# A Sound Approach to Stock Investment for Individual Investors — Unmasking Common Fallacies

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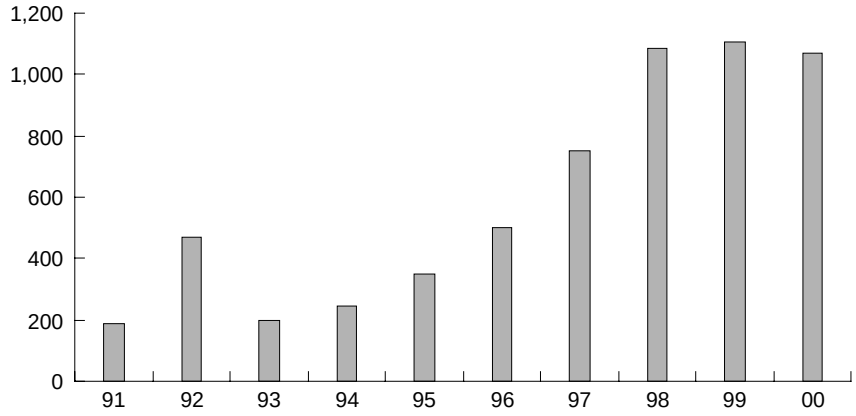
## 1. Introduction

As interest rates in Japan continually mark new historical lows, the return on household financial assets, of which savings deposits generally comprise a large proportion, continues to shrink.

Perhaps one telling indicator of concern over this situation is the expanding media coverage of topics related to asset management, as seen by the number of articles published (Figure 1). However, as informative as these articles are about different aspects of asset management, they probably do not help readers very much in seeing the big picture.

In this paper, we examine what individual investors new to stock investment need to know regarding the importance of a sound investment plan.

**Figure 1 Number of Articles on Asset Management in Four Nikkei Newspapers**




Note: Shows number of search hits with key word “asset management” on the Nikkei Telecon DB; the four newspapers are *Nikkei Shimbun, Nikkei Kinyu, Nikkei Sangyo*, and *Nikkei Ryutsu* newspapers.

## 2. Understanding the Risks of Investment

### (1) Deals That are Too Good to be True

Individual investors are bombarded with enticing opportunities — stock price predictions abound in magazines and in analysts' recommendations, all intended to whet the appetite of investors. Unfortunately, countless investors have succumbed to temptation and lost large fortunes.

With assets as volatile as stocks, there is a substantial risk of erosion of capital. Nonetheless, some investors invest in stocks without fully understanding all the risks involved. They mistakenly believe that stock price predictions are a guarantee of future performance.

We must dispel the fallacy that using stock price predictions can significantly reduce investment risk. Three reasons immediately come to mind.

First, numerous empirical studies testing the efficient market hypothesis have examined whether stock prices can be predicted. These studies ask whether investors can use certain information to make market predictions, and thereby outperform the market. Three types of information are considered in the studies: (1) historical stock prices, (2) publicly available information including financial data and business data, and (3) insider information. While many of the studies find that predictions based on insider information have an effect, results are mixed regarding predictions based on the other two types of information. Thus, with the use of insider information prohibited, making investment decisions based on predictions from the other data sources is practically meaningless.

Second, even if predictions are possible to some extent, using them to invest in risk-bearing assets such as stocks (risk of erosion of capital) also poses the risk of significantly underperforming safer assets such as bonds. For the period from 1970 to 2000, we predicted fluctuations in the TOPIX index, and actively managed a portfolio that made transactions once a year. The active management consisted of the following: each year, a prediction is made as to whether the return on stocks for the following year will be positive or negative. If negative, stocks are sold off and converted into cash (whose return is zero), and if positive, stocks are held (or bought if cash is being held at the time).

Using the data for the period, we varied the prediction accuracy rate (percentage of the time that the prediction proves to be accurate) and market timing with respect to volatile swings, and calculated performance after the fact. Figure 2 shows the (1) worst timing case, and (2) optimal timing case.

