A Study of the Use of the Delphi Method, A Futures Research Technique

For

Forecasting Selected U.S. Economic Variables And Determining Rationales for Judgments

Prepared for the Society of Actuaries

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1. Background

From August, 2004 to September, 2005 an inaugural in-depth Delphi Study was performed by the Society of Actuaries designed to obtain insights into the rationales and thought processes experts used in making judgments about the long range (20 year) values of four U.S. economic variables:

1. Annual increase in the Consumer Price Index
2. 10 Year Treasury Spot Yields
3. S&P 500 Total Rate of Return
4. Corporate Baa Spot Yields

The Study had the additional goals and objectives of providing actuaries and other financial professionals with an illustrative application of the use of a futures research technique to supplement traditional forecasting practices and with a plausible "fan of possibilities" for the values of these economic variables to aid in setting of assumptions and as a backdrop for strategic planning.

From the outset it was recognized that it was impossible to forecast such variables with accuracy and confidence over this time period. We hoped to produce a plausible range of opinions about these variables- not necessarily a consensus. The Study was also intended to identify the factors and prospective developments that could contribute to the uncertainty and influence the path of the selected variables. It was hoped that identifying the techniques, rationales, and thought processes used by the participants would prove useful to actuaries and other financial professionals in supplementing traditional actuarial techniques of forecasting.

Thus the Study had both methodological and substantive components. **Methodologically**, it was to demonstrate the Delphi technique and supporting methods in a meaningful application. **Substantively,** the Delphi was designed to provide a plausible quantitative range of expectations with insight into the subjective models and rationales used by the participants in making their judgments.

The design involved two approaches to asking about the future of the variables: the first was direct: "What value might these variables achieve by 2024?" and the second was indirect: "What future events might determine the course of these variables, and what are the probabilities and impacts of these events?" The answers to the questions in the latter approach were used in a Trend Impact Analysis ("TIA") to produce the second estimate of the future value of the variables, in this case a time series extending to 2024.

In each of the Delphi rounds, participants were also asked about the usefulness of judgmental methods of the sort used here in actuarial modeling and other applications. The questionnaires used in this Study appear in Appendices A and B.

The participants were nominated by the Society of Actuaries Project Oversight Group and the Principal Investigator to the Study; the participants were actuaries, economists, investment managers, futurists, modelers, and scientists. Twenty-eight people participated in the first round and twenty-four in the second. Of the twenty-four in Round 2, twenty one had also participated in Round 1 and twelve of the Round 2 participants self-identified themselves as having 10 or more years experience as an actuary. Section 11 presents more detail about the participants.

The Society of Actuaries is a nonprofit educational, research, and professional society of 17,000 members involved in the modeling and management of financial risk and contingent events. The mission of the SOA is to advance actuarial knowledge and to enhance the ability of actuaries to provide expert advice and relevant solutions for financial, business and societal problems involving uncertain future events.

The Study was sponsored by the Society of Actuaries' Futurism Section, Investment Section, Committee on Finance Research and Committee on Knowledge Extension Research as part of the Society's ongoing goal of providing continuing education and research for its members and the public at large.

The Project Oversight Group hopes that this Study will provide valuable insights into how the Delphi method can be used to aid in planning and forecasting the future. Although Delphi Studies have been performed by the Society of Actuaries in the past, this was an inaugural in-depth Study that focused on using the Delphi method to forecast economic variables. It is anticipated that the Study will be repeated in the future incorporating refinements to make the Study's results even more useful.

2. Acknowledgments

Many people contributed to this work.

3. Executive Summary

The Study:

The Study was designed to elicit reasons behind the participants' judgments about the future course of the four variables. In the first round participants were asked to provide judgments about the value of the four variables in 2024 and the reasons behind their judgments. In addition, they were asked to list future developments that could cause historical trends in the variables to change. Finally they were asked to express their views on how the judgmental process employed in this study might influence the use and interpretation of traditional actuarial (e.g., stochastic, deterministic) estimation processes or to aid in planning. The data were collated between rounds and in the second Round, the responses of the group were provided to the participants.

Because the number of participants is usually small, Delphi studies do not (and are not intended to) produce statistically significant results. In other words the results provided by any panel do not predict the response of a larger population or even a different Delphi panel. The estimates and the rationale, techniques and methods for estimating the variables represent the synthesis of opinion of the particular group involved, no more, no less. For this reason, choice of participants is extremely important and commanded a great deal of attention from the POG and WG.

Three questions were posed in Round 2: First, participants were again asked to provide estimates of the four variables in 2024 (and reasons) in view of the average of the responses in Round 1 and the reasons previously given by the group. Second, some prospective possible developments derived from Round 1 inputs were listed and participants were asked for judgments about the likelihood and impacts of these developments on the variables, should they occur. (These judgments were used in a later Trend Impact Analysis to project the ranges of the variables over time.) Finally, the Round 1 answers to the question on potential applications of judgmental processes were fed back to the participants and a number of more precise questions about judgmental applications in actuarial applications were posed.

Comments on Rationales

The reasons given by the participants for their quantitative estimates were interesting and varied. In both rounds, there were some points that apparently occurred to many participants in their reasoning and others which occurred only to a few. (The complete list of comments appears in the Appendices C and D; a more detailed summary appears in Chapter 5.) There were many areas of wide disagreement. As an example of wide differences in perception, consider these responses from two different participants that depict entirely **different futures** for the United States:

- ….. The US will be well along toward second-rate status by 2024.

- The U.S. reasserts and further develops its moral, political, and economic leadership of the west: that leadership is essentially accepted throughout the world.

Many **participants used models** in their reasoning. A few of the models were quite explicit, others, qualitative mental models. For example in the explicit class:

- I have used The Theory of Economic Series, which is described in …. my book … The theory takes into account underlying mood and business cycle changes. I believe that this is a unique actuarial approach, and that the actuarial profession can make a valuable contribution in this very crowded field, in its own way.

And an example of a less explicit model, but a model nevertheless:

- I believe that the energy inflation rate will dramatically increase due to the fact that all the current producers are at full capacity, unless there is a significant shift in the energy policy, we should start to see oil shortages. This is why I believe that there will be inflation in excess of 13%.

