RISKS and REWARDS

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Chairperson's Corner

by Joseph Tan

With this being my first column as chair of the Investment Section, I would like to take this opportunity to welcome the new Section Council members and to express the appreciation of the Council to the retiring members. Leaving us are Pierre Caron, Martin Leroux, Prakash Shimpi and Susan Watson. Joining us are Frederick Jackson, David Li, Christian-Marc Panneton and Peter Tilley. Our immediate past chair, Judy Strachan, is still with us. We thank her for leading the Council this past year and for her accomplishments. Luke Girard has been an editor for several years, and has now moved to an advisory position. We have appreciated his work during that time.

Also deserving our sincere appreciation are our three tireless newsletter editors: Richard Wendt, Nino Boezio and Anthony Dardis, and their associate editors. Without their assistance and

Is the New CPI Different? Implications for Pension Plans

by Todd Rutley

Changes to the CPI calculation methodology used by the Department of Labor have reduced the measured CPI rate by an estimated 0.7% over the 1995-99 period and other changes are being considered that could further reduce the CPI. The cumulative impact of these changes will reduce the CPI in the year 2000 by up to 1% relative to the pre-1995 methodology. Changes to the CPI methodology raise the following questions:

- Does the CPI accurately measure inflation?

- Will the change in methodology affect the economy?

- Will wage increases continue to track the CPI as they have in the past or will they exceed the new CPI as employees realize that the new CPI does not reflect their cost of living?

- Will bond yields be affected by the change in inflation methodology?

- Do CPI changes reduce the usefulness of "real" return numbers calculated by subtracting the CPI from nominal return data?

- Should Nominal Returns be used in investment analysis, rather than Real Returns?

In This Issue

Letter to the Editor

The October issue of *Risks and Rewards* contained an interesting statistical analysis of the likelihood of a recurrence of the 1987 stock market crash. I would like to suggest another view, that the answer depends on the investment strategies in vogue at the time. In 1987, the probability of a crash was near 100%. The only question was timing. Investment consultant Bill Morris not only predicted the crash, but exactly how it would happen. Money manager Richard Brignoli did the same and also correctly estimated both its magnitude and that the entire stock shock to the system would occur in a single day.

The culprit was program trading, or portfolio insurance in particular. Portfolio insurers increase their equity allocation as the market rises and decrease the portfolio insurance program; whenever the market fell (or rose) to a present level, some equity exposure would be sold (bought). If the market fell (rose) more to the next trigger point, more equity exposure would be sold (bought), and so on.

This strategy worked just fine as long as it wasn't too popular. However, if too high a proportion of the market embraced the approach, an initial sharp downdraft in the market (for whatever reason) would produce a huge number of automatic sellers. If portfolio insurance became popular enough, the buy/sell imbalance would become so pronounced that each wave of trigger point selling would depress prices below the next trigger point, leading to another round of selling and further depressing prices, yielding a downward spiral.

And that is exactly what happened. Something occurred over the weekend to cause the market to open on Black Monday well below the Friday close. The cycle of trigger point selling began, producing a rapidly decreasing price spiral. The non-insurers in the market did not cooperate. Rather than stand in front of a train, they front-ran the insurers. Instead of buying, they added to the sell pressure. It was bloody.

But it wasn't surprising. The exact same thing happened in September 1986, when portfolio insurance caused a price drop of 100 points in an hour. And, over the next 13 months, billions more were placed in the strategy. There were far too many market participants organized to sell in unison for the market to support. The only questions were when, how fast and how much. But a crash was near certain. And if a systematic weakness again occurs in the system, a crash could be near certain again.

It's fads. Like Tulipmania. Fads kill. The rash wasn't part of the extreme end of any probability distribution. It was a jump state.

Sincerely,

Eric P. Lofgren, F.S.A.
Watson Wyatt Worldwide

Editor's Note: Some analysts did correctly predict the 1987 crash, but then again, some economists have predicted 5 of the last 2 recessions.

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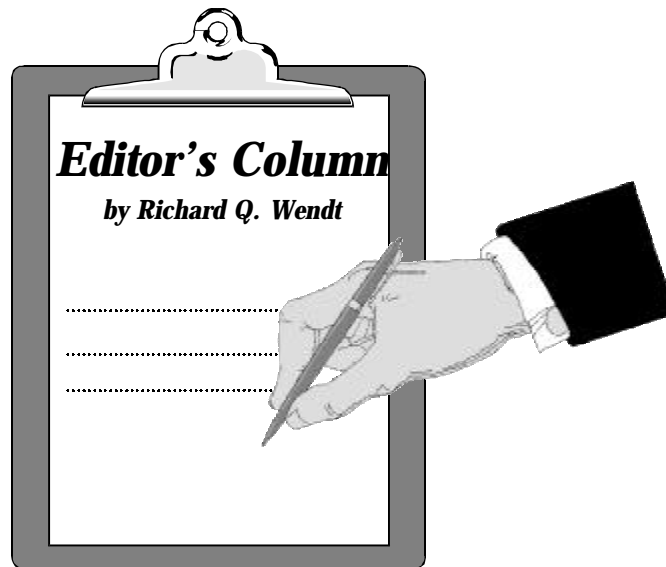 Investment Topics

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Editor's Column
by Richard Q. Wendt

As we enter 1999, there are a number of issues on the finance horizon that may affect investment actuaries. Whether you are working in the insurance or pension arena, the expectations for future inflation, U.S. budget surplus and interest rates will shape financial and political decisions for the next few years. The questions of privatization of Social Security and the investment of a portion of the Social Security Trust Fund in equities present intriguing questions. One prominent commentator wrote that the current budget surplus is mainly due to the incorporation of the Social Security inflows into the budget accounting mechanism and there may be some double counting of the surplus. Another commentator, reprinted in this issue, shows that equity investments and Social Security funding are inextricably linked, so that one can not be a solution to the other. A third commentator stated that a shift of the Social Security Trust Fund towards equity investments would raise bond yields, which would be good for Social Security investment income. None of these commentators were actuaries and actuaries need to speak out on the economic issues.

One article in this issue discusses financial patents, which is definitely a growth area. In an upcoming issue, we're anticipating an article on actuarial patents, which we hope will be of interest to our readers.

Unfortunately, the Denver Broncos won the 1999 Super Bowl. I say "unfortunately," because market pundits follow the Super Bowl effect, which predicts that the Dow Jones Industrial Average will have a good year following a Super Bowl victory by a team from the National Football Conference or the original National Football League. That category doesn't include the Denver Broncos. The prediction has been correct 23 out of 23 years. In the nine years that the NFC/old NFL team did not win, the Dow was down eight times; last year's Denver win was the first exception to that pattern. It remains to be seen whether 1999 will be another exception to the pattern.
That brings us to the 1999 Triathlon, which asks you to predict the bond and stock market results for year-end. Our last Triathlon results were placed in a "safe place" by the contest editor and have not surfaced since. We apologize to those who had entered and especially to those who had accurate predictions.

We hope you made equally accurate investment choices. This year, the Investment Section Council has graciously offered to award $100 prizes to the winner of each segment of the Triathlon. It is up to you to decide whether to follow the Super Bowl effect or your own crystal ball.

Is the New CPI Different? Implications for Pension Plans
continued from page 1

Does the CPI Accurately Measure Inflation?

The December 1995 report of the U.S. Senate Finance Committee's Commission on the Consumer Price Index (the Boskin Commission) stated that the U.S. CPI was an upwardly biased measure of the cost of living that most likely exaggerated inflation by 1.1 percentage points a year. The conclusion of the Boskin Commission has been supported by numerous other studies, including those by Federal Reserve Board Economists (see references). The old CPI methodology was faulted for many reasons including:

- *Substitution bias.* Fixed CPI consumption weights measure average prices not volume-weighted selling prices. This assumes that consumer demand is price-inelastic (i.e. it does not change when apples fall in price and oranges rise in price). This is important in an era of constant sales that makes the "real" price difficult to determine (this applies to food, retail, hotel, airlines, gasoline and other prices that change frequently).

- *New product bias.* Fixed CPI consumption weights are slow to adapt to changing consumption patterns which ignore new products and product substitutes (e.g. PCs and VCRs were not in the index until 1987).

- *Quality change bias.* The prior CPI methodology does not consistently reflect the difference between simple price increases and quality improvements. This is difficult to measure.

- *Outlet bias.* The fixed CPI methodology does not quickly account for the consumer benefit resulting from changes in distribution channels.

An Actuary Looks at Financial Insurance

by Richard Q. Wendt

With the development of new variations of equity indexed annuities and complex pension benefit design, new forms of return guarantees have been created in both insurance and pension. These guarantees create a form of "financial insurance" for investors and plan participants, as the expected returns are protected against market downturns. Today, both insurance and pension actuaries are determining the cost of return guarantees and appropriate investment strategies to support those guarantees. Some actuaries may be surprised to find that the conditions necessary for the use of traditional actuarial analysis may not exist in financial insurance and that the costs developed by traditional actuarial analysis may significantly understate the "true" cost. This article discusses the differences between traditional actuarial analysis of financial insurance and an option based analysis.

In 1995, Professor Zvi Bodie published his controversial article, "On the Risk of Stocks in the Long Run" in the *Financial Analysts Journal.* That article showed that the price of a put option on the S&P 500, with a strike price based on the risk-free rate of return, would increase with time horizon. That, Professor Bodie argued, indicates that stocks are indeed risky in the long run. Since his conclusion was contrary to the popular view of the long-term benefits of stock investment, his article generated quite a few responses.

