



Intelligent Investing

## Redefining Investor Risk

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You have probably been told by many financial advisors that your risk tolerance should be a function of your investment time horizon. This belief is touted by almost everyone in the financial services industry, because it is predominately accepted that if you plan to invest for a long period of time, you can make more risky investments. However, before blindly accepting this theory as factual truth, let's look at four ways in which risk can be defined. After thinking about risk from these four different perspectives, you may reach a different conclusion about investing.

### **Risk Theory No.1: Risk is Reduced if You Have More Time to Recoup Your Losses**

Some people believe that if you have a long time horizon, you can take on more risk, because if something goes wrong with your investment, you will have time to recoup your losses. When risk is looked at in this manner, risk does indeed decrease as the time horizon increases. However, if you accept this definition of risk, it is recommended that you keep track of the loss on your investment, as well as the opportunity cost that you gave up by not investing in a risk free security. This is important because you need to know not only how long it will take you to recoup the loss on your investment, but also how long it will take you to recoup the loss associated with not investing in a product that can generate a guaranteed rate of return, such as a government bond.

### **Risk Theory No.2: A Longer Time Horizon Decreases Risk by Reducing the Standard Deviation of the Investment**

You may have also heard that risk decreases as the time horizon increases, because the standard deviation of an investment's compounded average annual return decreases as the time horizon increases, due to mean reversions. This definition of risk is based on two important statistical theories. The first theory is known as the law of large numbers, which states that the likelihood of an investor's actual average return achieving its long run historical average return increases as the time horizon increases--basically, the larger the sample size, the more likely the average results are to occur. The second theory is the central limit theorem of probability theory, which states that as the sample size increases, which in this context means as the time horizon increases, the sampling distribution of sample means approaches that of a normal distribution.

You may have to ponder these concepts for a period of time before you comprehend their implications about investing. However, the law of large numbers simply implies that the dispersion of returns around an investment's expected return will decrease as the time horizon increases. If this concept is true, then risk must also decrease as the time horizon increases, because in this case, dispersion, measured by variation around the mean, is the measure of risk. Moving one step further, the practical implications of the central limit theorem of probability theory stipulates that if an investment has a standard deviation of 20% for the one-year period, its volatility would be reduced to its expected value as time increases. As you can see from these examples, when the law of large numbers and the central limit theorem of probability theory are taken into account, risk, as measured by standard deviation, does indeed appear to decrease as the time horizon is lengthened.

Unfortunately, the application of these theories is not directly applicable in the investment world, because the law of large number requires too many years of investing before the theory would have any real world

implications. Moreover, the central limit theorem of probability theory does not apply in this context because empirical evidence shows that a constant standard deviation is an inaccurate measure of investment risk, due to the fact that investment performance, is typically skewed and exhibits kurtosis. This in turn means that investment performance is not normally distributed, which in turn nullifies the central limit theorem of probability theory. In addition, investment performance is typically subject to heteroskedasticity, which in turn greatly hinders the usefulness of using standard deviation as a measure risk. Given these problems, one should not postulate that risk is reduced by time, at least not based on the premise of these two theories.

An additional problem occurs when investment risk is measured using standard deviation, as it is based on the position that you will make a one-time investment and hold that exact investment over the length of the time horizon. Given that most investors employ dollar-cost averaging strategies that entail ongoing periodic investment contributions, the theories do not apply. This is because every time a new investment contribution is made, that portion is subject to another standard deviation than the rest of that investment. In addition, most investors tend to use investment products such as mutual funds, and these types of products constantly change their underlying securities over time. As a result, the underlying concepts associated with these theories do not apply when investing.

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### **Risk Theory No.3: Risk Increases as the Time Horizon Increases**

If you define risk as the probability of having an ending value that is close to what you expect to have at a certain point in time, then risk actually does increase as the time horizon increases. This phenomenon is attributed to the fact that the magnitude of potential losses increases as the time horizon increases, and this relationship is properly captured when measuring risk by using continuously compounded total returns. Since most investors are concerned about the probability of having a certain amount of money at a certain period of time, given a specific portfolio allocation, it seems logical to measure risk in this manner.

Based on Monte Carlo simulation observational analysis, a greater dispersion in potential portfolio outcomes manifests itself as both the probability up and down movements built into the simulation increase, and as the time horizon lengthens. Monte Carlo simulation will generate this outcome because financial market returns are uncertain, and therefore the range of returns on either side of the median projected return can be magnified due to compounding multi year effects. Furthermore, a number of good years can quickly be wiped out by a bad year.

### **Risk Theory No.4: The Relationship Between Risk and Time from the Standpoint of Common Sense**

Moving away from academic theory, common sense would suggest that the risk of any investment increases as the length of the time horizon increases simply because future events are hard to forecast. To prove this point, you can look at the list of companies that made up the Dow Jones Industrial Average back when it was formed in 1896. What you will find is that only one company that was part of the index in 1896 is still a component of the index today. That company is General Electric. The other companies have been bought out, broken up by the government, removed by the Dow Jones Index Committee or have gone out of business.

More current examples that support this empirical position are the recent demise of Lehman Brothers and Bear Sterns. Both of these companies were well established Wall Street banks, yet their operational and business risks ultimately led them into bankruptcy. Given these examples, one should surmise that time does not reduce the unsystematic risk associated with investing.

Moving away from a historical view of the relationship between risk and time to a view that may help you understand the true relationship between risk and time, ask yourself two simple questions: First, "How much do you think an ounce of gold will cost at the end of this year?" Second, "How much do you think an ounce of gold will cost 30 years from now?" It should be obvious that there is much more risk in trying to accurately estimate how much gold will cost in the distant future, because there are a multitude of potential factors that may have a compounded impact on the price of gold over time.

## **Conclusion**

Empirical examples such as these make a strong case that time does not reduce risk. Given this position, investors should reach a very important conclusion when looking at the relationship between risk and time from the standpoint of investing. You cannot reduce your risk by lengthening your time horizon. Therefore, the only way you can mitigate the impact of unsystematic risk, is by developing a broadly diversified portfolio