Many comments showed faith in the **ability of regulators** to control inflation and other aspects of the economy:

- Inflation is everywhere a monetary phenomenon, meaning that it is within the power of the Fed (not precisely, and not at every moment) to control the sustainable rate of inflation.
- I think extremely high CPI inflation will less frequent in the next 20 years, as the Fed has made the commitment for price stability.

Or, on the other side of the coin, the **old institutions** of economic control were seen by a few participants as likely to be challenged, fail, or at least change greatly in the new circumstances presented by future conditions:

- The Fed's credibility is eroded by deteriorating debt, fiscal and trade issues
- The Fed may not be able to effectively offset a global recession (especially a serious one), so fighting deflation may be less effective then containing renewed inflation.

Some saw the **economic troubles** ahead:

- Economic collapse of US based on debt and deficits
- The retired baby boom generation demanding huge amounts of services, especially health care

As is usual in the Delphi process, Round 1 results were fed back to participants in Round 2. In considering their Round 2 answers they were asked to review the Round 1 results- both the quantitative answers and the reasons provided by participants for their judgments. Despite the fact that the averages of the

quantitative responses were little changed between Rounds 1 and 2, the feedback process nevertheless caused some participants to reconsider their earlier answers. For example in providing his reasons for a Round 2 estimate, one respondent said:

- Originally I had a lower value but after reading the other responses I was probably influenced too much by recent history.

And another said:

- Survey caused me to think more about the possibility that the government may not do anything about social security till the mess occurs.

It should also be mentioned that a few participants found the question calling for quantitative estimates of the variables in 2024 somewhat awkward; instead of asking for values in the year 2024, they would have preferred to have been asked for the maximum and minimum values during the interval from the present to 2024 (or some portion of the interval). For example:

- By the way, it would have also have been useful to ask what the range of average values are likely to be for the 10-year period 2014 to 2024 say. By asking what I think about the values of a volatile variable for a given point in time I really have to think about some type of interval average anyhow.

- Equity returns will always be volatile, so I'm not sure that the right question is being asked. I believe a more appropriate question would be "what will the annualized return of the S&P 500 be in the years surrounding 2024."

This point is well taken and a reasonable question from the participants. It was intended from the start to perform a Trend Impact Analysis in addition to the Delphi analysis, for all of the variables. The TIA is designed to form a projection of the history of the variables based on an extrapolation of their past performance and an analysis of events that can occur in the future that will change the trend. In this Study, the participants were asked to provide their judgments about the "peak impacts" of the developments, that is the maximum amount that the value of the variable would shift up or down within the next 20 years as a result of the occurrence of the development.

The TIA Analysis

In collecting judgments for the TIA analysis, participants listed some 200 future developments that they saw as important to the future course of the four variables, together with judgments about the developments' probabilities and impacts. Using a subset of these developments (see Chapter 8 and Appendix F) in the TIA model, the following forecasts were produced. For reference, the average judgments from the direct estimate of the Delphi for lowest plausible, expected, and highest plausible are also shown.

CPI Annual Change (%)

10 Year Treasury Spot Yield

S&P 500 Total ROR

Corporate Baa Rate (%)

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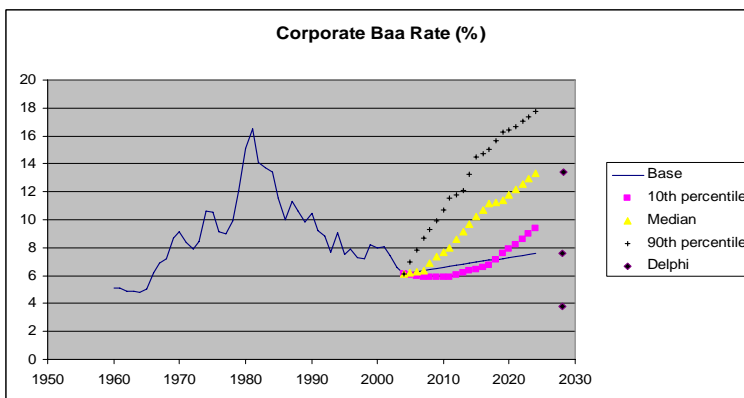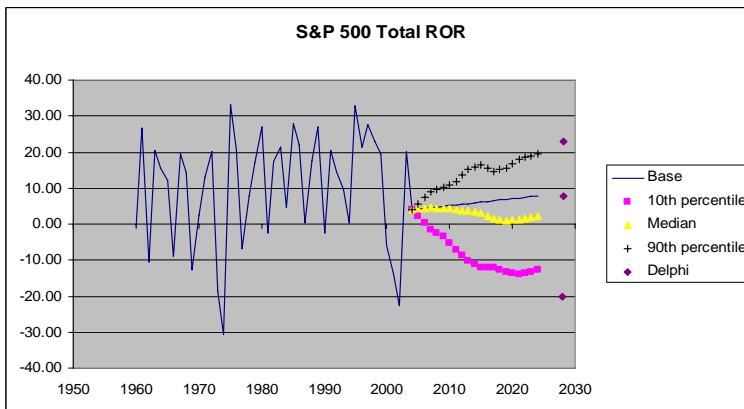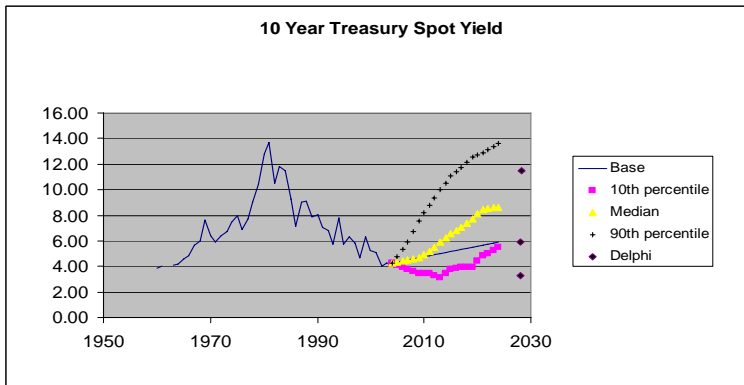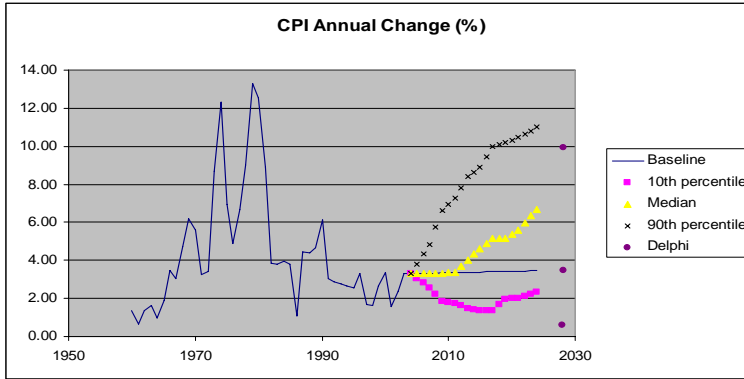
Comparison of Quantitative Results