Bodie's article showed that the price of a 20-year put option, under stated assumptions, would be 34.5% of the initial investment. Several commentators (using the traditional analysis) stated that a premium of that level could not possibly be correct, since the probability of a twenty-year shortfall was given as only 4%.

Option pricing concepts tend to puzzle and perplex actuaries and other analysts who are familiar with the more traditional insurance or probability-based approach. Thinking of a put option as a form of financial insurance,

the traditional actuary would likely attack the problem of pricing a put option by determining the distribution of future results, applying an interest discount factor and then summing the probability weighted present values of all outcomes. It often comes as a shock that the financial insurance premium is quite different than the option price calculated by the well-known Black-Scholes option formula.

Many analysts are aware that the Black-Scholes option price is primarily determined by the volatility of the security, and know, but may not fully understand why, that the expected return on the security is not an element of the formula. On the other hand, the traditional insurance methodology primarily references the expected return, while the volatility of the results is not directly referenced. The two methodologies are quite different; it should not be surprising that they may produce different results.

First, some background on the Black-Scholes option pricing model. The B-S model makes the following key assumptions (in simplified form):

- The underlying security is continuously traded and can be bought or sold, in any amount.
- Cash can be borrowed or lent at the risk-free rate, without limit.
- No taxes or transactions costs
- Security prices are given by geometric Brownian motion.
- There is no arbitrage.

Next, consider the key assumptions underlying an ideal insurance transaction:

- Large number of individual insured events
- Independence of insured events, in one year and over time
- Predictable risk

There are two key differences in the underlying assumptions—risk—and a related issue, independence.

Risk—the option transaction is priced to be arbitrage free, in the sense that an investor selling an option can, on the basis of the B-S model's stated assumptions, make continuous adjusting transactions in the underlying security to provide a guaranteed riskless result. On the other hand, the financial insurance transaction is not completely riskless.

> *"Option pricing concepts tend to puzzle and perplex actuaries and other analysts who are familiar with the more traditional insurance or probability-based approach."*

To expand on the issue of risk in the financial insurance arena, recall that in Professor Bodie's model the risk of stocks performing below the risk free rate is about 4%. One commentator suggested that, even if all value were assumed to be lost when there is underperformance, the cost of insurance would still be less than 4% (compared to the put option premium of 34.5%) .

- Assume that an investor puts $100 in the stock market and also spends $4 for financial insurance.
- The financial insurance provides a benefit only if the 20-year stock return is less than the risk free rate.
- If the 20-year risk free spot rate is assumed to be 6%, then the guaranteed amount would be $100 $*1.06^{20}$, which is $320.71.
- If the $4 insurance premium were to be invested at the risk free rate, then it would accumulate to $12.83.

How can $12.83 support a potential loss of $320.71? Only if, say, 100 investors buy the insurance and no more than 4 receive benefits. But if all 100 investors are investing in the same stock market at the same time, then they either all receive a large benefit or none

receive any benefit. Given a stochastic future, the insurer would have a profit 96% of the time, but the other 4% of occurrences would be financial disasters. Whenever performance is poor and benefits are payable, the insurer would have only $13 of assets and a required payment of $321. Assuming no other resources for the insurer, there would be a 4% probability of bankruptcy.

In fact, the risk-free insurance premium (i.e., the premium required to be 100% confident of covering all claims) would be 100% of the potential exposure (ignoring interest discount factors). The wonder of the B-S option pricing formula is that the true riskless cost is much less than 100%.

Some analysts might suggest that the insurance premium could be reduced by investing the premium in higher returning equities. That would not improve the financial results, since the accumulated premium would itself be valueless in the 4% of scenarios where benefits were required.

Independence—Suppose the insurer sells financial insurance policies every year, with each year's policies having a 4% expected loss. What premium would the insurer need to charge in order to assure solvency? Consider this simple example:

- 1000 policies sold each year for 25 years.
- The investment made under each policy is $1000 for a total of $1,000,000 in each year.
- The probability of loss for each policy after 20 years is 4%.
- The premium charged is 4% of the investment or a total of $40,000 per year.

At the end of the first 20 years, the determination of potential claims for the very first purchasers is made. If there are claims (4% probability), then $1,000,000 will be paid out; but total premiums over 20 years of sales only amount to $800,000. Assuming no additional resources, the insurer can make only a partial payment to the initial purchasers, but is now insolvent and can not provide any benefits to purchasers from years 2 through 20.

It would seem clear that a 4% premium would be insufficient to provide reasonable assurances of solvency. But what level of premium would be required for a higher degree of security?

Assuming that each issue year's results are independent for 25 years of issue, an 8% premium would be required to cover the 92% probability of 0 - 2 payout years in a 25 year period (assuming a binomial distribution). There would still be a remaining 8% chance of 3 or more payout years. For 98% certainty of covering payouts (up to 3 payout years), a 12% premium would be required.

Notice that, even though thousands of investors are buying financial insurance, there are only 25 different insurable events, not 25,000. The traditional insurance requirement of large numbers of independent events does not hold.

Furthermore, the payout years for this financial insurance would not actually be independent, since the investment periods overlap. For example, the admittedly extreme result of 100% loss in year 20 would wipe out investments for all purchasers in the first 20 years and trigger 20 years of payouts. In other words, $800,000 would be available to pay claims of $20,000,000 (ignoring the risk-free accumulation of both premiums and claims).

In order to evaluate the impact of overlapping periods, the Towers Perrin CAP:Link economic simulation model generated 500 stochastic scenarios covering 25 years of sales. That analysis indicated that a premium of 16% would be required for 90% certainty and a premium of 32% would be required for 98% certainty of covering all losses.

When we adjust the financial insurance premium for the risk of insolvency, it is easy to see that an expected loss of 4% can be translated to a premium that approaches, or even exceeds, the Black-Scholes risk-free cost of 34.5%.

This analysis shows that the traditional actuarial analysis of financial insurance may significantly understate the risk free cost of the insurance and that more advanced techniques are needed to properly price the cost of guaranteed returns for equity-linked products or pension plans.

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"...The traditional actuarial analysis of financial insurance may significantly understate the risk free cost..."

Chairperson's Corner

dedication, the Investment Section members would miss out on worthwhile investment-related articles and news.

Let me discuss the various projects that the Investment Section Council is currently working on or intends to pursue in the near future. Hopefully, the discussion may generate some interest among members to share your ideas or even to volunteer your participation (which we always need and appreciate).

First of all, we are all aware that 1999 is the Society of Actuaries 50th anniversary. Besides taking part in the various celebrations and activities planned by the Society of Actuaries, the Investment Section Council would also like to publish our own Investment Section monograph. Our hope is to provide this Investment Section monograph to all Investment Section members free of charge and to also provide the monograph to a wider distribution group, depending on the cost and our budget. Papers that had been mentioned as potential candidates include well-known papers by Redington, Reitano, and Tilley. The Council had decided that it would not be practical to expand the list to all investment papers found in the various investment and financial journals. The articles/papers selected would be those the Section Council considers important as far as having an influence on the thinking and practice in investments. Any member who has a suggestion about potential papers, please send your suggestion to either David Li or me.

Secondly, the Council intends to sponsor a seminar in 1999. Frederick Jackson is heading up this project, and is being assisted by Frank Sabatini. Likely topics for this seminar include:

1. **Liability Boot Camp for Investmeny Professionals**
    This session would be designed to introduce investment professionals to the basics of liability. The objective would be to enhance the investment professionals' understanding of liability issues so that investment objectives and strategies

would be tailored more appropriately.

2. **Advanced Risk Management Seminar**
    Using the new Actuarial Foundation text, *Financial Economics*, and the new syllabus material as a basis, this seminar would be designed to enhance the risk management knowledge and skills among actuaries.

Please provide your suggestions and feedback regarding these potential seminar topics to Frederick Jackson or Frank Sabatini.

Thirdly, the Council would like to solicit your input for session topics that the Investment Section should sponsor during the spring and annual meetings. Though the 1999 meetings sessions are already somewhat finalized, your participation and suggestions are still needed in the following areas:

*   Volunteer to be a speaker in one of the 1999 spring and/or annual meeting sessions.
*   Suggest session topics for the 2000 spring and annual meetings.

For 1999, Peter Tilley is our spring meeting representative, and Josephine Marks is our annual meeting representative. You are encouraged to contact them with your ideas.

The Section Council is once again nominating candidates and recipients for our prestigious Redington Prize award. And this time we are making it even more attractive and financially rewarding for the winner. Luke Girard, with assistance from Judy Strachan of the Section Council, is heading up the nominating committee. If you know of a good paper (even if it is your own), please don't hesitate to bring it to the attention of Luke Girard or Judy Strachan.

Regarding other exciting projects that the Council is or will be working on in the future, we will reserve that for

the next time. In the meantime, if you have any ideas, suggestions, comments (or even complaints), the Council members are all ears. Please contact any of us at our Directory addresses, phone/fax numbers and/or e-mail.

Food for Thought
With the yield rate on fixed income securities being at a levels unseen for many decades, and with the projection of it being even lower, what should insurance companies do? As actuaries, what challenges and opportunities can we identify?

