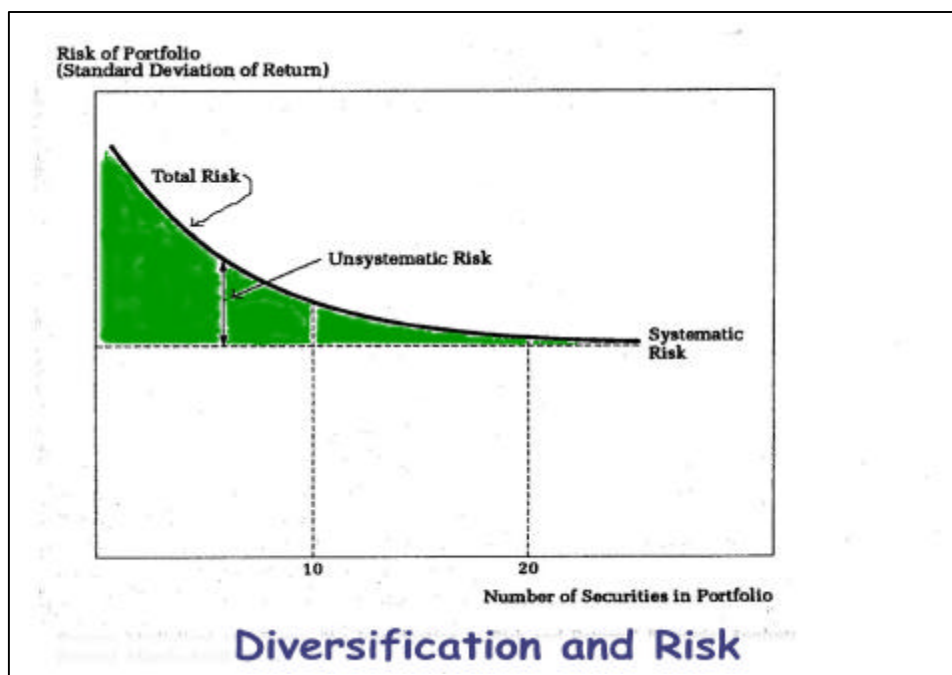


Modern Portfolio Theory-the underpinning

This section gives the theoretical basis for Beta, a necessary prerequisite for the intelligent use of Beta.

Modern Portfolio Theory (MPT) [pronounced as ‘empty’, an unfortunate choice of acronym!], developed in the 1950’s by Nobel laureate Harry Markowitz says investors should pay more attention to getting their asset allocation right for the desired level of risk, leaving market timing and individual security selection as secondary considerations. His great contribution to portfolio management was his demonstration that anything less than perfect positive correlation can potentially reduce risk. It is not necessary to have negative correlation to achieve the risk reduction benefits of diversification. MPT concentrates at least as much on risk as return.

Risk is composed of systematic (market risk) and unsystematic risk (company-specific). Systematic risk includes currency risks, inflation risks, foreign investment risk, political and regulatory risks, interest rate risk, economic risks, and lately terrorist risk. Even bad weather risk can affect certain market sectors such as retailers, agriculture, forest products, insurance, airlines and tourism. Systematic risk *cannot* be eliminated by diversification within a given market. Systematic risk captures the reaction of individual stocks or portfolios to general market swings.



Some stocks and portfolios tend to be very sensitive to market movements. Others are more stable. This relative volatility or sensitivity to market moves can be estimated on the basis of the past record, and is popularly denoted by *Beta*. Beta is the numerical description of systematic risk. Despite the mathematical manipulations involved, the basic idea behind the Beta measurement is one of putting some precise numbers on the subjective feelings money managers have had for years. Beta is essentially a comparison between the movements of individual stocks (or portfolios) and the movements of the market as a whole. Professionals often call high- Beta stocks *aggressive* investments and label low- Beta stocks as *defensive* investments. The Beta of a portfolio is the weighted average of the Betas of individual securities making up the portfolio.