Responses for the two Rounds of the Delphi Study and for the Trends Impact Analysis ("TIA") results for the year 2024 are presented in the table below. The figures are all in percentages; for example the average judgment of the Round 1 participants placed the highest plausible value of Corporate Baa Spot Yields in 2024 at 14.3%, and the value of the 90th percentile produced in the TIA was 17.7%.

Quantitative Results

As expected the range between the lowest and highest plausible values are quite wide. There was little shifting from Round 1 to Round 2. The TIA produced somewhat narrower ranges and in most cases higher values than the direct estimates made by the participants. The prospective developments used in the TIA moved the expected values higher in all cases except the S&P Total Rate of Return; thus taken together the prospective developments suggest a more inflationary environment. The expected values are shown in bold print in the table below[1].

	Rd 1 Lowest Plausible Value	**Rd 1 Expected Value**	Rd 1 Highest Plausible Value	Rd 2 Lowest Plausible Value	**Rd 2 Expected Value**	Rd2 Highest Plausible Value	TIA 10th percentile	**TIA Median**	TIA 90th percentile
Annual increase in the Consumer Price Index	0.8	**3.8**	11.0	0.6	**3.4**	9.9	2.3	**6.7**	11.0
10 Year Treasury Spot Yields	3.3	**6.5**	12.0	3.3	**5.9**	11.4	5.9	**8.6**	13.6
S&P 500 Total Rate of Return	-20.1	**8.4**	25.3	-20.2	**7.8**	23.1	-12.6	**2.3**	19.5
Corporate Baa Spot Yields	4.8	**8.4**	14.3	3.8	**7.6**	13.4	9.4	**13.3**	17.7

Comments on Applicability of Judgmental Methods

In examining the applicability of judgmental methods to actuarial modeling, seven specific applications were considered:

- The historical period used to calibrate stochastic models

- Expected values of variables.

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[1] For purposes of comparison, the values of the variables in 2004 were: Annual percent increase in CPI= 3.3%; 10 Year Treasury Spot Yields= 4.23%; S&P 500 Total Rate of Return= 12.1%; Corporate Baa Spot Yields= 6.15%. See Section 8 for a discussion of how assumptions about the TIA baseline affected these TIA forecasts.

- Identification of potential developments that could affect forecasts

- Mean reversion assumptions in stochastic models

- The period over which the current assumption reverts to the mean

- The volatility assumptions used in stochastic models

- Validity of outliers that stochastic models may forecast.

It is apparent that the methods were highly regarded by the panelists. In both rounds, judgmental methods were rated as "somewhat useful" or better in all applications as shown in the following table:

Application	Av. Score	
	Rd 1	*Rd 2*
Identification of potential developments that could affect forecasts	4.42	4.21
Validity of outliers that stochastic models may forecast.	4.00	3.86
The volatility assumptions used in stochastic models	3.52	3.64
The historical period used to calibrate stochastic models	3.64	3.50
Expected values of variables.	3.64	3.43
Mean reversion assumptions in stochastic models	3.30	3.36
The period over which the current assumption reverts to the mean	3.05	3.21

Where the scale was:

5= Use of judgmental processes is essential
4= extremely useful
3= somewhat useful
2= May help or hurt
1= Counter productive

In Round 2, a series of additional questions were asked about each application. Several questions were posed to the participants that could be answered with a "yes" or "no"; reasons and comments were again invited. About 30% of the participants answered these questions. The answers to the questions appear below:

Almost everyone answered "yes" to the following

- Do you think that this Study identified potential developments or forecasts that could lead to an increase or decrease in volatility assumptions?

- Do you think that this Study provided potential developments and forecasts that could lead to changes in estimates of the expected value of the variables?

Almost everyone answered "no" to the following

- Do you think that this Study provided potential developments and forecasts that could lead to revision of the historical period used in calibration?

- Do you think that this Study identified potential developments or forecasts that could lead to a lengthening or shortening of the mean reversion period?

The complete list of responses and specific comments on the questions posed in the questionnaire appear in Chapter 9 and Appendix E.

Principal Conclusions

The principal conclusions of this work are:

- It is possible to use the Delphi approach to collect judgments about:

   Long term forecasts about volatile economic parameters.

   The reasons behind the quantitative answers.

- The opinions of the expert panel in this Study were widely separated and they seemed to be based on mental models held by the participants about the nature of the economy, the role of external events, and the effectiveness of regulatory institutions.

- Using the Round 2 direct estimates, the lowest to the highest plausible forecasts of the variables in 2024 are widely separated and may in fact represent the uncertainty intrinsic in these variables:

Annual increase in the Consumer Price Index	0.6 to 9.9 %
10 Year Treasury Spot Yields	3.3 to 11.4 %
S&P 500 Total Rate of Return	-20.2 to 23.1 %
Corporate Baa Spot Yields	3.8 to 14.8 %

- In considering the future course of these variables, the key developments were found to be:

   Oil prices rise over $ 60 / barrel for at least 5 years

   US dollar currency collapse vs. Euro

   CPI pressures from growing budget deficits, rising demand for services (e.g., health care costs), stable or declining labor force, and concomitant growth in retirements.