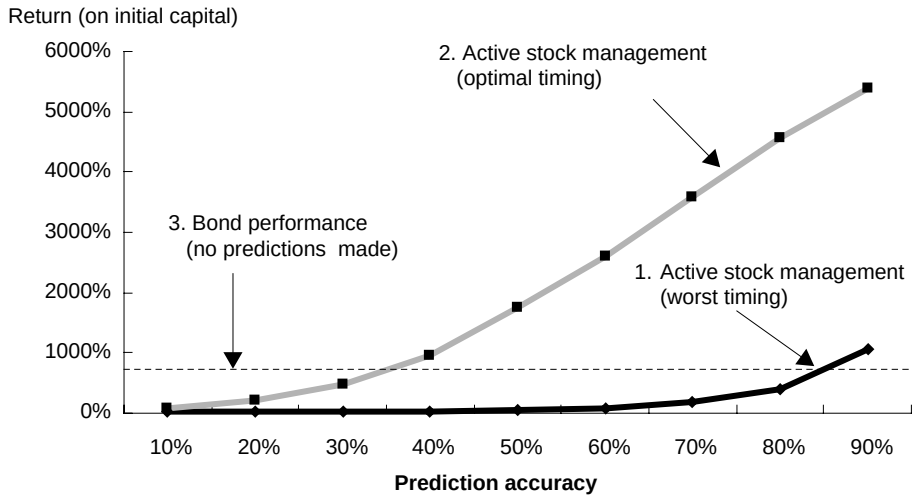
These two cases are compared to a third result, investment in bonds using no predictions at all. As the figure shows, in the worst timing case, prediction accuracy needs to approach 90% to outperform a bond investment. In other words, even if predictions are quite accurate, stocks can still significantly

underform bonds depending on market timing. Thus being armed with accurate predictions is not enough to ensure success; unless investors are willing to tolerate timing risk, they should not be investing in stocks.

Third, even assuming that some people actually have the ability to make accurate predictions, there is no reliable way to differentiate them from the rest. Of course, it is extremely difficult for investors to find these people on their own.

Based on the above reasons, it is very unlikely that anyone case use market predictions to invest in stocks as safely as in bonds. Thus a vital rule for investors is to objectively understand the risks involved and not be influenced by all the available information, and then take on only as much risk as can be tolerated.

**Figure 2 Performance of Actively Managed Stocks Using Predictions Vs. Passively Managed Bonds**




Notes: In the optimal market timing case, if the timing accuracy is 50%, for example, then the 30-year period includes the 15 most volatile years; in the worst timing case, the 15 least volatile years are included.
Source: Calculated using TOPIX/Nomura-BPI yearend data from 1970 to 2000.

### (2) Long-term Investment Does Not Necessarily Reduce Risk

Another instructive case that demonstrates the importance of understanding investment risk is that of long-term investment.

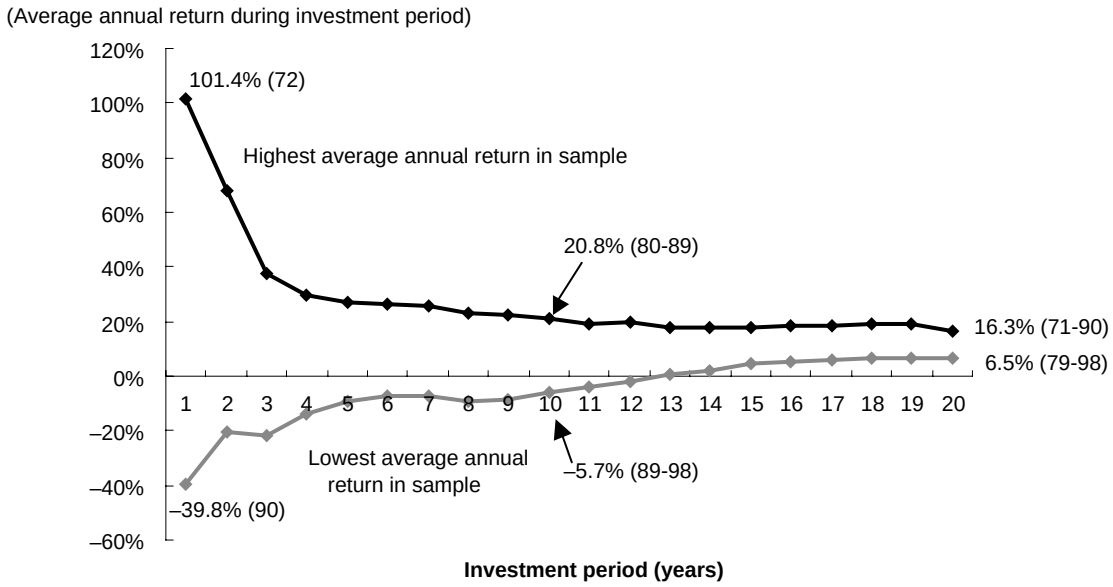
Long-term investment is often advocated as a method for dispersing risk over time, thereby reducing the probability of loss. Some would even argue that the reduced probability of loss justifies a more aggressive exposure in stocks than with short-term investment. Advocates often point to the data shown in Figure 3.