Modern Portfolio Theory says that the total risk of each individual security is irrelevant. It is only the systematic component that counts as far as extra rewards go. Because stocks (30 or more at least) can be combined in portfolios to eliminate or reduce specific (unsystematic) risk, only the undiversifiable or systematic risks will command a risk premium. Investors will not get rewarded for bearing risks that can be diversified away. This is the basic logic behind the Capital Asset Pricing Model (CAPM), which itself is a very simplified model. The logic behind it is as follows:

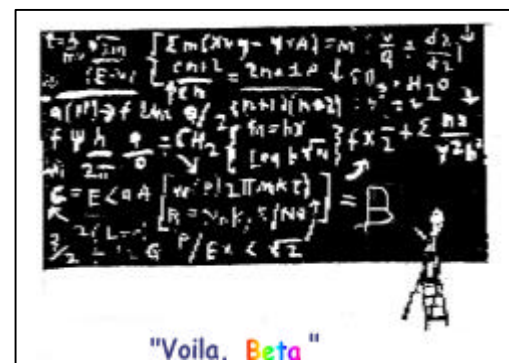
If investors did get an extra return / risk premium for bearing unsystematic risk it would turn out that the diversified portfolios made up of stocks with large amounts of unsystematic risk would give larger returns than equally risky portfolios of stocks with less unsystematic risk. Investors would jump at the chance to have these higher returns, bidding up the prices of stocks with large unsystematic risk and selling stocks with equivalent Betas but lower unsystematic risk. This process would continue until the prospective returns of stocks with the same Betas were equalized and no risk premium could be obtained for bearing unsystematic risk. Any other results would be inconsistent with the existence of an efficient market.

Some Math

For those intimidated by math, move on to next section.
For those interested, mathematically Beta is defined as:

$$\beta = \text{COV}(R_F, R_M) / \text{VAR}(R_M)$$

where COV is the covariance between R_F and R_M



R_F =the return of the mutual fund
 R_M =the return of the index
VAR (R_M)=the variance of the index

VAR-the variance is the square of the standard deviation usually denoted by the Greek letter Sigma (σ).

Covariance is defined as $COV(X, Y) = E[(X - \mu_X)(Y - \mu_Y)]$ and measures the direction and strength of the relationship between random variables X and Y where E is the expected value and μ =the population mean. If X and Y are statistically *independent* (no relationship) than $E(X*Y) = E(X)*E(Y)$. Beta is a dimensionless number. Dividing the covariance by the benchmark variance merely normalizes the measure of Beta.

Another equivalent, but perhaps more intuitive definition of Beta is:

$$\beta = \text{Correlation (Fund, Market)} \times \text{Std Dev (F)} / \text{Std Dev (M)}$$

Beta values can be roughly characterized as follows:

- * β less than 0
Negative Beta is possible but not likely. People thought gold stocks should have negative Betas but that hasn't been true.
- * β equal to 0
Cash under your mattress, assuming no inflation
- * Beta between 0 and 1
Low-volatility investments (e.g., utility stocks)
- * β equal to 1
Matching the index (e.g., for the S&P 500, a U.S. index fund, in Canada an Index ETF like i60; TSX: XIU. XIU which mirrors the S&P/TSX 60, has a turnover of about 13 % to remain congruent with it's index changes
- * β greater than 1
Anything more volatile than the index (e.g., small cap. funds)
- * β much greater than 1 (tending toward infinity)
Impossible, because the stock would be expected to go to zero on any market decline. 2 is probably as high as you will get.

NOTE: It has been shown that Betas are approximately normally distributed with a standard deviation of around 0.3. Hence, about 95 percent of shares have Betas which lie between 0.4 and 1.6.