New technologies drop costs of production of most products by 10% or more.

Significant corporate defaults (tripling over current rates)

Confidence in US drops; direct foreign investment reaching 50% of current levels.

Global political instability, Iraq-like wars and terrorist activities and threats become the norm

New technologies improve productivity in services by more than 10%.

U.S. investment climate proves attractive.

Globalization lowers labor costs by 10% average.

- The participants were of the opinion that the following were realistic expectations during the next 20 years (median judgments, Round 1):

    - Oil prices rise to above 70 $/barrel for at least five years.

    - New technologies drop costs of production of most products by 10 %

    - Confidence in US drops; direct foreign investment reaches 65 % of current levels

    - U.S. Government current account deficit increases to 10 % of GDP

    - Productivity increases 5 % for five continuous years.

    - Profit margins of most US companies drop to 70 % of current levels for 10 years.

- Most of the judgmental techniques and forecasts of the sort used in this Study were found by the participants to be extremely useful or essential.

- Finally, in reaching their judgments, some participants:

    - Anticipated very different futures for the United States, some optimistic and others pessimistic.

    - Used qualitative and quantitative mental models as a means of making their forecasts,

    - Had faith in today's regulatory structures and regulators while others believed them to be obsolete and incapable of handling problems of the future.

    - Saw economic good times, or troubles ahead

4. Methodology

The Delphi method was designed to encourage a true debate, independent of personalities. It is usually administered in the form of multi-round surveys. Anonymity is required in the sense that no comments are attributed to specific participants. Key questions are posed in the first round- in our case the questions revolved around the chosen variables and we asked the participants for their estimates of the chosen variables and their reasons underlying their estimates. The second follow-up round fed back these reasons for extreme positions as well as the emerging group medians; and requested a reconsideration of earlier responses. These aspects: anonymity and feedback, represent the two irreducible elements of a Delphi study. This general approach has been used thousands of times since the first published Delphi study, Report on a Long-Range Forecast at RAND in 1964, by Gordon and Helmer.

Thus, the Delphi method is a controlled debate. The reasons for extreme opinions are made explicit, fed back coolly and without anger or rancor. More often than not, expert groups move toward consensus; but even when this does not occur, the reasons for various positions become clear. In this Study we asked questions about the thought processes that led to the estimates provided by the participants, the possible developments that could occur to change these estimates, and the rationale for their occurrence and their impacts.

Because the number of participants is usually small, Delphi studies do not (and are not intended to) produce statistically significant results. In other words the results provided by any panel do not predict the response of a larger population or even a different Delphi panel. The estimates and the rationale, techniques and methods for estimating the variables represent the synthesis of opinion of the particular group involved, no more, no less. For this reason, choice of participants is extremely important and commanded a great deal of attention from the POG and WG. Delphi studies produce results that differ from more common surveys in that they are not statistically representative of a larger population nor are they intended to be.

In Rounds 1 and 2, the participants were asked four questions.

1) First, they were asked to imagine the world in 2024 and to provide their judgments about the values these variables could plausibly attain in that year. Three estimates were requested:

> the lowest plausible value; that is the value which you believe has a 90% chance of being exceeded.

> the expected value; that is the value that is equally likely to exceed or fall below the actual result in 2024.

the highest plausible value; that is the value which you believe has a 10% chance of being exceeded.

2) In Round 1 participants were also asked to provide the reasoning that led to their quantitative estimates. These reasons were presented to participants in Round 2 as background for their reassessments of their quantitative forecasts.

3) In addition to requesting direct forecasts and reasons for these forecasts, the questionnaires asked for judgments about future events that could swing the variables away from past trends. These data were to be used in a different forecasting method known as Trend Impact Analysis (TIA). A list of such future developments was developed from responses to the Round 1 questions; in Round 2, the participants were asked to judge the probability and impacts of the developments on the variables.

TIA is a forecasting method developed in the late 1970's that permits extrapolations of historical trends to be modified to recognize the effects of plausible future developments. The developments can include technological, political, social, economic, and value-oriented changes. The TIA process utilizes a Monte Carlo analysis. The TIA computer program combines the impact and event-probability judgments with results of a surprise-free extrapolation to produce an adjusted extrapolation[2]. This analysis typically produces estimates of upper and lower quartile limits or limits at some other probability levels. The expected value of the combined impacts is computed by summing the products of the probabilities of impacting events for each year in which they were possible with the magnitude of their expected impacts, taking into account the specified impact lags. The simplest approach treats the events as though they were independent of one another.

4) Finally, the participants were asked to assess the applicability of judgmental methods such as those used here for a number of estimating and modeling processes used by actuaries in making economic forecasts.

Judgments about the values that the variables could plausibly attain are presented in Section 7; Section 5 presents a discussion of the reasons provided by the participants.

Section 6 deals with the list of perturbing events and assessments of their probabilities and impacts; Section 8 presents the TIA results.

Section 9 presents the results of the inquiry from both Rounds 1 and 2 into the applicability of judgmental methods in modeling processes used by actuaries.

Section 10 presents a brief comparison of answers provided by self identified actuaries with non actuary participants.

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[2] In this context, a "surprise free" extrapolation is an extension of historical data into the future that does not anticipate future developments that can, if they occurred, change the course of the variable.

5. Rationales for Forecast of Values

All of the Round 1 and Round 2 responses are repeated without attribution in Appendices C and D. The responses showed a wide range of perceptions about what might drive trends in these variables and certainly provide insight into the reasoning processes of the participants, which was a major objective of the Study.

As mentioned in Section 3, there were some points which apparently occurred to many participants in their reasoning and others which occurred only to a few. There were also many areas of wide disagreement, particularly about the potential future role of the United States in world affairs, and in the ability of regulators to anticipate and control the economy. Many participants used explicit or implicit models in their reasoning. Some questioned the ability of existing institutions to control the economy and therefore perceived a need to change

The table below presents a summary of the reasons given in **Round 1** for high and low estimates of the four variables.