Figure 3 shows that the longer the investment period, the smaller is the volatility of average returns. During the period from 1970 to 2000, assuming that investments of n years were made in the TOPIX index beginning in 1970, 1971, and so on, we calculated arithmetic average annual returns for all n-year periods, and plotted the highest and lowest values for each period. For example, the 20-year investment period consists of 11 samples (1970-89, 1971-90, ... 1981-2000), of which the lowest average annual return was 6.5% for 1979-98, and the highest value was 16.3% for 1971-90.

At first glance, as the investment period grows, the maximum and minimum curves tend to converge toward a positive value, giving the impression that long-term stock investment does indeed decrease risk. However, there is more to the story.

The risk dispersion effect of time is based on a statistical concept called the law of large numbers: the average value of a sample group approaches its true value as the sample size grows.[1] Thus the larger the sample size (in this case the investment period), the more the average annual return converges toward a positive value as in Figure 3, and the lower the probability of incurring a significantly lower return.

**Figure 3 Average Annual Return of TOPIX by Length of Investment Period**




This phenomenon is illustrated more clearly in Figure 4. The curve shows the probability that the average annual return will fall below the risk-free rate for different investment periods.

The risk-free rate refers to the investment return on assets regarded as very safe such as government bonds. As in Figure 3, probabilities are calculated from annual yearend data from the Tokyo Stock Exchange from 1970 to 2000 (the average annual return is 10.7%, and standard deviation is 28.0%).

In other words, the curve in Figure 4 denotes the probability of not earning a return commensurate with the additional risk being taken. As the investment period grows, this probability decreases due to the convergence of returns described above, creating the appearance that long-term investment is more advantageous. However, since the total asset value consists of the cumulative returns of each period, should returns fall below the risk-free rate, the expected loss actually increases as the investment period grows.

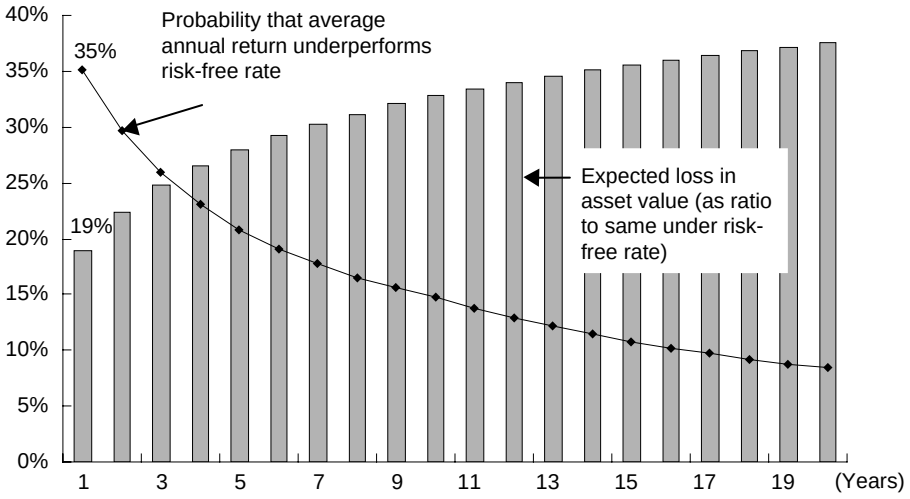
The bar graph in Figure 4 shows the average loss incurred (in relation to the risk-free case) if the investment return falls below the risk-free rate. For example, for a 20-year investment period, while the probability of underperforming the risk-free rate is only 8%, doing so would generate an average expected loss of 38% compared to the risk-free return, and thereby eroding the principal. On the other hand, for a 1-year investment period, the probability of underperformance is 35%, but the average expected loss is only 19%.

Based on the above discussion, long-term investment will: (1) reduce the probability of underperformance against the risk-free rate, but (2) in the event of underperformance, generate a larger average loss. Thus the widely held notion that long-term investment disperses risk is only partially true.

The tradeoff in long-term investment is a matter of personal preference; some people will emphasize the reduced risk of underperforming the risk-free rate, while others will focus on the average expected loss doubling from 19% to 38%. In any case, even if long-term investment returns converge toward a positive value, this does not justify overweighting stocks unconditionally.

