



How to Think about Return and Risk at the Same Time

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This introductory article is intended for the educated layman. It was written as part of a continuing series of essays on a variety of investment topics.

My Worldview and Welcome to It

Introduction

Robert Benchley wrote, “There may be said to be two classes of people in the world; those who constantly divide the people of the world into two classes, and those who do not.” Someone from the former group has said that investment analysts can be divided into two classes: the academics and the sportsmen.¹ The academics dispassionately systematize the processes of selecting stocks and bonds and putting them together into portfolios, and the sportsmen are caught up in the excitement of picking the stocks that will have great returns. If you’ve read my earlier articles, I needn’t tell you to which class I belong. That’s not to say anything against the sportsmen. The financial markets need both classes in order to function efficiently and to provide the greatest benefit to society.

The discourses of the academics trickle down to the public with hardly a trace. For better or worse, the sportsmen, abetted by the daily financial press, mould the public perceptions of investing.

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These perceptions sweep across a broad horizon, but two extreme and opposing views have been commonly held by the public: Does the market give you something for nothing? Or is it a casino? Surely there are few who still maintain the first view, which was common during the febrile summer of the dotcoms in 1999, though it was seldom so starkly expressed. Since the market collapse of 2008, far more have adopted the gambling metaphor.

¹ This implies nothing about the person’s academic attainments. The portfolio manager who first told me this defined himself as a sportsman and had a doctorate in comparative literature from Harvard.



The truth is not midway between the extremes. In investing, you can never get something for nothing. Investing can, however, come close to resembling a casino, but only if you choose to make it so.

In order to understand why investing is at neither of these extremes but at some intermediate point of your choosing, one must grasp the relationship between return and risk. Return and risk are essentially paired, not like Gilbert and Sullivan, Minneapolis and St. Paul, or even love and marriage, but in a much deeper, inextricable way, like energy and mass. This is because both, fundamentally, concern the same things: value, and changes in value.

What we get from an investment, the prospect of an increase in our wealth, comes at a price: the prospect of risk of loss of value. If you want return with no risk, the only choices are cash or an investment in U.S. government inflation-indexed securities,² and even with these, you'll lose money after the payment of taxes. All other investments require that you assume some risk. There are times when the stock market continually rises, but that does *not* mean that it lacks risk, even temporarily.

This article will explore the relationship between return and risk, concepts that we tried to consider separately in my two previous articles (which, for brevity, I will refer to as "Essay on Return" and "Essay on Risk"). Even there, it wasn't entirely possible to isolate the concept of risk from the concept of return. As I wrote before, the definition of risk most pertinent to the individual investor is the possibility of falling short of the amount of wealth needed or desired. But I pointed out the practical limitations of this definition, and I proceeded with the alternative definition of risk as the volatility (or variability) of return, with all its slippery uncertainties and ambiguities. In this article, we'll continue with the latter definition and come back to the idea of shortfall risk in a future article on risk tolerance.

At the level of late-night undergraduate philosophizing, "there is an appealing and psychologically comprehensible sort of metaphysical pathos in the idea"³ that we live in a slowly expanding universe of financial rewards and risk, where risk is in flux and can be shifted but never destroyed. Be this as it may, it's not contrary to reason, and there's no evidence against it. An appreciation of this worldview may help you to see through the eyes of those of us financial professionals who call ourselves "quants," that is, the academics (as distinct from the sportsmen.) Leaving this to one side, a grasp of finance requires that one appreciate first, that return is inseparable from risk, and second, that broadly speaking, the prospect of larger returns implies the prospect of larger risks. That bald statement, however, does not capture the complexities and nuances of the relationship.

² Treasury Inflation-Indexed Securities, more commonly known as Treasury Inflation-Protected Securities (TIPS).

³ A. O. Lovejoy, *The Revolt Against Dualism* (London: George Allen & Unwin, 1930), p. 166. Lovejoy is actually describing the appeal of a worldview in which there is unity in everything being related to everything else through divine law.



Over the last half century, and until the current economic crisis, the world of the real economy experienced a steady decline in risk, as recessions proved to be shorter and milder than earlier in economic history. This has been named “the Great Moderation.” At the same time, the world of financial instruments became more volatile, with more violent crises, like the stock market crash of October 1987 and the Asian financial crises of 1997. In the view of some, this reflected a transfer of risk from the real economy to the financial markets, and for citizens living off their labor rather their investments this was a good thing. Others have seen the increased risk of the financial markets as the consequence of the perversion of financial engineering and as a threat to the real economy. My own view is in between, but inclined to the latter. I also think that it is too soon to say that the Great Moderation was not real, and merely a fortuitous and illusory decline in risk. (I’m an historian, not a journalist.) But I won’t detain you any longer from our appointed subject.