*   Types of assets to invest (e.g., common stocks)
*   Hedges and derivatives
*   Investment laws
*   Kinds of insurance and annuity products
*   Asset adequacy analysis (e.g., Is failing a large set of declining scenarios acceptable? Or should strategies be put in place to ensure the fulfillment of policyholders' obligations if the declining scenarios do materialize?)
*   Risk-based capital
*   Profit objectives
*   Reserve conservatism (Where is it? How much?)
*   Policy illustration
*   Market value determination, financial statement presentation
*   Technological advancement
*   Should I look for a different job?

Joseph H. Tan, FSA, MAAA, is an actuary for the National Actuarial Network Inc. in Voorhees, NJ, and is Chairperson of the Investment Section Council.

Is the New CPI Different? Implications for Pension Plans
continued from page 3

For the reasons cited above, it was clear that the CPI overstated inflation in 1995. The degree of upward bias estimated by the Boskin report will be largely eliminated by the changes that are scheduled to take effect by the year 2000. Although the stated objective of the methodology change is to reduce the bias in the CPI measurement, it may make inflation even harder to estimate. Rapidly changing prices and distribution channels could result in very wide price dispersion for the same product over a short period of time.

Summary of Recent CPI Index Methodological Changes
1/1/1998—Updating of CPI basket to 1993-95 consumption patterns and decision to update more frequently in the future than in the past.

1/1/1998—Updating of CPI component classifications to reduce substitution bias.

1/1/1999—Adoption of Geometric mean calculation to reduce substitution bias.

The result of the recent and planned changes to the CPI is that the pre-1995 and post-2000 CPI series will not be based on the same methodology. Therefore, **historical inflation and real return data may not be comparable to future inflation and real return data**. This has serious implications for investors interested in real returns.

The Effect on the Economy
The Consumer Price Index is used to adjust Social Security benefits and to adjust the income brackets for the U.S. income tax. Changes in the methodology could have a significant effect on government income and expense. A methodology change that reduces the calculated CPI will reduce future increases in Social Security benefits and reduce future bracket increases for

tax calculations. Both effects will either increase the federal budget surplus or reduce any budget deficit, compared to no change in CPI methodology. A higher budget surplus would likely result in reduced government borrowing and lower government bond yields. These effects could significantly impact a broad spectrum of the public: Social Security beneficiaries, taxpayers, and investors.

The CPI and Wages
Aggregate wage inflation generally exceeds CPI inflation by a small increment that is attributed to productivity increase. This real wage increase is typically estimated at about 0.50%. This is based on the average relationship over the 1950-97 period. Chart 1 shows this relationship over the 1981-1996 period for the private sector labor force.

The historical relationship between the CPI and wage increases suggests that wages typically track the CPI fairly closely. However, this relationship may weaken in the future for several reasons. First, CPI changes caused by methodological changes will reduce the measured rate of inflation and the average employee's acceptance of this measure. That is, employees and unions may have come to accept the CPI as a

benchmark measure for pay increases because it had a built-in real wage increase due to the price measurement bias. Second, the relative importance of the CPI mismeasurement is high now that inflation is only about 1.5%-2.0% (i.e. the mismeasurement may account for 1/3 of reported inflation. Third, the labor force is becoming increasing "bipolar" as the gap between high and low wage workers increases due to changes in productivity. As a result, high skill workers may have average wage increases far higher than the rate for low skill workers. All of these factors suggest that the reliability of the CPI as a benchmark for wage increases may diminish.

The Impact of CPI Changes on Bond Yields
The long-term impact of CPI changes on bond yields is unclear. On one hand, the increase in government budget surplus will tend to reduce government bond yields. On the other hand, it is uncertain whether investors' inflationary expectations will change and, if so, whether bond yields would decline more than justified by changes in the budget surplus alone. For example, if the federal government suddenly announced that, starting tomorrow, the official CPI calculation would be arbitrarily reduced

Chart 1
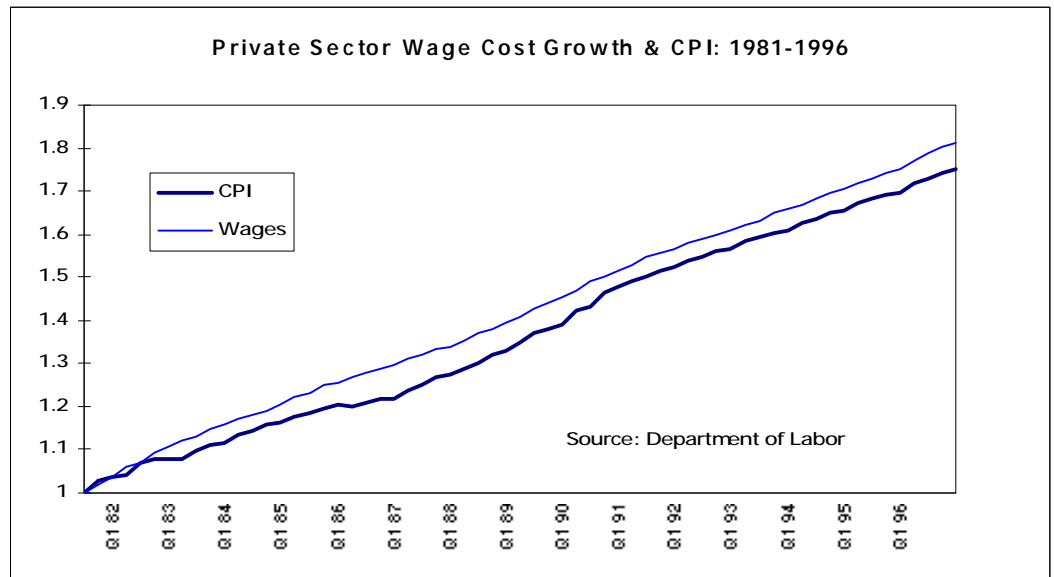
Private Sector Wage Cost Growth & CPI: 1981-1996

Source: Department of Labor

Is the New CPI Different? Implications for Pension Plans

1%, it is unlikely that government bond yields would immediately drop 1%. Investors would presumably realize that an arbitrary change in the measurement of inflation would not truly affect their personal purchasing power and would not reduce their required yield for government bonds. If the methodology change were gradual and not perceived to be arbitrary, investors might adopt new inflationary expectations and reduce their required yield.

With respect to the suggested methodology change, the government is introducing the change on a low key, gradual basis, and there have been no published suggestions that the change is arbitrary. Therefore, the expectation is that the methodology change will act to reduce government bond yields over the long-term.

The Impact of CPI Changes on Real Investment Returns

The current changes in the CPI methodology may increase prospective real returns, depending on how capital markets react. For example, if interest rates do not decrease in line with lower calculated CPI, real stock and bond returns will be higher. Conversely, if real bond yields decline, this may lead to a decline in the required return on equity and higher equity valuation ratios (this appears to have happened over the last two years in the equity market).

The current revisions to the CPI indicate that historical inflation has been overstated with the result that both real returns and real economic growth over the last 25 years of relatively high inflation have been understated. This has important implications for investors because it reduces the reliability of historical data.

Are Nominal Returns a Better Measure of Investment Performance than "Real" Returns?

The relevance and accuracy of real investment return calculations depend both on the selection of an appropriate measure of inflation and also on an accurate calculation of inflation. The analysis above indicates that the CPI is an inaccurate measure of consumer price inflation, which suggests that it is also an inaccurate adjustment measure to determine the real return on investment capital. This indicates that the CPI should be compared with other measures of inflation, including the GDP price deflator and the producer price index, in order to evaluate whether one of these measures would be a better measure of inflation for investment purposes.

The current changes to the CPI indicate that the CPI is not a consistent price measure over time and that pre-1995 and post-1995 real return comparisons for either investments or economic growth may be invalid. For these reasons, nominal returns appear to be a better measure of future investment performance than real returns using the consumer price index.

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Psychology and Financial Markets: Richard H. Thaler Addresses the Investment Section

by Luke N. Girard

Editor's Note: See Victor Modugno's article on page 11 for more comments on the annual meeting.

Richard H. Thaler is the Robert P. Gwinn Professor of Behavioral Science and Economics at the University of Chicago. He is also well known for writing the best-selling book *The Winner's Curse: Paradoxes & Anomalies of Economic Life.* Dr. Thaler addressed the Investment Section at the Society of Actuaries meeting in New York on October 20. This article provides a review of his talk.

Thaler challenges perceived economic wisdom by revealing many paradoxes that abound. Modern financial economics is based on two rationality assumptions. These assumptions are: (1) rational expectations and (2) expected utility maximization. Over the past 20 years, evidence is mounting that these assumptions are descriptively inaccurate. He mentioned several important results from studies in the psychology of decision making. These include "overconfidence," "anchoring and adjustment," "mental accounting" and "framing."

We all know that overconfidence leads to overpricing which then leads to surprise and then regret. However, Thaler brought this home by asking the audience to rate themselves on their ability to get along with people. This rating was determined relative to the others attending the session. If the attendees had an unbiased evaluation of their ability, then about half the group

would be rated above the 50th percentile and half would be below. As it turned out, 86% of the attendees rated themselves above the 50th percentile. On the bright side, Dr. Thaler did say that the group as a whole had a more realistic expectation than other groups he had tested. Yet, this result does show that we exhibit overconfidence in our abilities relative to our peers, that is, we're still human after all.