High Beta funds are expected to do better than the market. During declines they are expected to do worse than the market average. Betas are not stable from period to period), and they are very sensitive to the particular market proxy/ benchmark against which they are measured (the S&P 500 itself has a annual turnover of about 8 % due to changes and mergers/divestitures). The choice of index is huge for obvious reasons. There is only a handful of Canadian equity

funds that truly deserve to be benchmarked to a 100% TSX Composite Index. Most have at least 10% foreign content, with many at 20%+. Also, some U.S. equity funds (i.e. Janus American Equity, Spectrum American Growth, and Templeton Mutual Beacon to name a few) have a mandate to hold a certain amount in overseas stocks. Benchmarking a fund seems a difficult task since few funds offer pure exposure to a single market/ asset class.

What does Beta mean?

A lot of disservice has been done to Beta in the popular press because of trying to oversimplify the concept. A Beta of 1.5 does not mean that if the market goes up by 10 points, the stock (or fund) will go up by 15 points. It also doesn't mean that if the market has a return (over some period, say a month) of 2%, the stock will have a return of 3%. To understand Beta, look at the equation of the line representing the best fit using the least squares linear regression technique:

$$\text{stock return} = \text{alpha} + \text{Beta} * \text{index return} + \text{epsilon}$$

where epsilon is a random error term

Beta indicates the average sensitivity of an individual security to the market return, and is a measure of the market or systematic risk of a security (or portfolio). As the coordinates do not fall exactly on the line of best fit, an error term, epsilon, is introduced to represent the unexplained security return. The specific returns arise because of events affecting the economy, and are represented by alpha as well as epsilon. Alpha represents on average, the portion of a security's return that is not associated with general movements in the economy. Alpha therefore represents the average return of an individual security when the return of the market index is zero. It is taken to be equal to the risk-free rate i.e. T-bill rate.

One shot at interpreting Beta is the following. On a day the (S&P-type) market index goes up by 1%, a stock with a Beta of 1.5 will go up by 1.5% + epsilon (can be positive or negative). Thus it won't go up by exactly 1.5%, but by something different.

The good thing is that the epsilon values for different stocks are guaranteed to be uncorrelated with each other. Hence in a diversified portfolio, you can expect all the epsilons (of different stocks) to cancel out. Thus if you hold a diversified portfolio, the Beta of a stock characterizes that stock's response to fluctuations in the market index.

So in a diversified portfolio like a mutual fund, the Beta of a fund is a not an unreasonable summary of its risk properties with respect to the "systematic risk", which is fluctuations in the market index. A fund or stock with high Beta

responds strongly to variations in the market, and a fund or stock with low Beta is relatively insensitive to variations in the market.

The main practical problem in applying the Markowitz approach to *portfolio* management is the large amounts of data which is required. The calculation of Beta makes it necessary to estimate how returns of every individual security would move or “covary” with those of every other individual security.

With a view to simplifying the computations and reducing the quantity of data required for the Markowitz approach, Dr. William Sharpe and others side-stepped the difficult task of estimating covariances between all securities. This was achieved by including risk-free securities in the analysis, identifying the market portfolio on the Markowitz efficient frontier and generating a market sensitivity measure (Beta) for each security. Without going into all the details, this results in the equation $E(R_F) = \alpha + \beta [E(R_M) - \alpha]$ which from our Grade 11 math is a straight line with slope Beta and Y intercept alpha. In plain English this means that the expected Return of the fund is =to the risk-free rate, say a GIC or T-bill, plus Beta times the expected return of the market index less the risk-free return. So, Beta can be a useful tool in assessing the risk/reward appropriateness of a fund.

So, if the market return is 2% above the risk-free rate , the stock return would on average be 3% above the risk-free rate, if the stock Beta is 1.5.

“... As your investment time horizon increases, the probability of regret decreases exponentially. In other words, financial risk has an embedded dimension of time. It is meaningless to talk about whether or not something is risky or safe without addressing the relevant time horizon and the financial alternatives.

So, is the stock market risky? Well, that depends. Using only a short-term horizon, it’s absolutely risky. Using a long-term horizon, I would argue that most equity markets probably are not. Are GICs, treasury bills, Canada Savings Bonds, and term deposits safe? Well, once again, that depends on time. In the short term, they’re the safest things available. After all, federal and provincial authorities implicitly guarantee them. Their returns are reliable and predictable. But, in the same manner, I would argue that over the long term, they are the riskiest places for your money. In sum, risk is in the time of the beholder....”