Thus the conventional wisdom that longer investment periods will automatically reduce risk is actually a fallacy. Regardless of the investment period, investors need to avoid taking on more risk than they can tolerate.

**Figure 4 Probability of Underperformance, and Expected Loss Compared to Risk-Free Investment**




Note: For the risk-free rate, we used corresponding government bond yields in the secondary market for 1, 2, 5, 10 and 20-year bonds. For other periods, rates were extrapolated.

## 3. Determining Reasonable Risk Tolerance Levels

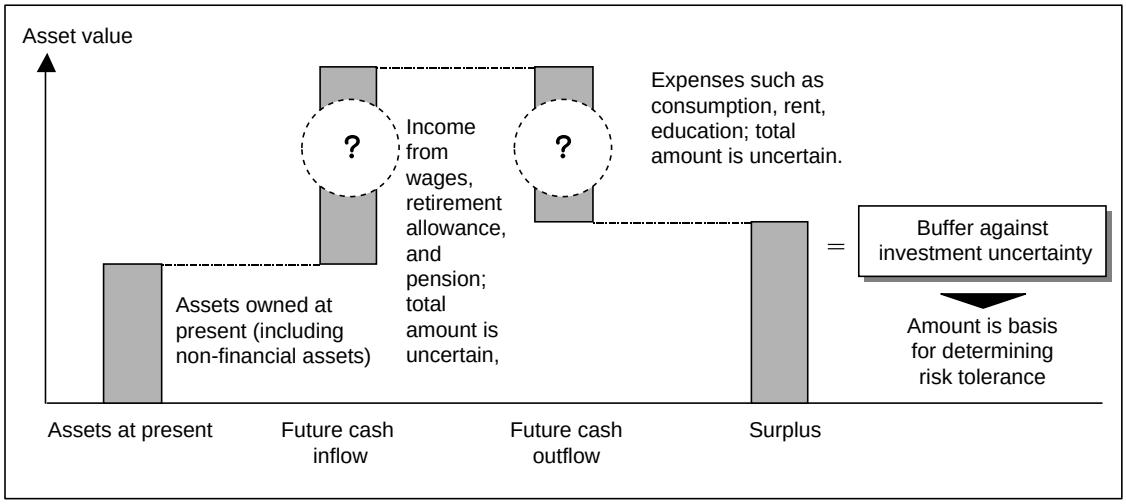
We next consider the approach to determine investors' risk tolerance. As Figure 5 shows, our approach determines risk tolerance based on present asset holdings and future cash inflow and outflow.

If the sum of present assets and discounted future cash inflow[2] exceeds the discounted future cash outflow, the surplus becomes a buffer against downside investment risks. Thus the larger the surplus, the more risk that investors can generally take on.

Let us take a closer look at the components of future cash inflow and outflow. Cash inflow consists mainly of items such as wages, retirement allowance, and pension, while cash outflow includes expenditures such as consumption, rent or mortgage payments, and education. Of course, all of these components are subject to uncertainties beyond our control, such as changing economic conditions. However, the calculation of future cash inflow and outflow takes such uncertainties into account.

Investors who have inadequate assets at present and do not expect significant income in the future tend to shun volatile assets (where high returns are possible, but the risk of loss is quite high) because they would have to be willing to risk losing what they have and possibly ending up in poverty. Thus a sound investment plan must start with a clear understanding of the surplus concept described above.

**Figure 5 Factors That Determine Risk Tolerance**




## 4. Conclusion

We have argued that for individual investors, the use of stock price predictions or long-term investment methods do not necessarily reduce the risks inherent in stock investment. Thus rather than relying on these practices, it is imperative that investors devise sound investment plans based on a clear understanding of investment risks.

Some individual investors may conclude from this that investing is full of uncertainties and risky. But to use an analogy, when people drive cars, they accept the risk of traffic accidents to enjoy the benefits of using cars. The important point is the extent to which these risks and benefits can be weighed. In the same way, people should not hastily conclude that investment is risky and thus should be avoided without first trying to objectively assess the risks. Otherwise they may be as foolish as their counterparts who leap before they look.

## Notes

1. Since the sample average is the arithmetic mean of returns during the period in question, the law of large numbers involves calculation of simple interest.

2. For example, if the annual interest rate is 5%, 100 yen today will be worth 105 yen in one year. It follows that 100 yen next year is worth not 100 yen today, but 100/1.05 = 95.2 yen. To take into account the time value of money, future amounts are discounted with the prevailing interest rate and converted into their present value.