Bias in earnings estimates can be introduced by anchoring and adjustment. As example, Thaler provided a couple of tests one of which he calls "The Dating Heuristic." Here, two questions were asked of a student sample: (1) "How happy are you?" and (2) "How often are you dating?" If these two questions are asked in this order, their correlation .12. If they are asked in reverse order, their correlation is .66. This should give us pause when interpreting any survey results, political or economic.

Thaler illustrated mental accounting with the "The House Money Effect." Here investors exhibit different risk aversion depending on whether they are betting their "own money" or "house money." This is also called the two pocket theory of gambling. See the table below and note that the probability distribution of the payoffs for both situations is exactly the same.

For framing, Thaler used the example of consumer attitudes toward price increases. In this example, a shortage has developed for a popular model of automobile and customers

Richard H. Thaler addresses the Investment Section.

must now wait two months for delivery. In Case I, the dealer has been selling the cars at list price and now raises the price by $200. In Case II, the dealer has been selling the cars at a discount of $200 below list price and now sells them at list price. In test results, 71% consider the pricing action in Case I to be unfair while 42% consider Case II unfair.

Thaler addressed the "Equity Premium Puzzle." That is, the real return on stocks is about 7% while it is 1% for bonds, so why is any long term investor such as a pension plan willing to hold bonds? Thaler attributes this to mental accounting and loss aversion. Investors exhibit loss aversion in that they weight losses greater than gains by about 2.5 to 1. Also, between evaluation dates, they aggregate gains and losses. That is, they do not look at results between evaluation dates which diminishes risk aversion. Thaler calculated how often investors would need to be evaluating their portfolios in order to be indifferent between investing in bonds and stocks. The answer is 13 months.

Thaler also addressed asset allocation behavior in defined contribution plans where the "1/N Heuristic" is

Situation I	Situation II
You have won $30. Now choose either:	Choose between:
A. A 50% chance to win $9 and a 50% chance to lose $9.	A. A 50% chance to win $39 and a 50% chance to win $21.
B. No further bets.	B. A sure gain of $30.
Result: 70% choose A	Result: 43% choose A.

Psychology and Financial Markets: Richard H. Thaler Addresses the Investment Section
continued from page 9

Rational Expectations	Observed Facts
Changes in prices reflect new information.	On October 19, 1987, price changes did not reflect new information.
Everyone buys the market portfolio.	Most portfolios are poorly diversified.
Virtually no trading should occur.	Most equity funds are actively managed and turnover is high.
Prices are unpredictable.	Small firm, prior losers, low p/e and low price to book all outperform index. Also, price drifts after announcements of earnings, dividend and share repurchase.
Only non-diversiable risk is priced.	CAPM Beta barely matters.
When dividends are taxed higher than capital gains, firms will repurchase shares rather than pay dividends.	Dividends are the norm. When firms announce dividend increases, share prices increase.

observed. That is, the allocation to stocks will tend to follow the number of stock funds being offered relative to the number of bond funds being offered. For example, in the TIAA-CREF plan, there are only two options, stocks and bonds, and the most popular allocation is 50-50. In the TWA pilots plan there are five stock funds and one bond fund and participants invest 75% in stocks. The University of California plan has one stock fund and four bond funds and participants invest 34% in stocks.

Three morals of human behavior:
1. People are more sensitive to losses than to gains.
2. Opportunity costs are under weighted relative to out of pocket costs.
3. The way a decision is framed alters the choice.

So, why do the rationality assumptions prevail? There are two lines of defense. First, market forces somehow induce participants to act rationally. Second, people behave "as if" they are rational, even though they are not rational. For example, an expert billiards player plays "as if" he knows the laws for physics. With respect to market forces, stupidity does not always create arbitrage opportunities. For example, "Closed-end funds almost always trade at a discount relative to net asset value." However, arbitrage is not possible because the discount could become wider.

As for the "as if" defense, we need to judge theory by its predictions. The table above shows the predictions of the rational efficient market framework and compares this to real world observations.

Thaler concludes that (1) the assumptions are unrealistic and the predictions are poor. It's time for a new theory. (2) There is, as yet, not a fully developed behavioral equivalent to the CAPM. He states, "The economist may attempt to ignore psychology, but it is impossible for him to ignore human nature. If the economist borrows his concept of man from the psychologist, his constructive work may have some chance of remaining purely economic in character. But if he does not, he will not thereby avoid psychology. Rather, he will force himself to make his own, and it will be bad psychology."

Luke N. Girard, FSA, MAAA, is Vice-President of Lincoln Investment Management Inc. in Fort Wayne, Indiana.

"There are two lines of defense. First, market forces induce participants to act rationally. Second, people behave 'as if' they are rational, even though they are not rational."

Report From the Society of Actuaries Annual Meeting in New York

by Victor Modugno

Editor's Note: See Luke Girard's article on page nine for more comments on Professor Thaler's speech.

Two economists spoke on topics of interest to Investment Section members during this meeting. Lester Thurow, Professor of Management and Economics at MIT, gave the keynote speech. Richard Thaler, Professor of Economics and Behavioral Sciences at the University of Chicago's Business School, spoke at the Investment Section's Breakfast Meeting.

According to Dr. Thurow, a 21st century historian will view the 1990s as a third industrial revolution. The first industrial revolution occurred in the 19th century. It was driven by the invention of the steam engine that changed transport, leading to nationwide industries. The second revolution occurred at the beginning of this century with electrification, turning night into day. Computerization, globalization, and telecommunications drive today's revolution. As with previous revolutions, great fortunes are being made in new industries and the way we work and live is changing.

For example, teleconferencing is reducing business travel, while globalization is increasing it. Brand names may become more important as the Internet lowers barriers to entry. It's the only way you can tell the difference between a large business and two high school students on the Internet. The value of knowledge is increasing while globalization is forcing down wages in jobs that can be exported.

The euro may replace the dollar as the international reserve currency in the next century. The U.S. runs persistent trade deficits, while Europe runs surpluses. This cannot continue indefinitely. The euro will become a viable alternative to the dollar. If this happens, it will have major implications for U.S. financial markets.

Dr. Thaler's speech focused on disproving a key assumption underlying much of financial economics—that investors behave rationally. Both the assumption and the results predicted by the theory are wrong. Instead we have to look to behavioral science to explain markets.

Several behavioral reasons why investors are not rational include:

- Overconfidence—people have a higher opinion of their ability or luck than justified—explains why gamblers play against losing odds.
- Anchoring Adjustment—Given a number, estimates will be made from that number even if known to have no relevance. For example, given a number determined by age and birth month, students were asked to guess the year Atilla invaded Europe—the response varied based upon the first number. This explains why earnings projections always are close to current earnings.

- Mental Accounting—gamblers consider money they win as "house money," differently from money they bring with them.
- Framing—you can get any result from a survey by framing the question differently.
- Loss aversion—pain of losing money is greater than joy of gaining it. 2 to 1 odds are needed to take an even money bet.
- False intuition—several intuitively correct notions are wrong.

The audience participated in several exercises to illustrate these behaviors, proving that even investment actuaries are human! First was solving a puzzle—a one-mile-long road increases by one inch and buckles up into a pyramid. What is the height from the ground to the point of the pyramid? Most guessed it was 0 to 3". The correct answer was 26'.

I admit I was with the 3" group—my excuse is that it was 4:30 am Pacific time. In the second exercise, participants were asked to rate their interpersonal skills relative to others in the room. Only a few rated themselves below the 50th percentile. Actuaries were more modest than some other groups where most of the participants rated themselves above the 80th percentile.

Many anomalies in the stock market are contrary to what would result from rational behavior, including:

- Dividends—tax exempt investors are indifferent to dividends compared to capital gains, while taxable investors prefer capital gains. Yet companies continue to pay dividends instead of buying back shares.
- Noise trading—there is far more trading than would be justified by rationale expectations.
- Historic overperformance of small and low p/e stocks

Commentary-Social Security: Go Refigure

by Aaron Bernstein

Democrats and Republicans disagree sharply on how to save Social Security. But they agree on two things: the system faces a funding crunch some 30 years hence and investing in the stock market can help fill the gap. Problem is, both of these views can't be correct. The fear of a gigantic shortfall in funds rests on the Social Security Administration's (SSA) projection of an economy growing at just 1.4% over the next 75 years. But the stock market solution depends upon equities producing inflation-adjusted returns of some 7% a year, which is what has happened over the past three-quarters of a century, when the economy averaged 3% annual growth. "If you believe the Social Security projections, the rate of return on capital will be less,'' says Jeremy J. Seigel, an expert on long-term stock trends at the University of Pennsylvania's Wharton School.

DEEP GLOOM

The politicians can't have it both ways. Either the economy will grow at far below the historic rates, and there will be a Social Security crisis that the stock market will not be able to rectify. Or the economy will grow at a faster rate, the stock market will continue to rise at a healthy pace, and Social Security will have the funds it needs to keep operating throughout the retirement of the baby boom generation.

What makes SSA take a view that's so pessimistic? The agency doesn't believe that productivity will continue to grow as rapidly as it has since 1995. Agency economists say they are simply being prudent by projecting a future annual rate of 1.26% for productivity. To arrive at this number, the agency focuses on the 1% average annual increase set between 1973 and 1995 and ignores the more recent spikes that have put productivity gains closer to the historic 2%-a-year average. The SSA views population growth in much the same fashion. It focuses on the trend toward smaller families that began in the 1970s and dismisses the rise in birth rates that has occurred in this decade as a possible aberration.