Only when you can keep in mind at one and the same time the two concepts, return and risk, can you properly understand how to invest. And you will also understand why you should invest. Without the marriage of the concepts, you will be playing the market—or shunning it—as if it were a casino.

How volatility detracts from returns

In “Essay on Risk,” I explained why we can define investment risk as the variability of returns, and how this variability translates—in ways that are, alas, nearly impossible to compute accurately—into the probability of falling short of your expectations of future wealth.

Variability of returns also, purely by mathematics, detracts from investment performance (when performance is measured by the average return).

Consider two investment advisors, Edwin and Angelina, each of whom averages an annual return of 10% over five years. Angelina, however, produces a constant return of 10% each year, whereas Edwin’s returns are constantly changing.

Manager	2003	2004	2005	2006	2007	Average
Edwin	13%	-6%	8%	25%	10%	10%
Angelina	10%	10%	10%	10%	10%	10%

Now, although they achieve the same *average* annual return, Edwin actually has worse investment results. If you had invested \$100,000 with each manager at the beginning of 2003, your investment with Angelina would have grown to \$161,051 at the end of 2007, whereas your investment with Edwin would have grown to only \$157,737, a difference of \$3,314, or 2% worse. And, no, the order of the returns doesn’t matter. (Readers



familiar with the mathematics of compound growth can confirm these results in a minute or less with a calculator or spreadsheet.) Why should variability of returns produce a worse result? Consider this: If the price of a stock is \$100 and it falls -50% in one year, the new price is \$50. If the price then rises +50% the next year, the final price is only \$75. So, although the average annual return was 0%, there was a net loss of \$25.00.

This is just an example of a general truth: If any two investments or investment managers have the same average return, the one with less variability will produce greater wealth.⁴ So the variability of returns is a cost imposed on returns even as it increases the uncertainty of what future wealth will ultimately be.

This reinforces what I have written before: What matters in the end is wealth, not return.

Hence, we can better appreciate the economic assumption that a rational investor, in order to achieve greater wealth, wants greater return and is averse to variability of returns.

Origins of return and risk

Let's consider whence return and risk arise.

Some investments return money to you soon, some pay you later. Some pay you continual streams of cash, some pay out cash at irregular intervals, and some produce cash only when you sell them. The more certain the cash, the less risky is the investment that generates it.

In "Essay on Return," we saw that there are two components of return in any given period: the income and the change in price (which results in a capital gain or loss in your portfolio). Income is the cash produced by the investment apart from what it sells for. The change in price results from a change in the market's estimate of the cash that the investment will bring its owner in the future.

Everything comes down to the ability of an investment to generate cash now and in the future, because cash gives you the ability to buy stuff. Even if you believe in the "greater fool theory" (namely, that you can knowingly buy a company's stock regardless of the company's intrinsic ability generate cash and then sell it in short order to a fool who thinks it's worth much more than you paid for it), you still depend on the fool's belief that somehow there's a lot of value in the company, or that he knows another fool who believes there's a lot of value in the company. If we all agreed (and knew that we all

⁴ This result can be further generalized, so that we aren't limited to comparing cases where the average returns are identical. The effect is sometimes called the "variance drain." As we will see below, in Part II, we should compare any pair of investment results by looking at both the average return and the variability of the returns of each series. The more mathematically inclined reader will recall that the geometric mean is always less than or equal to the arithmetic mean.



agreed) that a company would never generate any cash in the future, the stock would be worth next to nothing.⁵ Companies do, it is true, usually possess land, buildings, and equipment, which are real assets that have value. But these assets are worth something only to the extent that they, too, can generate cash in the future. Land that lies under a burden of toxic waste, factories of spalling brick and rusting pipe, and precision machines that efficiently turn out gramophone needles or corset stays are real assets with not much propensity to generate cash.

Consequently, any unexpected turn of events that investors think might impair a company's ability to generate cash in the future will cause them to lower the price of the company's stock, and the price return will be negative. In contrast, unexpected new inventions, ingenious marketing, and cultural changes may lead to forecasts of increased cash flows and therefore a higher price for the stock and a positive price return.

So the health of financial creatures (primarily stocks, bonds, derivatives, and combinations thereof, like mutual funds) ultimately depends upon perceptions of the real economy, consisting of real things and services that are sold for cash. The world of the real economy, in its turn, depends on the ability of this world of financial creatures to provide the financing needed to nurture and sustain it. Returns and risks flow back and forth between these twinned worlds.