-Source: Moyshe Milevsky ; www.milevsky.com

Using Beta

Current Government regulations do not require Fund Companies to publish the value of Beta in the Prospectus. They only publish return data, portfolio turnover % and the MER so you’ll have to phone the Company for the data. Expect some pain, as customer service people don’t get this type of question every day.

In general, Beta values are a useful way of determining how a mutual fund has done, and how well it may do from a risk perspective in the future. Beta values for many U.S. mutual funds can be found in financial magazines or special investing periodicals such as Investor's Business Daily. In Canada, it's best to phone the fund Company or use www.globefund.com or equivalent web-site. Filtering on Beta is not provided so you'll have to do some trial and error to find the fund that fits the Beta that's right for you.

A conservative investor whose main concern is preservation of capital should focus on funds with low Betas, whereas one willing to take high risks in an effort to earn high rewards should look for high-Beta funds. Some funds go better together than others. You do not diversify if you buy two funds that have a history of moving up and down at the same time. Also, never forget your personal financial goals and risk tolerance.

If you had a portfolio of Beta 1.2, and decided to add a fund or stock with Beta 1.5, then you know that you are slightly increasing the riskiness (and potential average return) of your portfolio. This conclusion is reached by merely comparing two numbers (1.2 and 1.5). That parsimony of computation is the major contribution of the notion of "Beta". Conversely if you got cold feet about the variability of your Beta = 1.2 portfolio, you could augment it with a few companies with Beta less than 1. The Beta of a portfolio is the dollar -weighted average of the securities held in the portfolio (i.e. mutual fund) relative to a given market.

If you had wished to figure such conclusions without the notion of Beta, you would have had to deal with large covariance matrices and nontrivial computations. Not realistic for the individual investor.

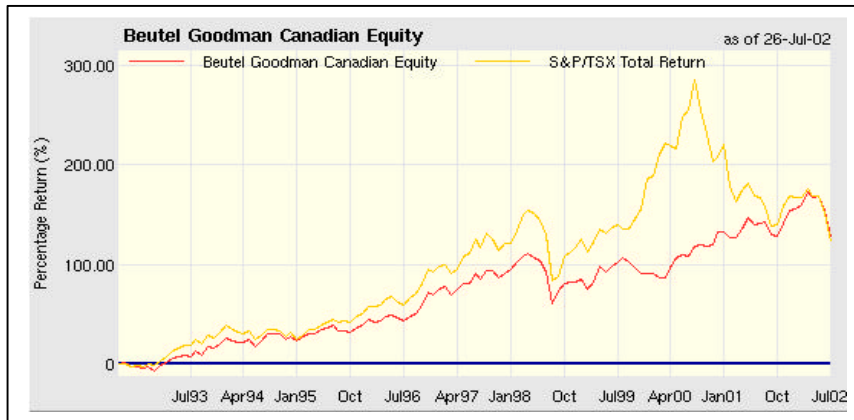
Use Beta this way: In good times, look for funds with a higher Beta (and low MER/turnover) because you'll get higher returns. In bear markets, look for funds with Betas lower than 1. That way, your fund shouldn't have losses larger than the average for the market.

Some Typical fund Betas

TD Canadian Index Fund	0.98 (TSX/S&P)
TD Canadian Equity	0.73 (S&P/TSX)
TD Balanced	0.67(60% S&P/TSX, 40 % Scotia Universe)
TD Dividend Growth	0.33 (TSX/S&P60)
TD Canadian Bond	0.93 (SCM Universe Bond Total Return)
TD U.S. Blue Chip	1.09 (S&P 500 Composite Total return –Cdn \$)

Beutel Goodman Canadian equity (0.20), Mackenzie Ivy Canadian (0.21) and Royal O'Shaughnessy Canadian equity (0.33) are examples of low Beta funds. Be aware though that Betas can change if there has been a fund manager change or style drift occurs. The chart below plots the $\beta=0.20$ Beutel Goodman Canadian equity fund vs. the TSX/S&P 300 Total Return. Swings do seem more modest as

predicted by theory. After 10 years, the return of the fund has been 9.94% vs. 9.87% for the index.