If the SSA is right, the stock market can't be the savior of Social Security. With subpar productivity gains and slower growth in the labor force and the ranks of consumers, corporate profits are unlikely to expand rapidly. And without higher profits, it's hard to see how equities will continue to rise 7% annually over future decades. Stephen C. Goss, Social Security's deputy chief actuary, argues that stock gains are linked to economic growth only in the short term. But over time, capital has a fixed rate of return. As a result, stocks can still deliver the returns even if gross domestic product slows. Experts such as Seigel disagree. And so, no doubt, would Wall Street pros and corporate executives who still think that slow growth means market doldrums.

ALTERNATE MODEL

The SSA isn't totally wedded to its gloomy projections, however. It has an alternate model, in which gross domestic product growth averages 2.14% a year over the next 75 years. At that rate, Social Security is likely to show a slight surplus through 2072, largely because the population grows faster and there are more workers paying taxes for every retiree drawing a government retiree check.

Clearly, no one can predict what will happen over such a long period of time. But if you think that the markets will match their historic performance, you shouldn't be worrying so much about Social Security. And if you buy the notion that we're in for 75 years of 1.4% growth, you have a lot more to worry about than just Social Security.

Aaron Bernstein is an editor for the Business Week magazine.

Report From Annual Meeting in New York

Dr. Thaler was a supporter of 401(k) plans. He felt it was the only way most employees would save enough for retirement since the money was automatically deducted from their paychecks. One phenomenon in these plans that explains the decline in stable value funds is the $1/n$ rule. Given n funds, the most common election is $1/n$ to each fund. If more funds are bond funds, employees chose a higher allocation to bonds than in those plans that have more stock funds. Thus the decline in stable value is due to the proliferation of investment alternatives and not to stock market performance. Since employees rarely change their investment election, the movement from stable value has been slow, but may not reverse if the stock market drops.

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Patenting In Insurance Starts Shaping Up As Robust Discipline

by Bruce W. Foudree & Peter K. Trzyna

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Patenting in the insurance business has developed into a robust discipline with mature complexities. Insurance company management and legal counsel find themselves in a much more complicated environment where they must consider a variety of issues involving intellectual property rights.

They must also deal with growing concerns about how to protect commercially valuable developments against losses resulting from government activity, including regulation and litigation. This is the first of several articles that will appear in *National Underwriter,* dealing with the state of the art in using intellectual property law in the insurance industry. We begin with some history and basic ideas.

For over 30 years, it has been known that a patent can be used to indirectly protect an insurance innovation. For instance, U.S. Patent No. 3,634,669, filed by Aero-Flow Dynamics in 1969 and issued in 1972, covers an analog computer (i.e., an amplifier) with input dials for determining certain insurance premiums with a voltage gage.

Also, U.S. Patent No. 3,698,630, covering a circular slide rule that calculates insurance premiums, was filed by Metropolitan Life in 1970 and issued in 1972. A patent provides the exclusive right to make, use, or sell a machine (programmed computer), process (method of making or using the programmed computer), or an article of manufacture (software on a diskette).

Although an insurance innovation cannot per se be patented, it is possible to protect the computer support necessary for the innovation so broadly that using any computer and any software to carry out the patented activities would infringe the patents. Indirectly, this kind of protection can equate to the exclusive right to the product or service itself for the patent term (20 years from the first filing date. But enforceable only after the patent issues).

The objective is to use a patent to obtain a royalty stream from sales made by a competitor. Thus, in an insurance company, a true research and development group in combination with the informations services department can be a significant profit center in and of itself.

Insurance companies with patents include Metropolitan Life Insurance Company (20), Liberty Mutual (11), Hartford Life (5), Allstate (3), Aetna (3), Prudential (2), and Lincoln National (2), and dozens of companies with only one patent. Interestingly, the majority of these patents do not pertain to insurance *per se*, but instead show the vertical integration of the insurance companies involved.

For instance, Met's patent portfolio includes 11 plan patents on various fruit tree cultivars. Meanwhile, other insurance companies have patents on prosthetic devices, ultrasonic detectors for boilers, chemical treatments for diseases, etc.

Chronologically, it appears that patents on insurance innovations evolved from company experience pursuing patents in other related areas, all long before other financial services caught on to the idea. When the industry turned to patents for insurance innovations, the initial approach was to have each innovation protected by a single patent.

Examples include: U.S. Patent No. 4,837,693 on a computerized insurance premium quote request and policy issuance system (The Chubb Corporation 1989); and U.S. Patent No. 4,975,840 concerning a method for evaluating a potentially insurable risk (Lincoln National 1990).

This approach still continues. One example is U.S. Patent No. 5,806,042, which covers a system for designing bank owned life insurance with a reinsurance option (unassigned 1998).

For highly valuable innovations, insurance companies have begun obtaining clusters of patents for added protection. Thus, while a potential infringer may be able to avoid one or two patents, they will not likely avoid five or ten patents. This is especially true if some applications are kept pending in the Patent and Trademark Office, to be tailored and issued in response to whatever defense the potential infringer may pursue. As demonstrated in other industries, this approach greatly increases the likelihood of success in obtaining royalties. That's because litigation would more likely be a hopeless long shot against a patent owner with all the cards, including wild cards up the sleeve (most U.S. patent applications are confidential).

Ryan Evalulife Systems is pursuing this approach. U.S. Patent No. 5,673,402 covers a hybrid mortgage/insurance product for purchasing a home with smaller up front costs, the cash value builds up to retire the interest only mortgage, and if the seller retires the mortgage for cash, the seller keeps the life insurance policy.

Also, Ryan's U.S. Patent No. 5,655,085 covers computerized insurance quoting for universal life insurance products. Based on disclosures in these two Ryan patents, Ryan filed a third patent application in 1992 that would cover quoting and selling all insurance, annuity, IRAs, 401(k), securities, certain mortgages, and other financial products on the Internet. This application is still pending.

All the Ryan patents are related. Another leader in protecting financial innovations with patent clusters is Hartford Life Insurance Company,

Patenting In Insurance Starts Shaping Up as Robust Discipline
continued from page 13

which has obtained four of its five patents in the last two years.

The company's U.S. Patent No. 5,802,500 covers computing involving the use of insurance in trusts to set aside money for Other Postretirement Employee Benefits under FASB 106. Hartford also is an owner of U.S. Patent No. 5,136,502 on a similar subject and has further patent applications pending. U.S. Patent No. 5,590,037 covers a method for producing an illustration of a prefunding program for an employee benefit, and U.S. Patent No. 5,839,118 covers an insurance/loan optimization system.

It could be said that using patents for insurance innovations is, *per se* an active area. In fact, the PTO has so many patents and applications that it has designated a separate subclass to keep track of them, and the PTO has assigned about 20 examiners to handle applications in the financial and insurance industries.

The usual backlog delay in obtaining such patents is upwards of three years. Cash value life insurance areas have been the most active, as indicated above. However, the workers' compensation field seems to have come alive. U.S. Patent No. 5,613,072 covers a

> *"Despite the court's clear decision, PTO has not changed its policy on examining patents to come in line with the decision or the body of law on which the decision is based."*

system for funding WC losses (Risk Data 1997). B & S Underwriters has announced that the Patent Office has allowed its patent claims covering its Alternate Plan (R) WC, involving the use of combined health-life and property-casualty policies to provide WC coverage.

Hospital/medical insurance patent activity abounds. US Patent No. 5,832,447 covers an automated system and method for real-time verification of health insurance eligibility (Envoy

Corporation 1994). Mean-while, U.S. Patent No. 5,235,507 covers a health insurance management system (P.B. Toau and Company, Ltd. 1990). These are only a few examples.

Despite all this patenting activity, there are some trouble spots on the horizon. The primary obstacle is the Patent and Trademark Office, which serves as a gatekeeper for our nation's technology.

In determining whether an invention is patentable by law, the PTO follows an Examination Guideline that largely repackages an earlier Guideline in new government speak.

Under the old Guideline, the PTO would reject patent applications covering a programmed computer for insurance computing as an unpatentable "method of doing business."

Under the new Guideline, the same computer system is unpatentable as an "abstract idea" for manipulating insurance concepts—but it is still a rejection of a programmed computer as a machine. A recent federal court decision, *State Street Bank vs. Signature Group,* upheld a computer system patent broad enough to gain exclusive rights to an entire class of financial products (multi-tiered mutual funds). The court considered the so-called "business method" exception used by the PTO to determine whether computer program-related inventions are patentable and stated, "We take this opportunity to lay this ill-conceived exception to rest."

Despite the court's clear decision, PTO has not changed it's policy on examining patents to come in line with the decision or the body of law on which the decision is based. There has been little improvement since the time of the prior Guideline.

Efficiently getting patent protection

is an ongoing significant challenge. This is made more difficult because a patent examiner background in computer

> *"It could be said that using patents for insurance innovations is, per se, an active area."*

science and insurance is about as rare in the patent examining corps as it is in the patent bar.

The problem hurts independent inventors and small companies the worst. Everyone knows that such a PTO rejection will be reversed on appeal, because the PTO has lost every case involving patent claims limited to a programmed computer since the creation of the Federal Circuit. But small companies cannot afford the cost and the half-decade or greater delay in getting a patent when an appeal is involved.