1. Annual increase in Consumer Price Index

Reasons for high estimates

- Tight energy and commodity markets: price shocks, oil shortages; rising oil prices
- Widening of the US budget and trade deficits
- The rise in China's economy with resulting higher wages and prices for exports to the U.S.
- The retired baby boom generation demanding huge amounts of services, especially health care.
- Growth in the number of elderly and concomitant cost increase in medical care expenses.
- The current economic recovery slowly gaining strength.
- Consumers with a "buy now" attitude, discounting the future in pursuit of comfort in the present.
- The Fed increasing money supply to help avoid a collapse in housing and reduce the trade deficit.
- The Fed's credibility being eroded by deteriorating debt
- Fiscal and trade issues triggering a return to more stimulative monetary and fiscal policies.
- Geopolitical issues: e.g., instability in the Middle East or wartime conditions, such as 1917 – 18.
- A shock due to terrorism or natural catastrophe (earthquakes, hurricanes, influenza pandemic).

Reasons for low estimates

- Productivity increases continue.
- Commodities- even energy becoming less important.
- The Fed policy for controlling inflation remaining effective
- Fed putting liquidity into the market
- Global depression or a period of prolonged weak economic growth
- Deflationary pressures continuing as Asia develops
- A shift to rebuild savings by over-indebted consumers
- Exchange rates not being allowed to adjust to offset competitive and trade imbalances.
- Baby boomers spending less, saving more over concern for social security.
- Jobs traveling to poorer countries and consequent dramatic growth in unemployment.
- A technology driven continued steady decline in the real prices of natural resources.
- Capital market discipline on government inflation.

2. 10 Year Treasury Spot Yields

Reasons for high estimates

- Tight energy and commodity markets: price shocks, oil shortages; rising oil prices
- Labor unrest as the dependency ratio rises with the baby boomers retiring.
- Continuing wave of technological change driving robust economic growth
- Need to attract foreign capital to finance the enormous US budget deficit
- High inflation from combination of the budget and trade deficit
- Foreign investors diversifying portfolios away from U.S. dollar assets.
- Highly stimulative U.S. monetary and fiscal policies
- Inability to generate domestic savings to reduce reliance on foreign borrowing
- People continuing to favor current consumption over saving.
- Calls on government promises for retirement income and medical care straining federal budgets.
- The growth in demand for treasuries falling behind the growth in federal commitments.
- U.S. dollar losing value
- Foreign governments switching to place funds in euros
- Government inability to "manage" mid or long term rates.
- Competition to Treasury bonds for investment: other alternatives including global capital markets.
- Combination of projected labor force growth, productivity growth and the achievement of the inflation target

Reasons for low estimates

- Low CPI and the Fed putting liquidity into the market
- Combination of projected labor force growth and productivity growth
- Extreme Fed controls such as in the early cold war/ McCarthy period.
- A prolonged period of US fiscal austerity in an attempt to balance its budget.
- The Fed commits to and achieves inflation in a 0-2% range.
- Delays in retirement and new retirement careers resulting in improved tax revenues and slowing the growth of calls on Social Security and Medicare.
- The extra productivity of the post-retirement workers increasing the amount of money looking for secure investments while reducing the need for government borrowing.
- Government policies reacting quickly to inflationary pressures

3. S&P 500 Total Rate of Return

Reasons for high estimates

- This is a highly volatile series: above 24% gain or below - 10% loss due to immediate growth, irrational exuberance, recession or under & over valuations in recent years.
- Exceptionally volatile, but globalization and cross-linking of exchanges dampening overall fluctuations
- Very volatile; capital can be repositioned quickly. New records are possible
- A continued wave of technological change should drive robust economic growth
- Taxes being reduced, and income taxes possibly being replaced by consumption taxes.
- Good returns can be realized even in crisis years.
- An environment that supports the lowest plausible value of the other variables.
- Significant increases in service sector productivity, particularly medical services.
- Though implausible, an exuberant bull market in 2024.
- A balance existing between those who cash out their equity portfolios to meet current spending needs or to find more stable investments, and those who hold on to equities for their potential to deliver solid income.
- Many companies shifting their focus to provide solid dividend income to their shareholders, mitigating the impact of declines in equity prices.

Reasons for low estimates
- High interest rates and poor fiscal policy damaging corporate earnings and hurting investor confidence.
- Rising discount rate, but highly volatile.
- Poor and pessimistic years.
- Increased cross-border, competition in both goods and services reducing the return of equities
- An environment that supports the highest plausible value of the other variables.
- A bear market.
- The baby boom reaching the Social Security retirement age, with the U.S. the last of the major industrialized nations to reach this point of a massive proportion of its population in retirement.
- A flight from equities resulting from retirees' needs for cash.
- The next generation creating another bubble in the market, which will burst as always.

4. Corporate Baa Spot Yields

Reasons for high estimates

- Tight energy and commodity markets: price shocks, oil shortages; rising oil prices
- Labor unrest as the dependency ratio rises with the baby boomers retiring.
- A recession involving a credit crunch, raising yields
- A continued wave of technological change driving robust economic growth
- Rising inflation and a continuation of inflationary expectations
- Need to attract foreign capital to finance the enormous US budget deficit
- Increasing competition for savings; the retirement of the baby boomers will mean dis-saving on a massive scale as they quit paying into IRAs and start withdrawing funds.
- High inflation
- Lack of government prudence
- A perception of relatively high corporate risk because of unhealthy balance sheets, low earnings momentum and unfavorable economic conditions
- Investment grade corporate bonds appearing more conservative than the government bonds (as calls on government promises of retirement income and medical care accelerate).
- Rising political risk.