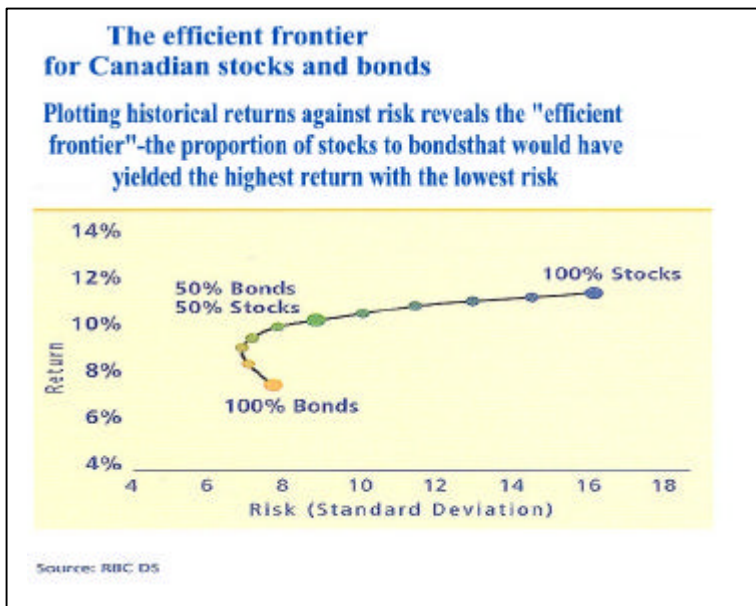


We can also use *foreign markets* (i.e. markets only partially correlated to the TSX/S&P index) to enhance overall equity –based returns and reduce risk. The TSE 300 Total Return index has a 0.70 correlation coefficient (a close relative of Beta with range –1.00 to +1.00) with the S&P 500 TR index but only 0.45 correlation with the Morgan Stanley Capital International (MSCI) EAFE index over a 20-year period. (Source: TD FundSmart Quarterly, July 1,2002). Foreign indices produce dissimilar returns to Canada partly because they are populated with companies, industries and sectors not found in Canada and a different economic structure.

“ According to the Efficient Frontier theory of portfolio management, there is an optimal level of global diversification for every investor. It’s the point at which risk is minimized and potential rewards are maximized. Typically, it lies between 40 and 50 % foreign content-far more than most Canadian investors.”

-RBC Investments/Action Direct,”Action Directions “, Summer 2002

Adding some foreign content in a reasonable proportion definitely helps investors build a more robust investment portfolio. Similarly, another asset class, bonds, can assist in risk reduction and performance optimization. The significant point is that adding some riskier securities actually reduces the portfolio’s risk level at least for a while. Eventually as larger proportions of the riskier TSX (or NYSE/Nasdaq) stocks are put in the portfolio, the overall risk rises with the overall return.



A low Beta does not imply that the fund has a low level of volatility though; rather, a low Beta means only that the funds' *market-related* risk is low. A specialty fund that invests primarily in gold, for example, will often have a low Beta (and a low R-squared), relative to the S&P 500 index, as its performance is tied more closely to the price of gold and gold-mining stocks than to the overall stock market (i.e. the S&P 500). Thus, though the specialty gold fund might fluctuate wildly because of rapid changes in gold prices, its Beta relative to the TSX/S&P may remain low. See Appendix II.

Conclusion

There are important systematic relationships between stock returns and economic variables that may not be captured adequately by a simple Beta measure of risk. Beta changes over time and its estimation can be "noisy" as a result.

