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Financial Illiteracy

by Andrew Vazsonyi, Feature Editor



The United States has a high rate of financial illiteracy, and consumers are paying for what they don't know. That was the gist of testimony at a Senate Committee on Banking, Housing and Urban Affairs hearing held in February 2002. Federal Reserve Chairman Alan Greenspan testified:

Financial literacy can empower consumers to be better shoppers, allowing them to obtain goods and services at lower costs. In particular it has been my experience that competency in mathematics—both numerical manipulations and in understanding its conceptual foundations—enhances a person's ability to handle the more ambiguous and qualitative relationships that dominate our day-to-day financial decision making.

There was general agreement for the need for more and better education in finance, and the Bush administration, the Federal Reserve, and the Treasury Department are supporting such goals. The words *economics, statistics, management sciences, operations research, decision sciences* were not mentioned. Here is an opportunity for the Decision Sciences Institute to enter the fray and introduce decision-making techniques via financial issues and, in particular, via resource allocation and portfolio management.

Treasury Secretary Paul H. O'Neill said, "The problem of financial illiteracy is growing as finance becomes more complex." In the past, mortgage rates were fixed, savings went to the bank, goods were bought on a cash-only basis, and people had little to say about their retirement plans. Today, mortgage financing comes in a variety of packages, credit card use is universal, and saving investments range from CDs to mutual funds to individual stocks to annuities. Also, people are increasingly responsible for investing their savings for retirement.

A Random Walk Down Wall Street

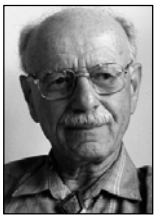
This is the title of the excellent and popular book by Burton B. Malkiel (1999), my principal guide to the modern theory of investment. The theory of random walks provides an insight to many of the counterintuitive and preposterous consequences of uncertainty. This is a good time and place to review some of the advice based on the theory.

A striking consequence of the random walk hypothesis is to abandon all thoughts of buying individual stocks and invest in mutual funds that track certain stocks of the market. Renounce all attempts to manage your stocks *actively* and become a *passive* bystander; let chips fall where they may, this theory says. Face up to it—it is impossible to predict the price of individual stocks. Investors must adequately diversify, allocate their resources, balance their investments.

The Pearson Lens

Karl Pearson (1857-1936), British mathematician, statistician, and philosopher of science, claimed that the *real things* of science are not single numbers but probability distributions. Applying this philosophy to the stock exchange means to me that I do not see the price of stocks but only the probability distribution of a portfolio. Pearson worked with four characteristics: the mean, standard deviation, symmetry, and kurtosis. As far as investments are concerned, I work only with the first three. I look at the market through the *Pearson Lens*, which means that I measure risk with symmetric distributions, expected means, and standard deviations. I assume that the market is in statistical equilibrium; if I know well the histogram of a portfolio, I can predict the future probability distribution.

Consider, for example, an index fund that emulates and uses as a benchmark the behavior of the Standard and Poor 500-Stock Index. For this well-diversified portfolio, the yearly expected return was about



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10% and the risk (measured in standard deviation) was about 16.34% based on data taken from 1940 to 1998 (59 years). I accept that these characteristics of the fund will hold for the future.

When talking about the risks of stocks (or portfolios), it is customary to use the S&P as a yardstick, and using the Beta factor

$$\text{Beta factor} = \frac{\text{STD of stock}}{\text{STD of S\&P}}$$

If a stock has a Beta factor greater than 1, then it is more volatile than the S&P; if the stock is less than 1, it is less volatile. If the stock happens to be 1, it matches the S&P.

I can achieve my desired risk, depending on my risk preference and capacity, by allocating my resources into a diversified portfolio of some of the over 700 funds marketed with different Beta factors. I select funds made up of specific classes of stocks and other instruments of investment, and balance my investments. If I want to be fancy, I apply Markowitz resource allocation technique and generate optimum, efficient portfolios.

Do's and Don'ts

Disregard the daily hullabaloo of the market. Do not look at the daily list of prices. Trade very rarely, hold on to what you have. Disregards all "hot tips." Trade only when something dramatic happens, creating a long-range change in the market, requiring rebalancing your portfolio. Or, if there is a change in your goals, or in your situation—like getting old. If you invest for

retirement, keep your eye on the pot of gold at the end of the rainbow. If you plan to begin selling 20-30 years away, short-range fluctuations are of no interest. Keep in mind some benchmarks:

Treasury bonds pay about 5%.

Inflation adjusted Treasury bonds pay about 3.5%.

Municipal bonds pay about 5.25%.

S&P Index funds pay about 10%.

Inflation is currently judged at the low level of about 1.5%.

However, these percents are more understandable in terms of the years I have until retirement. If I deposit yearly \$1, for 20 years, a total of \$20, my account accumulates to

\$29.27 at 3.5%

\$34.72 at 5%

\$63.00 at 10%.

As to inflation, I keep a few benchmarks in mind. For example, after 20 years of 5% inflation, an erosion to the fraction of 0.38 would occur and . . .

0.78 after 5 years

0.61 after 10 years

0.48 after 15 years

0.38 after 20 years

0.30 after 25 years.

These values defy intuition so I keep these benchmarks in mind. I have a list of funds made up of specific classes of stocks such as large-capitalization stocks, midcap, small-cap stocks, real estate equities, foreign stocks, municipals, sector funds, world funds, or other instruments of investment

such as cash, money market funds, corporate bonds, treasury bonds, inflation adjusted treasury bonds, etc. Index funds are favorites, for several reasons.

I wrote a Microsoft Excel program to project some of the more obscure points of retirement planning. For example, I do not keep my annual savings constant. Inflation means that my income goes up, too. So does my disposable income as years go by. When I retire, my equity starts to go down. When should I retire? When can I afford to retire? What I am really interested in is my long-range financial time series, and I cannot do this without a spreadsheet.

But I am not a do-it-yourself person. I selected my investment advisor carefully. I have a person who is well-versed in the modern portfolio management theory and adjusts all advice in harmony with the theory. While neither of us may accept all points of the theory, we do not make moves that would violate fundamental tenets.

Wrapup

Financial issues are so interwoven with the management of our lives that they cannot be separated into the box of finance. Thus, teaching modern portfolio management provides an excellent vehicle to introduce in a truly relevant way many, perhaps most, of the concepts of decision making. Viewing our uncertain world through the *Pearson Lens* stimulates the modern conceptual framework of looking at our situations through the strategy of global risk management. ■

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