Reasons for low estimates

- A boom, creating an excess of demand for credit risk, lowering yields
- Extreme fed control as in the early cold war/McCarthy era.
- It is possible, incidentally, that the issuance of long-term corporate bonds will have ceased entirely by 2024. This would go along with aversion to long-term liabilities generally.
- Good profitability and strengthened corporate governance keeping the spread over treasuries relatively tight.
- Government prudence and a perception of relatively low corporate risk because of healthy balance sheets, strong earnings momentum, and favorable economic conditions.
- Credit spreads over treasury securities becoming smaller because of a growing preference for corporate bonds (resulting from a reduction in confidence in government bonds) as the credit risk seems increasingly insignificant compared to the large-scale federal commitments.
- Baa yields depend on inflation, treasury yields, and credit market perceptions. It is unlikely that appetite for lesser quality investment grade bonds will be high enough to justify a spread of less than 200bp to treasury (particularly in a low interest rate environment where corporate profits might be squeezed by deflationary pressures).

The reasons from Round 1 were presented to the participants in **Round 2** and participants were asked to review them in making their judgments about quantitative forecasts of the four variables. Further, they were again asked to state the reasons for their quantitative judgments. In answering this question, some participants simply referred to the index numbers associated with the given reasons, while others add new reasons of their own. Appendix D presents all of the Round 2 reasons. Items that were selected by three or more participants are presented below (the numbers in parentheses show the number of participants who selected the item):

1. Annual increase in Consumer Price Index

Lowest Plausible

- Productivity increases continue. (6)
- Possible ongoing deflation as developing world plays ever increasing role in manufacturing and services (5).
- Fed will keep inflation relatively constant (3)
- Global depression or a period of prolonged weak economic growth (3)
- Jobs traveling to poorer countries and consequent dramatic growth in unemployment (3)

Expected Value

- The Fed policy for controlling inflation remaining effective (4)
- Productivity increases continue (4)
- Deflationary pressures continuing as Asia develops (3)
- Tight energy and commodity markets: price shocks, oil shortages; rising oil prices (3)
- Widening of the US budget and trade deficits (3)

Highest Plausible Value

- Geopolitical issues: instability in the Middle East or wartime conditions, such as 1917 – 18 (7)
- The rise in China's economy with resulting higher wages and prices for exports to the U.S. (6)
- Tight energy and commodity markets: price shocks, oil shortages; rising oil prices (5)
- The Fed policy for controlling inflation remaining effective (4)
- The retired baby boom generation demanding huge amounts of services, especially health care (4)
- Growth in the number of elderly and concomitant cost increase in medical care expenses (3)

2. 10 Year Treasury Spot Yields

Lowest Plausible Value

- Delays in retirement and new retirement careers resulting in improved tax revenues and slowing the growth of calls on Social Security and Medicare (5)
- The Fed commits to and achieves inflation in a 0-2% range (4)

- The extra productivity of the post-retirement workers increasing the amount of money looking for secure investments while reducing the need for government borrowing (4)

Expected Value

- Foreign governments switching to place funds in euros (3)

Highest Plausible Value

- Tight energy and commodity markets: price shocks, oil shortages; rising oil prices (5)
- Calls on government promises for retirement income and medical care straining federal budgets (5)
- U.S. dollar losing value (4)
- Need to attract foreign capital to finance the enormous U.S. budget deficit (3)
- High inflation from combination of the budget and trade deficit (3)

3. S&P 500 Total Rate of Return

Lowest Plausible Value

- A flight from equities resulting from retirees' needs for cash (5)
- A bear Market (4)
- Highly volatile series (4)
- High interest rates and poor fiscal policy damaging corporate earnings and hurting investor confidence (3)

Expected Value

- A continued wave of technological change should drive robust economic growth (4)

Highest Plausible Value

- A continued wave of technological change should drive robust economic growth (5)
- Significant increases in service sector productivity, particularly medical services (4)
- This is a highly volatile series: above 24% gain or below - 10% loss due to immediate growth, irrational exuberance, recession or under & over valuations in recent years (3)
- Exceptionally volatile, but globalization and cross-linking of exchanges dampening overall fluctuations (3)
- Many companies shifting their focus to provide solid dividend income to their shareholders, mitigating the impact of declines in equity prices (3)

4. Corporate Baa Spot Yields

Lowest Plausible Value

- Credit spreads over treasury securities becoming smaller because of a growing preference for corporate bonds (resulting from a reduction in confidence in government bonds) as the credit risk seems increasingly insignificant compared to the large-scale federal commitments (5)
- Government prudence and a perception of relatively low corporate risk because of healthy balance sheets, strong earnings momentum, and favorable economic conditions.(3)

Expected Value

- No suggestions were nominated by 3 or more participants

Highest Plausible

- A perception of relatively high corporate risk because of unhealthy balance sheets, low earnings momentum and unfavorable economic conditions (5)
- Rising inflation and a continuation of inflationary expectations (3)
- Tight energy and commodity markets: price shocks, oil shortages; rising oil prices (3)
- Need to attract foreign capital to finance the enormous U.S. budget deficit (3)

6. Potential Influential Future Developments

In Round 1 the participants were also asked to provide judgments about future developments that could affect the course of the variables; the question read as follows:

> In the table below please list a few plausible future developments that you believe could, if they occurred, significantly impact on the course of each of the four variables. Developments may be listed under more than one variable since a future event may affect many variables. Several examples are provided; you may cross these out if you believe they are not plausible or significant. Remember we're asking about developments that may occur within the next 20 year period (we'll be asking about your rationales, timing of the development and the level of impact in Round 2). Several of the examples have blanks; if you choose to include them please fill in the blanks with your assumptions.

As noted earlier, the responses were sorted into categories to aid in the identification of duplicates:

- Commodity Prices
- Productivity
- New Technology
- Foreign Affairs
- Energy and Resources
- The Dollar
- Corporate Factors
- Trade
- Social Factors
- US Deficit
- Foreign Investment
- Inflation and Investment Climate

The responses for each variable, grouped under these headings, appear in Appendix F. The table below presents developments selected from the set that were included in Round 2 on the basis of having been suggested by several participants and their potential significance.