Beta is therefore not a perfect measure of market risk but its relative ease of calculation, availability of information and link to a theory make it one of the important tools in our tool bag. It has been soundly critiqued and its death announced, perhaps prematurely. Undoubtedly there will yet be many improvements in the techniques of risk analysis, and quantitative analysis of risk measurement. Future risk measures will likely be more sophisticated and complex.

The key message for investors is to factor Beta into your investment considerations and pay as little as possible for the desired Beta (i.e. ETF's or index funds). Pay higher MER's only if you think you have found a manager(s) that can provide future persistent positive *Jensen Alpha* -a measure of risk-adjusted return.

Jensen's Alpha represents the ability of the fund manager to achieve a result that is above what could be expected given the risk in the fund. If the realized return is larger than that predicted by the overall portfolio Beta, the manager has added value. Jensen Alpha=the return of the fund above the risk-free rate less the return of the fund above the risk free rate that the Beta risk factor predicts= R_F -T-bill rate- β (R_F -T-bill rate). The bigger the Beta the better. If markets were completely efficient, the Alpha value would always be zero since all available information and analysis would already be priced into the shares. It would only be possible to achieve a return according to the risk taken. However, most mutual fund managers claim that this is not the case and that selecting special under-priced shares can achieve returns in their funds above what is expected from the risk taken. When looking at Alpha values, it is important to use a long time frame. To get a realistic view, a minimum of one year is needed, while three years is preferable.

There probably will never be a ultimate risk measure. In the meantime, Beta is at the least a useful tool, combined with others, in assessing an investment in a mutual fund for your portfolio.

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www.Barra.com - Barra Inc. offers historical and predicted Beta values for stocks that make up the major indexes. Barra is a provider of risk management technology and investment decision support tools.

www.bylo.org - Great site for independent thinking mutual fund investors run by Bylo Selhi. Interesting articles, excellent links, book references, a complete listing of low MER, No-load index funds and more.

www.fundscope.com -A good site with lots of free material. A modest annual fee is charged for more detailed information.

“This web site is not about promises of quick money, or wealth without risk. Those are myths in which we do not believe, and we have to state that from the very beginning in order to earn your trust. Nor do we provide daily updates of mutual fund prices. You can get those features for free from a number of popular web sites, or from any newspaper. What we provide is risk management tools and in-depth, forward looking analysis for the *serious* (novice or sophisticated) investor.

We are not aligned with any mutual funds company, nor do we endorse any specific funds at industry-sponsored events. We do not generate any revenue from mutual fund companies (advertising, consulting, commissions or other) and we take pride in our objectivity and independence.

The content of this web site is different. Here, you will find important information that some mutual fund companies would rather not bring to your attention. You will read about investment concepts that form the very foundation of a sound investment plan, and you will come across ground-breaking empirical studies that regular mutual fund analysts do not have the resources to conduct on your behalf.”

www.investorism.com - This a Canadian site run by long- time Investor Advocate Joe Killoran. The site provides useful commentary and effective point-of being SOLD/purchase Checklists and Adviser PROFILE, etc. forms to educate and protect mutual fund investors. All material is well researched. Passion runs deep here.

Killoran has long pressed for more open, simplified and informative point-of-sale documents for mutual-fund marketing. The examples on his Web site detail the commissions and trailer fees paid to those who make the sales, management expenses of the funds and penalties incurred if and when units are redeemed.

"It's like the checklist a pilot verifies before flying. It might take a little longer to go over it with the client, but it's worth it. “

<http://www.morningstar.ca> - Morningstar.ca is one of the more informative mutual fund sites in Canada. Getting the best of their free information only requires a registration. You'll get detailed information on most funds and analyst opinions on many. The most useful information on this site is something called Manager Monitor - profiles of mutual fund managers.

www.sipa.to - This is the official web–site of SIPA, The Small Investor Protection Association. SIPA is a volunteer member organization committed to fair practice in the investment industry. SIPA was incorporated (Ontario corporation number 1327366) as a national non- profit organization at the end of January, 1999, with headquarters in Markham, Ontario. The site contains a library, media links,