Unfortunately, there is no hint that the PTO will conform with case law. Just as the Internet is changing the financial world, the new trend of using patent clusters to cover Internet insurance and other financial activities can reshape the face of the insurance industry. The field of patents in the insurance industry has grown by leaps and bounds over the last decade, but undoubtedly, the same will be said 10 years from now.

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Editor's Note: A searchable database of issued patents can be found on the internet at www.uspto.gov/patft/. We are aware of three recent patents obtained by actuaries and hope to have an article in a futue issue of Risks and Rewards.

The Long and Short (Runs) of Investing in Equities

by Peter Yoo

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Many people have re-evaluated the share of equities in their portfolios as a result of recent stock market fluctuations. In their deliberations, most undoubtedly encountered this advice: Invest in equities for the long term and ignore the short-run fluctuations of the stock market because stocks offer a higher rate of return than many other types of investments. Many have heard a corollary: Investors with short investment horizons should lower their exposure to the volatility of equities.

> **"Investors with short investment horizons should lower their exposure to the volatility of of equities..."**

Historically, holding an investment in equities for a long horizon has lowered the risk of losing money. Monthly total returns (returns with dividends reinvested) on Standard & Poor's 500 Composite Index (S&P 500) averaged 0.8 percent and had a standard deviation of 4.1 percent between 1871 and 1998. So an investment in the S & P 500 held for one month would have lost money nearly 40 percent of the time, but one held for 10 years would have lost money less than 2 percent of the time.

However, as noted by Paul Samuelson 35 years ago, lengthening the investment horizon does not reduce all of the uncertainties associated with equity investments. Although a long investment horizon decreases the probability of losing money, it does not reduce the variability of an investor's portfolio value. Rather, a longer horizon increases the range of probable values of her wealth. Consider a simple game where a player wins one dollar if a coin comes up heads, and loses a dollar if it comes up tails.

As an inducement, the coin is weighted so that the probability of heads is 0.6. If the coin is flipped once the player will lose one dollar with probability 0.4. But if she plays the game 100 times, the probability of a net loss falls below 0.02, largely due to the expected gain from each toss. Yet, the range of probable outcomes does not shrink; it increases. The player who tosses the coin once expects to win $0.20 and may win or lose a dollar. If she tosses it 100 times, she expects to win $20, may win or lose up to $100, and will win less than $15, or more than $25, nearly a third of the time.
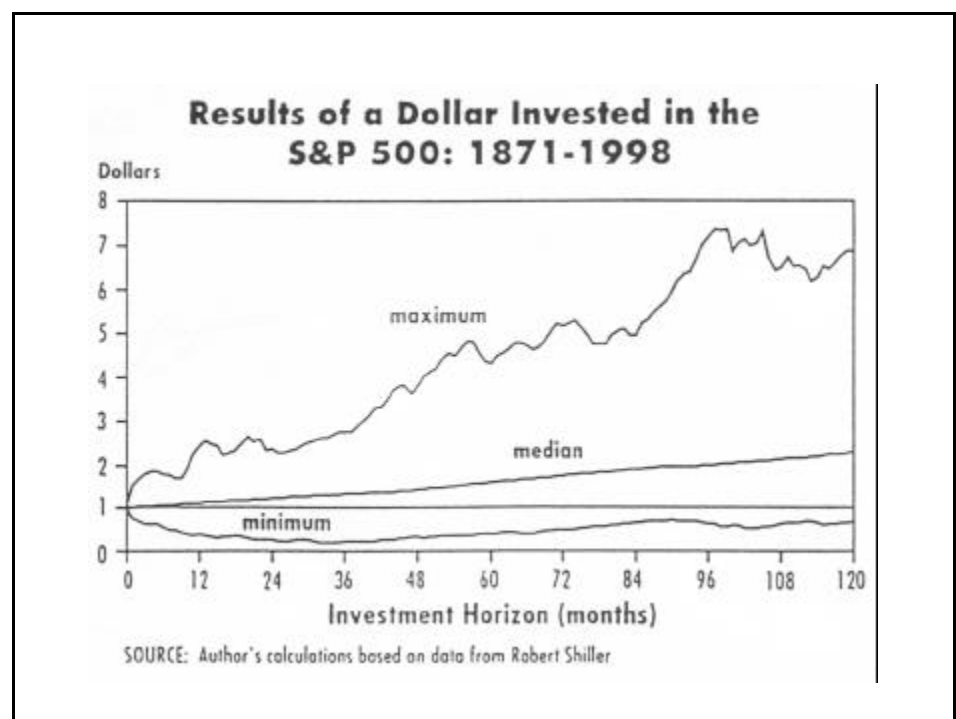
Investing in the stock market has similar implications. The chart below

> **"...Historically, holding an investment in equities for a long horizon has lowered the risk of losing money."**

shows the maximum, median and minimum results of a dollar invested in an arbitrary month between 1871 and 1998 for various investment horizons. It clearly shows that holding equities for a long horizon rarely produced a loss, but it did not shrink the range of probable outcomes.

Instead, the range of investment results grew with the investment horizon. So, investing for the long term may reduce one uncertainty associated with equities, but it does not reduce all of them.

Peter Yoo is an editor for National Economic Trends, located in St. Louis, Missouri.

Results of a Dollar Invested in the S&P 500: 1871-1998

SOURCE: Author's calculations based on data from Robert Shiller

Learning Curve—Credit Default Options

by Geoff Chaplin

Editor's note: This article was reprinted with the permission of Derivatives Week. This article last ran in the November 30, 1998 issue. This magazine is published in London, England.

Suppose you won XYZ Company bonds. I could write default protection. If XYZ defaults, you can deliver the bonds to me and I will pay you par plus accrued interest. In return you would have to pay me a premium for the contract—either up-front or a regular premium during the life of the option, when it is a default swap. There are many variations on this basic theme. The payoff may be par, par plus accrued, the value of the cash-flows promised on the bond (either at the risk-free rate or plus a spread); the actual cashflows on the due dates but paid by me instead of XYZ; or there may be no offset (a digital or binary option). But the basic concept is a pay-ment by me to you, on default of XYZ, in return for a premium. The contract is very similar to life insurance.

Applications

Going long a default option can be an alternative to selling the underlying risk and it can allow the user to manage the risk independently. For example, short-term insurance can be obtained on long-term debt, or insurance can be obtained when there is no underlying risk—an alternative to going short the underly-ing. Options can be written as a means of obtaining premium income. Buying a default option rather than selling the debt may be for relationship reasons—your customer may not be impressed if they see you selling their debt.

Why All The Fuss About Credit Derivatives?

These contracts offer new ways to man-age credit risk. As in other markets, such as fixed income and equity, the derivatives may become more liquid

than the underlying contracts. But one of the main reasons for interest arises from the identification of counterparty risk in the contract. If I default before XYZ, then your protection has gone. If you are paying a periodical swap premi-um, this may not necessarily be a bad thing: you may be able to buy a default swap more cheaply than the original terms.

Counterparty risk is not unique to default options. Any contract with another party involves some form of counterparty risk; it percolates through, not only the banking business, but all commercial businesses. One reason for the interest in credit derivatives is the framework it gives for looking at coun-terparty risk generally.

Pricing

Let's concentrate on the XYZ default risk. There are two approaches we could take—anticipated default and expected default. For anticipated default we might take historical default rates based, say, on similarly rated bonds as a guide. Or we might make some option theoretical analysis based on corporate

accounts and share price information (see Learning Curve, 5/18). For expect-ed default—and this word is used in a deep financial economics sense—we take the spreads at which XYZ market debt trades.

The key question is, am I pricing the derivative off a hedge I am going to put in place, or am I trying to decide if XYZ debt is cheap or expensive? In the former case I am arbitrage pricing and I should use market-traded debt as my guide—the expected default rate. In the latter case I am trying to beat the market—my assessment of anticipated default rates will partly drive the decision.

Hedging

If you buy five-year default protection on your five-year XYZ fixed coupon bond, then the default risk is now large-ly hedged out. There is interest rate risk in the XYZ fixed coupon debt which, if you were financing off LIBOR rates you probably hedged out via a fixed-floating swap. Thus interest rate risk is largely hedged out.