1. Oil prices rise over $ 60 / barrel for at least 5 years
2. Global political instability, Iraq-like wars and terrorist activities and threats become the norm
3. The terrorist threat under control (number of terrorist incidents 20% of current levels, worldwide, and remaining low)
4. New technologies dropping costs of production of most products by 10% or more
5. The U.S. assuming and accepted in a moral, political, and economic leadership role
6. CPI pressures from growing budget deficits, rising demand for services (e.g., health care costs), stable or declining labor force, and concomitant growth in retirements
7. U.S. balances its budget
8. U.S. dollar currency collapse vs. Euro
9. Globalization lowers labor costs by 10% average
10. Savings rate grows 10%
11. Significant climate change affecting food supply and costs

12. New technologies improving productivity in services by more than 10%
13. Confidence in US drops; direct foreign investment reaching 50% of current levels
14. U.S. current account deficit increases to 10% of GDP
15. U.S. investment climate proves attractive
16. Changes in Social Security permit individual investment decisions
17. Productivity increases 5% for five consecutive years
18. Significant corporate defaults (tripling over current rates)
19. Profit margins of most U.S. companies drop to 50% of current levels for 10 years
20. Economic depression for a seven year period
21. Significant bear market returns for a ten year period
22. Prime rate above 9% for 5 years

The evaluations of these future developments in terms of their probabilities and impacts appear in the next section of this report.

Some of the examples suggested in the Round 1 questionnaire called for the participants to "fill in the blanks" if they wished to. A summary of responses to these questions appears below[3]:

Oil prices rise to above _____$/barrel for at least five years.

Number of responses:	12
Lower quartile:	53.75
Median	70
Upper quartile	72.5

New technologies drop costs of production of most products by ____%

Number of responses:	13
Lower quartile:	10
Median	10
Upper quartile	20

Confidence in US drops; direct foreign investment reaches ___% of current levels

Number of responses:	8
Lower quartile:	32.25
Median	65
Upper quartile	81.25

---

[3] Round 2 responses were received in April and May, 2005.

U.S. Government current account deficit increases to _____% of GDP

Number of responses:	12
Lower quartile:	9.5
Median	10
Upper quartile	10

Productivity increases ____% for five continuous years.

Number of responses:	10
Lower quartile:	4.25
Median	5
Upper quartile	7.25

Profit margins of most US companies drop to ____% of current levels for 10 years.

Number of responses:	8
Lower quartile:	47.5
Median	70.5
Upper quartile	82.5

7. Forecasts of Values

The four following graphs summarize the quantitative responses from Rounds 1 and 2. The red dots represent the averages of the answers and the bars, the inter-quartile ranges.

1. Annual increase in Consumer Price Index

Number of Participants
Round 1= 28; Round 2= 13
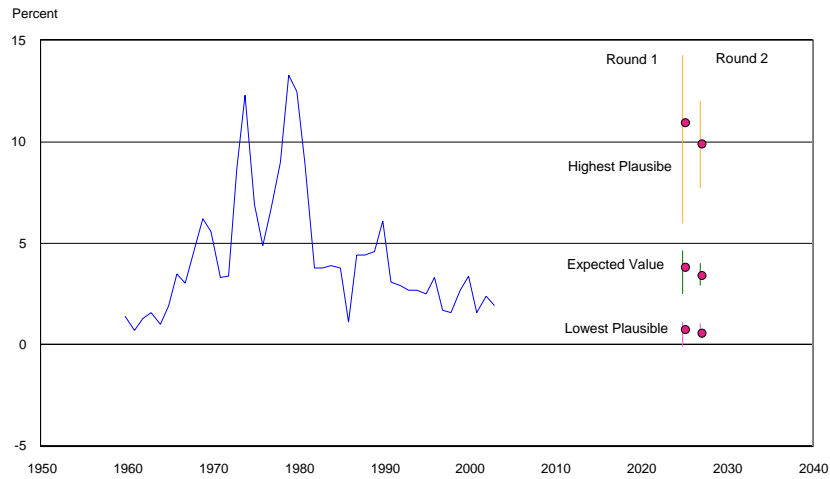
2. 10 Year Treasury Spot Yields

Number of Participants
Round 1= 27; Round 2= 24

25
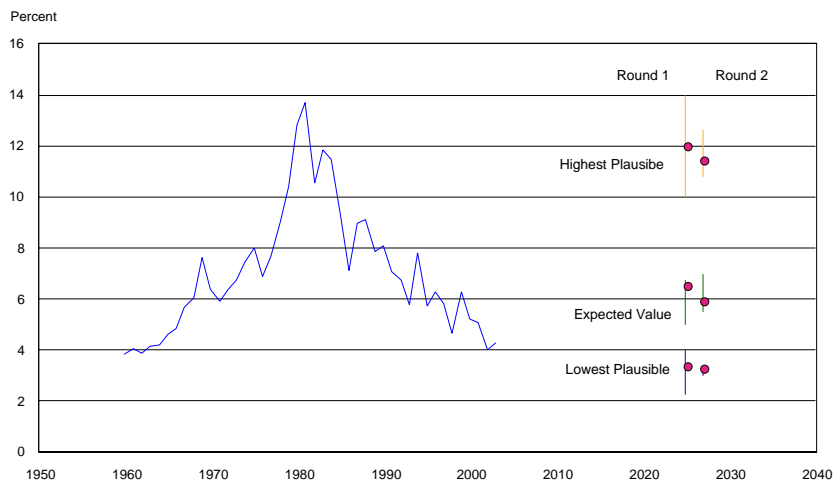
3. S&P 500 Total Rate of Return

Number of Participants
Round 1= 27; Round 2= 24
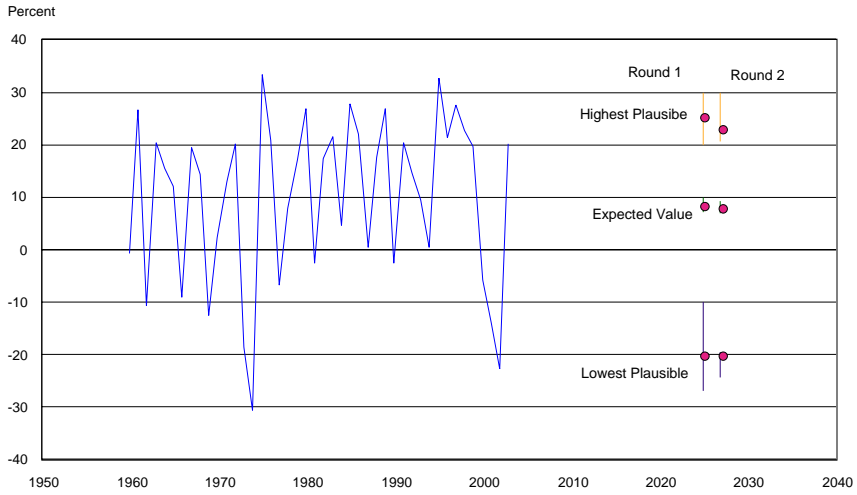
4. Corporate Baa Spot Yields