The basic investment life forms: Their returns and risks

As investors, most of us are interested primarily in the three largest families of investment life: cash, bonds, and stocks. Here they are, characterized by their ability to produce cash, and by their corresponding returns and risks. If this looks familiar, allow your attention to wander past the fine print and read on below.

a) Cash. Cash is a medium of exchange, which means that you can use it to buy stuff and services. In the specialized vocabulary of investing, cash is more than just coins and paper money; it is very, very short-term bonds issued by the government (called "bills," which are the sort of thing that the most stolid money market funds invest in). These have virtually no risk and very little return (unlike coins and paper money, which have a negative return, because their value is diminished over time by inflation). You can store value in cash for use later. Cash begets cash, in the sense that these short-term government bonds generate just enough cash to compensate for the decline in value caused by inflation, and maybe a smidgeon more.

⁵ At the height of the dotcom boom, in 2000, a colleague of mine looked up from his desk and told me that he'd just been reading an analyst's report on Amazon; the report said, "This company will never make any money," and the analyst rated it a "Buy." But surely this was a rare exception. And Amazon has since made money.



b) Bonds. Bonds are issued by governments, corporations, and some not-for-profit institutions (like universities). They generate predefined streams of cash, that is, interest payments, at fixed and regular intervals, like six months, over fixed periods of time (called “maturities”) ranging from less than a year to thirty years or more. Bonds are sensitive to changes in the rate of inflation, with a sensitivity that depends upon the size of the interest payment (increasing for smaller payments) and the length of the fixed period (increasing for longer periods). Because the outlook for bonds depends upon the outlook for the economy somewhat or far out into the future, they are more risky than cash but only if you don’t intend to hold them until their maturity dates; if, as in most cases, they don’t keep pace with inflation; and if the issuer doesn’t default. You can expect them to offer higher returns than cash.

c) Stocks. Stocks produce questionable flows of cash. Unlike bonds, stocks have a maturity date that is infinitely far in the future, so even the ultimate price is unknown (whereas a bond, if the issuer doesn’t default or retire the bond early, will be retired at the stated face value on a specific date). If the company becomes bankrupt, its stockholders will lose virtually everything. In contrast, bond holders usually get something in the case of bankruptcy, and in any case, they have legal precedence over the stockholders. The cash payments that a company makes to its shareholders, that is, its dividends, are much less reliable than the interest payments on bonds, because companies aren’t under a legal obligation to pay dividends, whereas they are contractually obliged to make interest payments on their bonds. A company’s board can, in contrast, choose at any time to change the size of the dividend. Dividends tend to make a company’s stock less risky because they suggest that at least some cash will be paid out, yet the stocks of those companies that don’t pay dividends aren’t necessarily more risky than the stocks of those that do. The key concern is how much a company could pay in dividends or otherwise return cash to its shareholders if it wanted to do so, not how much it actually pays out.

Here’s a numerical summary:

	Historical Average Annual Return	Historical Volatility
Cash	3.8%	3.1
Bonds	5.6%	5.7
Stocks	11.7%	20.6



I'm using one of the more helpful measures of volatility of returns,⁶ but the definition needn't concern us here. My point is that we have a comparison of the riskiness of these different kinds of investment life. With all its faults, historical volatility gives us some sense of future risk, and you can see that these numbers are very different from each other. Within each family of investment life, there is tremendous variation. There are bonds that are similar to stocks, like the British government's consols, which have no maturity date, and stocks that are similar to bonds, like the stocks of utility companies, at least in the era before these companies became more competitive.

There exist other families of investment creatures, such as commodities (including gold and oil), real assets (like fine art, antiquarian books, and vintage wines), and real estate, but in the interest of brevity, I'll defer consideration of these to later articles.

We call these families of investment life "asset classes." Some analysts regard cash as an asset class, but others believe it transcends classification as an asset class, perhaps because it has neither return (after you strip out its built-in adjustment for inflation) or risk (if you ignore very small fluctuations). I do consider it to be an asset class. These asset classes (stocks, bonds, and cash) are defined by their differing legal structures and status, which give rise to their different characteristic cash payments and hence their returns and risks.

There was a notion popularized briefly—very briefly—by the book entitled *Dow 36,000*⁷ that the stock market has very little risk, because it always has and always will produce a good return in the long run. A half-minute's reflection should be enough to banish this idea. If the stock market were expected to be less risky than the bond market, there would be no reason for anyone to invest in U.S. government bonds or any other kind of bonds, which over the course of the entire last century provided much lower returns than the stock market. (The authors had an explanation for this, but not a good one.) The higher return of the stock market has been a reward for the greater risk it poses for wealth, and an inducement to invest despite that risk.⁸

The economic linkage between return and risk

We see that cash has historically had the lowest return and the lowest risk, followed by bonds, which have had some return and some risk, and then stocks, with higher return

⁶It's the average of the annualized standard deviations of monthly returns. These data come from *Ibbotson S&P 500 Classic Yearbook* (Chicago: Morningstar, 2009). These are averages over the years 1926-2008, and the figures for bonds are those for intermediate-term government bonds.