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litigation and news of interest to investors. Most resources are free to the public but some require paid membership.

www.sterlingmutuals.com -This is an excellent site with good educational materials, financial links and mutual fund research. Sterling Mutual Funds Inc. is a no-load mutual funds broker representing over 60 fund companies.

www.strategicsector.com -This site is run by prominent investment adviser/ portfolio doctor Hans Merkelbach (IPC Investment Counsel). Contains some excellent material on mutual funds, financial links and a complimentary /confidential mutual fund portfolio review.

www.zurich.com- This sophisticated site is run by Zurich Insurance. It provides a source for news and financial information on selected investment markets. The learning center is superb and contains interactive tutorials, quantitative indicators and glossaries.

APPENDIX I

There is some controversy on whether all indexes are truly representative benchmarks .The S&P 500 in particular has been criticized for its criteria. Unlike most index publishers, such as the Nasdaq and Dow Jones, Standard & Poor's adds and subtracts stocks from its three broad indexes -- the large-cap 500, the Midcap 400 (\$MID.X) and the Smallcap 600 (\$SML.X) frequently in accordance with a largely subjective list of criteria that includes market capitalization, liquidity and their representation of industrial sectors. One reason that S&P, a division of McGraw-Hill has not come under fire for the index's poor performance is that most investors seem to think that it is a quasi-scientific measure that depends on little or no human intervention. The truth is that an eight-person committee of S&P bureaucrats -- editors, business managers, quantitative analysts and an economist -- wield a heavy hand in its purportedly passive management. . Yet, as risks of the S&P orthodoxy have become more apparent, a few voices in the industry have emerged to speak against it. Alan Newman, an analyst at brokerage H.D. Brous & Co. in New York, said in an interview that he believes Vanguard, among others, "has done a very great disservice by advancing the thesis that instead of trying to beat the market you should buy the market. The problem is that the S&P 500 isn't the market -- it's an actively managed fund, and a poorly managed one at that." Kenneth Safian, chief executive of Safian Investment Research in New York, says he thinks the problem arose because the S&P 500 and Nasdaq 100 are not true indexes measuring the U.S. economy or the strength of an investment philosophy, but rather are the products of marketing organizations with something to sell. "These indexes don't represent anything but some manager's hopes and dreams," he said.

Source:" The S&P 500 is a mutual fund-and a bad one", Jon D. Markham, available at <http://msn.com/content/P25387.asp>

Note also that benchmarks are costless, frictionless and do not hold cash, so are in a way idealized constructs.

APPENDIX II

Sometimes you can draw the "best fit" straight line to obtain a Beta, but the resulting Beta doesn't tell you much. The classic example of this problem is gold funds, which have an average Beta of 0.42 when you use the S&P 500 as their benchmark index. Such a low Beta might lead one to believe that gold funds are safe investments, but they are, in fact, extremely volatile and prone to suffer huge losses at times. What gives? Well, it turns out that their Betas are low because their returns have relatively little to do with the returns of the S&P 500. Beta provides a measurement of a security's past volatility relative to a specific benchmark or index, but you've got to make extra sure you've chosen a *relevant* benchmark index.

For that reason, when considering the Beta of any security, you should also consider another statistic--R-squared. R-squared measures how close all of the

points on the XY graph are to the best-fit line. If all of the points were on the line, a fund would have an R-squared of 100, indicating perfect correlation with the chosen index. An R-squared of zero would indicate no correlation whatsoever. The lower the R-squared, the less reliable Beta is as a measure of a security's volatility. Gold funds, for example, have an average R-squared of 3 with the S&P 500, indicating that their Betas relative to the S&P 500 are pretty useless as risk measures. Using the standard deviation as a risk measure, we can see just how risky gold funds are. The average gold fund has a standard deviation of 25.80%, far greater than the average diversified stock fund's standard deviation of 15.58%, or the average bond fund's standard deviation of 4.52%. Source: www.morningstar.com