MARKET VERSUS HISTORICALLY IMPLIED SPREADS FOR BBB- AND B-RATED DEBT AT A RANGE OF MATURITIES
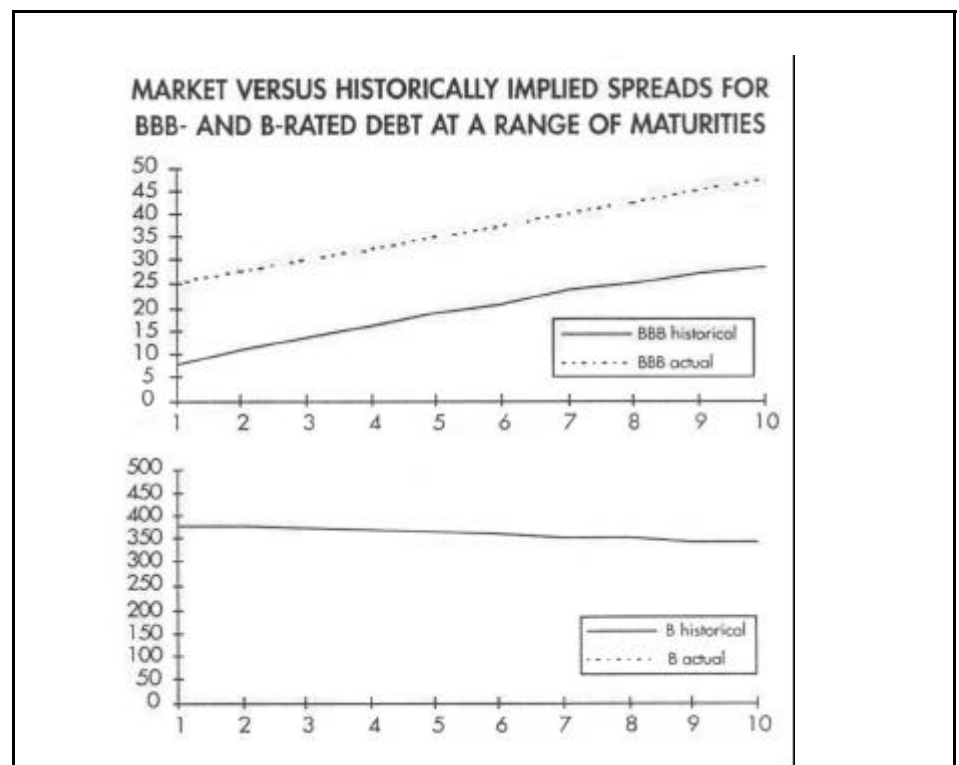
Arbitrage Pricing VS. Pricing Off Historical Default Rates

Typically, spreads exceed historical default rates. Why is there a difference between anticipated and expected default rates? This is because one is taking on credit risk which is different from interest rate, currency, or even equity risk, and this requires an additional reward for risk.

Figure 1 shows some typical spread curves for BBB-rated debt, the lower end of investment grade, and B-rated debt. We have used historical default rates to calculate what spread would be required to compensate purely for default risk. The calculation is simple and introduces some key concepts, so it is worth looking at an example in detail. Let's take a one-year annual XYZ bond with a 6% coupon, and suppose the company is rated BBB. If the company survives—with probability of one minus the one-year default rate for BBB debt; roughly 0.998—we get 106. If XYZ defaults—probability of 0.002— there typically will be a recovery on the debt. Recovery tends to be related to seniority rather than rating, but there is a wide range of levels. If the particular debt we are looking at is senior unsecured, we would expect about 50% recovery. If default is half way through the year the payment will be 0.5% recovery. If default is half way through the year the payment will be $0.5 \times (100 + 0.5 \times 6)$. So, if for example, risk-free rates are 5% the bond price should be

$$price = \frac{0.998 \times 106}{1.05} + 0.002 \times \frac{0.5 \times 103}{1.025}$$

and having calculated the price, we can now calculate the yield and then the spread. Figure 1 shows the result of this and similar calculations for a range of maturities.

Geoff Chaplin, a mathematician and actuary, is a quant trader in credit derivatives at ABN AMRO in London, England.

Investment Section Council Meeting in New York

Investing their time in Section activities, the Investment Section Council members plan for the coming year—

L-R—Frank Sabatini, Christian-Marc Panneton, David Li, Peter Tilley, Judy Strachan (1997-98 Chairperson), Rick Jackson, Joe Tan (1998-99 Chairperson)

An Actuary Looks at Financial Insurance
continued from page 5

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The Euro Will Eventually Lead to Global Instability

by Nino Boezio

The single European currency, once a distant dream, has become a reality. In time, it can significantly change the way the world does business, and will have some important implications on the ability of the United States and its currency to dominate the world's political and financial system.

The Euro is expected to foster greater intra-European cooperation and economic growth on that continent. However, the ECU can also damage the economic health of North America as the United States' fiscal problems including its debt and trade deficits will no longer be masked by the U.S. economy's dominance in the world. It will also encourage Europe even more to guide its own destiny, even if its vision for the world widely differs from that of non-European nations.

Understanding Europe

Unlike the relative peace and prosperity enjoyed by most North Americans the past two centuries, Europe has not been so lucky. The nations of Europe have historically been plagued by distrust, envy, competition and strife. Warfare has been a regular part of its turbulent history. Even though that continent cannot afford another world war on its territory, especially since the weapons of mass destruction today have become so powerful, it does not mean that the European psyche has changed to one

predominated by a desire for peaceful coexistence with its world neighbors.

Being confined to a small continent

with a large population, and where much of its resources must come from without, it can easily be seen how European politicians can become "nervous" and want to exert some sort of political/military muscle, which continental Europe currently does not have but the United States does. Yet the United States has largely determined its own foreign policy independent of input of Europe.

Also unlike the United States which is hedged by very large oceans and peaceful neighbors, Europe has the always dangerous Middle East nearby, and an unstable Russia and turbulent Asia within striking distance. Problems with any of its foreign neighbors can easily land on its doorstep, and yet still not be of much concern to a relatively isolated United States.

The Soon Fading Dominance of the U.S. Dollar

Until recently, gold was the reserve currency of choice for central banks. With inflation, gold maintained its value and appreciated relative to the average currency. It was relatively easy to convert to another currency if the need ever arose, and it was well-accepted worldwide as a trading medium. The last few years however, with the cooperative attack by central banks on inflation, have diminished gold's usefulness.

Central banks have opted instead for the U.S. currency and U.S. denominated assets such as bonds rather than gold, since these are even more liquid (the latter provided an attractive yield) and inflation has been perceived to be relatively dead hurting gold's major appeal. Even though new gold demand has exceeded new supply since the early 1990s, this was not sufficient to maintain interest in gold, inciting central banks to liquidate their gold reserves. If there ever is renewed concerns about inflation or the strength of a currency such as the $US, then there may be some exodus back to gold.

The ECU is being perceived by

some to be the most viable threat down the road to the $US. Even though it will be a new medium of exchange, its acceptance and use by a large continent may quickly establish it as an important currency. And if relative yields on US stocks, bonds, real estate and other assets fall relative to those achievable in
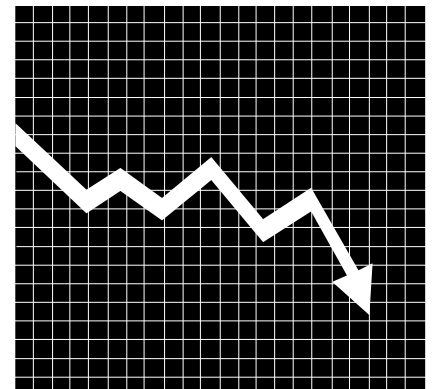
Europe (which can occur if the European economies strengthen and the U.S. economy weakens or falls into recession) the dominance of the $US dollar will quickly be undermined. Currently, trade deficits in the United States have been paid for through the acquisition of U.S. assets such as bonds by foreigners. If central banks decide to liquidate some of their U.S. assets and U.S. currency in favor of the ECU, we may find a severe depreciation in the U.S. currency worldwide and possibly U.S. inflation triggered not by robust economic activity but by too much currency with no place to go but back to the United States. The currency depreciation will help to alleviate the U.S. trade deficit but in the meantime could destabilize the world's financial system.

The World's Dynamics Will Change

If the ECU proves to be a dramatic success, or at least achieves a position of importance comparable to the $US, we may find that the world will no longer be dominated by the United States in non-financial matters as well. We note that Europe and the United States have often had widely differing views on

Finance Research Funds Available

The Finance Research Committee of the Finance Practice Area has funds available for researchers and welcomes proposals dealing with any area of finance or investments and the impact on the actuarial profession. Grants of up to $10,000 are available now. Proposals with larger budgets can be considered with joint sponsorship (i.e. this area and a section [Investment, Financial Reporting], an additional practice area, or CKER). However, the applicant should be aware that other practice areas or Sections may not have any funds available at this time.

Grants have been given for the following types of research in the past: modeling conference (in conjunction with the Ed Lew Award), papers on the 100-year-term structure, VAR, and currency risk. A study on the use of derivatives in the insurance industry was commissioned. Currently there is a grant outstanding to write a textbook on stochastic calculus that will be readable by actuaries whose statistical background is limited to that in the current educational syllabus.

The following areas should be covered in the proposal:

- Description of project:
  Goal of research
  Scope of proposed work
  Researchers who will be used, individuals or a team
  Approach planned
  Proposed time frame
  Where results will be published
  Actuarial impact
  i)   Potential customers for results
  ii)   Potential uses of results
  How it relates to the Finance Practice Area.

- Proposed peer reviewers to form Project Oversight Group (POG) and suggestions for chair

- Proposed budget
  Cost of data
  Cost of researchers time
  Other expenses—if for example, related to a conference
  Will staff resources be needed, if so attempt to estimate time required.

Completed applications should be submitted to:

Zain Mohey-Deen
Research Actuary
Finance Practice Area
The Society of Actuaries
475 N. Martingale Rd., Suite 800,
Schaumburg, IL 60173-2226

The Euro Will Eventually Lead to Global Instability
continued from page 18

foreign policy, including reactions towards events in the Middle East and Asia.

The United States has had different international interests, is not always perceived as a source of world stability from the European standpoint, does not understand Europe or its problems, and is too far away from the hot spots. For example, it is expected that oil demand will once again outstrip supply in the next 3-5 years. Any instability in the region will impact Europe much more than it would the United States, as over 50% of its oil is imported. Will the

United States come to the rescue (after-all, its military has been substantially cut back, even since the Persian Gulf War)?