⁷James K. Glassman and Kevin A. Hassett, *Dow 36,000: The New Strategy for Profiting from the Coming Rise in the Stock Market* (New York: Random House, 1999). Hassett was an economic advisor to the 2008 presidential campaign of Senator McCain.

⁸Glassman and Hassett's argument was that the Dow would rise rapidly to 36,000 as investors came to recognize that stocks were nearly riskless, and after that, the return on the stock market would be much lower.



and higher risk. Three observations normally aren't a sufficient basis for broad generalizations, but I can assure you that nearly every investment analyst thinks that this pattern is real, because it follows from the economics of the cash payments of these investments. Normally, higher return is the compensation that the market pays for higher risk. At least, that's what an economist would say, but it's a teleological description of how return compensates for risk. What is actually happening is that investors collectively (the market) won't pay high prices for investments that look risky, and as the risks of the risky investments are dodged (and near-term cash flows look more certain), the prices go up, leaving investors to face what are probably additional risky future cash flows. This is the economic foundation of the mathematics that connects return to risk.

The mathematical linkage between return and risk

If I have a portfolio that is half in cash (no risk) and half in a very diversified group of stocks (high risk), that portfolio will have half the return *and* half the risk of a portfolio consisting of only stocks (and, similarly, a portfolio that is $\frac{3}{4}$ cash and $\frac{1}{4}$ stock will have about one quarter the return and one quarter the risk).

Similarly, you can multiply return and risk, thanks to leverage. If you can borrow money to buy more of an investment than you are able or willing to do with your own money (and if the interest on the loan is small), your expectations for return, and your prospective risk, go up by the same proportion. For example, if you have \$100,000 to invest and you can borrow another \$100,000 on the collateral of the first amount to invest similarly, and if you were expecting a return of 8% on the \$100,000, you can now expect a return of 16% on your original \$100,000, and the risk to your investment will double likewise.

But the two foregoing examples don't represent the totality of the mathematics of risk, because risk doesn't always vary in proportion with return. Let's say that I have a portfolio that is $\frac{1}{2}$ stocks and $\frac{1}{2}$ bonds. The return on this portfolio is, as you might expect, $(\frac{1}{2} \times \text{return-on-stocks}) + (\frac{1}{2} \times \text{return-on-bonds})$. But the risk is *not* $(\frac{1}{2} \times \text{risk-of-stocks}) + (\frac{1}{2} \times \text{risk-of-bonds})$. It's less than that. I'll explain why in a future article, when I discuss diversification, but for the moment, the important point is that you can average returns across different investments, but you can't average risks.⁹ This is critically important to how we invest.

Finer distinctions

The creatures of investing belong to a variety of species within the large asset classes of stocks and bonds and so forth, and these species, as distinct from the individual specimens, do manifest distinctive patterns of return and risk when seen in aggregate.

⁹ This can be shown mathematically, and the statement doesn't rest on financial theory. It is a fact.



For example, there are stocks of U.S. companies and stocks of foreign companies; there are stocks of large companies and stocks of small companies; there are bonds issued by the U.S. Government, bonds issued by state governments, bonds issued by foreign governments, and bonds issued by corporations; there are bonds that mature in two years, bonds that mature in ten years, and bonds that mature in thirty years. There is U.S. cash, there is British cash, and there is European cash.

We usually call these species “asset subclasses,” but some of us sloppily call them “asset classes,” as if they had the same status as stocks and bonds.

Here is a table that shows the historical returns and risks of a few of these:

	Average Annual Return	Average Volatility
Large Company Stocks	11.7%	20.6
Small Company Stocks	16.4%	33.0
International Stocks (from 1970)	12.1%	23.2
Corporate Bonds	6.2%	8.4
Government Bonds	5.6%	5.7

This table is far from exhaustive, and again, the numbers I’m showing for volatility are just a convenient measure for comparing differing degrees of volatility and hence, risk.

The pattern is again clear: The asset subclasses that historically have had the higher returns have also had greater volatility of returns.

Because these asset classes and asset sub-classes have characteristic relationships between return and risk, then, if our own holdings of stocks and bonds exhibit the characteristics of their “species,” and if we ignore their idiosyncrasies, we can expect them, too, to exhibit by and large similar though not necessarily identical relationships between risk and return. And indeed, we can see that this is the case. If you consider mutual funds, many of which contain just stocks or just bonds, you’ll see that although there are big differences among the them, the stocks funds tend to rise and fall with the stock market (taken as a whole), and the bond funds tend to rise and fall with the bond market (taken as a whole). And over the whole of the last century, both the stock market and the bond market have tended to go up, as the positive returns in the table tell us.



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