We will likely find that any success in European financial endeavors will likely precipate into political, military and social pursuits. This will certainly contest the United States' role as the peacemaker and peacekeeper (the "PAX Romana" of today). Unlike the United States, European countries may not be considered to be less diplomatic or sensible, and may perhaps shoot first and ask questions later.

The concerns raised as part of the European 1992 initiative will once again be discussed. The prior initiative most likely failed because Europe fell into recession and various issues including excessive debt, could not be resolved quickly. The next 10 years could be quite interesting to watch.

Nino J. Boezio, FSA, FCIA, is a Principal at Matheis Associates in Pickering, Ontario, and is co-editor of Risks and Rewards.

Photos from the Investment Section Breakfast

1998-99 Investment Section Chairperson, Joe Tan, presenting the Section's silver tray to retiring chairperson Judy Strachan.


Editorial Correction

The editor would like to make notice of an error that occurred in the October 1998 issue of *Risk and Rewards,* Issue Number 31.

The column on Review of Financial Journals was jointly authored by Edwin A. Martin and William Babock. We regret that Will's name had not been included in the credits.

—Risks and Rewards Staff

Richard H. Thaler speaking on the psychology of investing at the Investment Section Breakfast during the Annual Meeting in New York. (See article on page 9.)
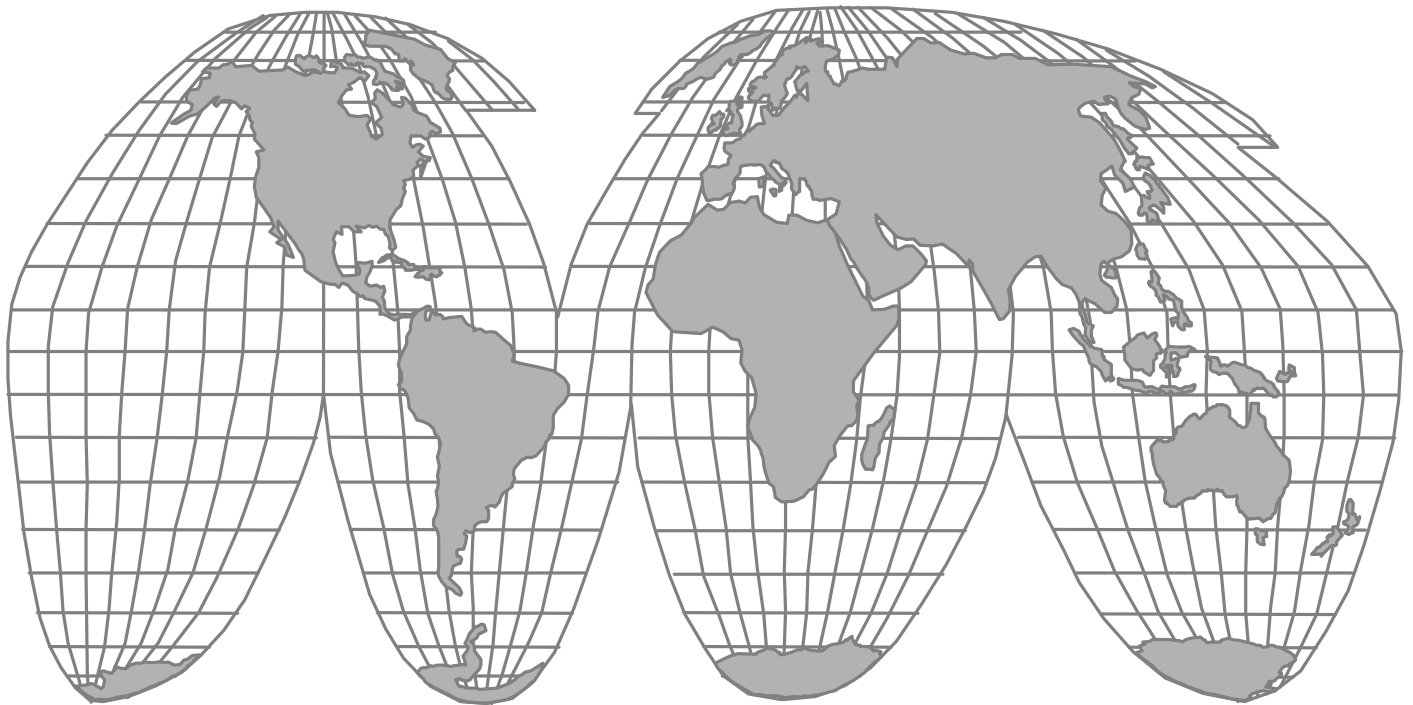
Redington Prize Nominations
Due May 31

To promote investment research, the Investment Section sponsors a biennial prize of $1000 (U.S.) for the best paper on an investment-related topic written by a SOA member. The prize is named after F. M. Redington, the eminent British actuary who coined the term "immunization" in a 1952 paper that was published in the Journal of the Institute of Actuaries. The Council has awarded three prizes since its inception. The award winning papers are shown below:

"The Risk of Asset Default" *TSA* XLI (1989): 547-582 by Irwin T. Vanderhoof, Faye Albert, Aaron Tenenbein and Ralph Verni.

"Multivariate Duration Analysis," *TSA* XLIII (1991): 335-376 by Robert R. Reitano.

"Multivariate Stochastic Immunization," *TSA* XLV (1993): 425-461 by Robert R. Reitano.

The Council is now seeking nominations for the next award. The criteria for selection are as follows:
Author. The work must have been written by a member of the SOA. In the case of a paper with multiple authors, a member of the SOA must be a major contributor to the paper.
Contents. The topic must be judged to be timely, primarily of investment nature and of substantial value to SOA members.
Source. The paper may appear in any recognized SOA format, including *Transactions, North American Actuarial Journal, ARCH,* Study Notes, Section newsletters and papers submitted at SOA seminars or colloquia. The paper may appear in non-actuarial journals or publications deemed to be at least comparable quality by the Prize Committee. Such publications include, but are not limited to, *The Journal of Portfolio Management, Financial Analysts Journal, Journal of Finance, and Journal of Financial and Quantitative Analysis.* The paper must have been published during the period July 1, 1995 to June 30, 1998.
Judging. Papers will be reviewed by a Prize Committee chaired by Luke Girard. Other Prize Committee members include Nino Boezio, Steven Craighead, John Manistre, Elias Shiu, Bob Reitano, Irwin Vanderhoof and Richard Wendt.
Presentation. A prize will be awarded only if the Prize Committee deems the best eligible work to be of sufficient merit to justify an award.
Submission. The paper must be submitted prior to May 31, 1999. The submission should be sent to:

Luke Girard
Lincoln Investment Management, Inc.
200 East Berry Street
Fort Wayne, IN 46801-7814

Announcing the

Return of the SOA Investment Section
Market Triathlon Contest

by Frank Grossman

Attentive readers of *Risks and Rewards* will doubtless have noted the absence of a 1998 contest. Your editors thought it best to take the year off given that financial markets were just too easy to forecast. After all—as every successful Course 230 candidate knows—market volatility is just another name for the standard deviation of returns. (And who says that assuming *normality* has less to do with behaviorism than with making the math simpler?) Nothing could have been more straight-forward. You betcha.

So, just how far can monetary easing go in the face of "irrational exuberance?" Will American financial markets continue to withstand the deleterious impacts of the so-called "Asian Contagion"? And is the disconnect between current market valuations and the tenets of (every CFA's best friend) the good ol' dividend discount model too surreal to continue? Well … that's where you come in.

Simply gaze deeply (not *too* deeply!) into your crystal ball and complete the official 1999 Market Triathlon Contest entry form below. Place the form in an envelope and mail it to:

> 1999 Market Triathlon Contest
> c/o P.O. Box 943 - Station "F"
> 50 St. Charles Street, East
> Toronto, Ontario
> Canada M4Y 2N7

Incidentally, there are prizes for those savvy prognosticators who succeed in coming closest to the actual market measures at the conclusion of 1999: $100 for each of the best T-bill, T-bond and Dow Jones Industrial Average index individual event picks; and an additional $100 to the winner of the triathlon with the best combined result.

- -

1999 Market Triathlon Contest - Official Entry Form

Your Name	Your Telephone Number
	( )

Market Triathlon Event Forecasts as at December 31, 1999			Tie-breaker: *lowest* DJIA close from October 1 to December 31, 1999, inclusive
3-Month T-bill Yield	30-Year T-bond Yield	Dow Jones Industrial Average Index Close	

Note that the official source for Market Triathlon Contest financial statistics is the Markets Diary summary published each weekday on the first page of *The Wall Street Journal* Money & Investing section. December 31, 1998, statistics as published in the January 4, 1999, edition of TWSJ were: 3-month T-bill yield close 4.44%; 30-Year T-bond yield (4 p.m.) 5.092%; and DJIA close 9181.43.

More fine print: the Market Triathlon Contest is open to SOA Investment Section members only; one submission per entrant; overall triathlon results based on average ordinal ranking over all three events; ties resolved by reference to the most accurate tie-breaker pick; and please write clearly or else print, as sloppy penmanship will not be indulged.

All submissions must be postmarked before June 1, 1999, to be eligible.