Number of Participants
Round 1= 26; Round 2= 24
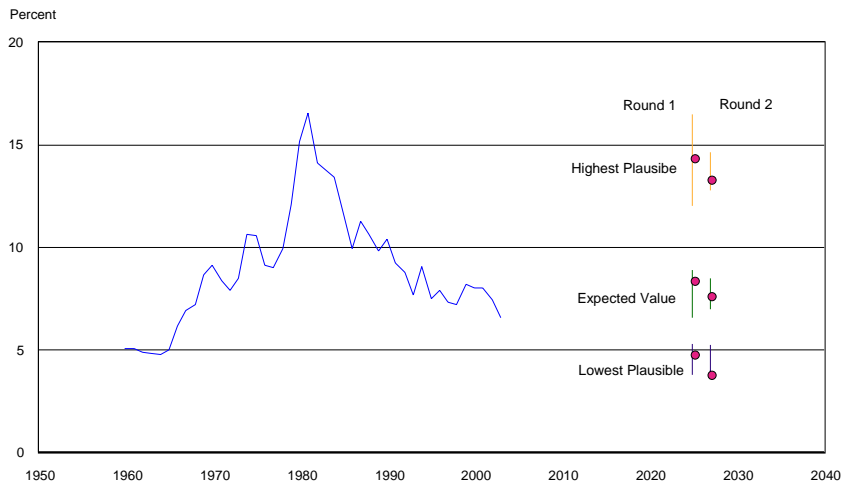
These charts show some minor shifting in the averages between rounds, but a significant convergence of the interquartile ranges. Additionally, the distance between

the lower quartiles and the upper quartiles were within the bounds of historical (1960 to present) extremes and therefore quite widely separated.

It was also possible to analyze the levels of agreement or disagreement among the participants. For example, the charts below illustrate the spread of opinions about the expected value of the four variables in Rounds 1 and 2. The chart shows the percentage of participants that felt the values were within the ranges shown.

Expected Values
Spread of Responses

1. Annual increase in Consumer Price Index

3. S&P 500 Total Rate of Return

2. 10 Year Treasury Spot Yields

4. Corporate Baa Spot Yields
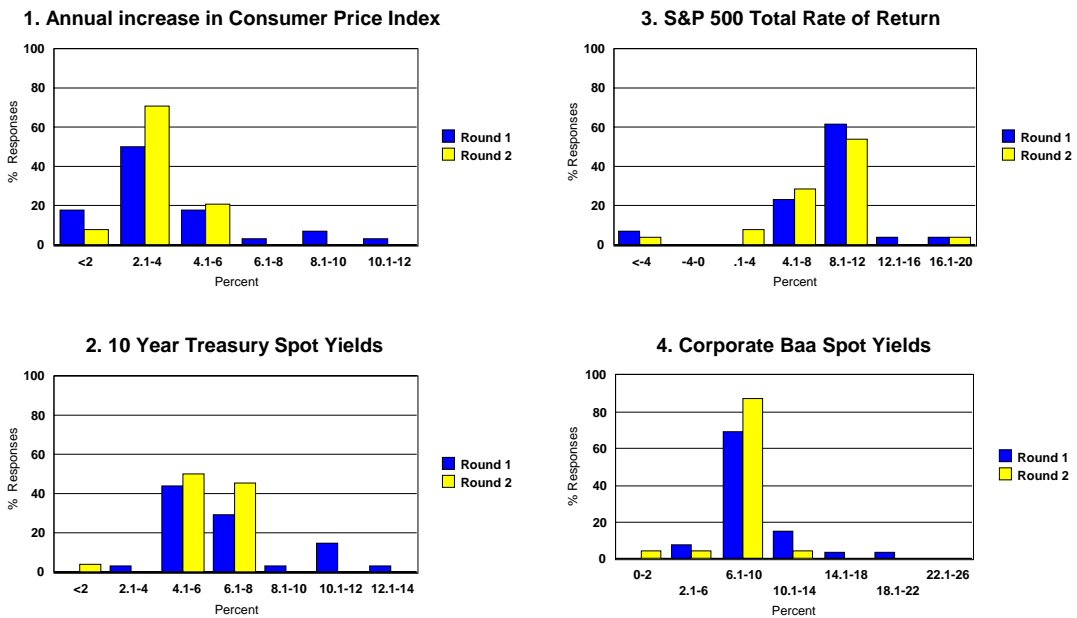
The forecasts show, by and large, a relatively tight distribution of opinions among the participants, particularly in Round 2.

8. Trend Impact Analysis

Trend Impact Analysis involves the following steps:

- Extrapolation of historical data to form a baseline.
- Selection of events which can impact on the future of the variables
- Assigning probabilities of occurrence of the events, and their impacts should they occur.
- Performing the Monte Carlo analysis.

Several approaches were explored in extrapolating the historical data. The first method simply fit a linear curve extending from the 2004 value of the variables to the average value of the 2024 expected value as determined by the Delphi. This is the approach that was selected and is the basis for all of the TIA results shown in this report, unless otherwise stated.

The second was accomplished using the statistical package CurveExpert version 1.37. This statistical package fits a number of different curve shapes to a given set of historical data and allows the user to select a fit, usually one that has least error. The curves tested include polynomials, linear, exponential, power law, sigmoidal, and growth models. In making these tests, a single data point was added in the year 2024, using the Delphi results for expected values. This was done to limit the excursions of the curve in the forecast interval. Using annual historical data for the four variables from 1960 to 2003 and the added data point in 2024, the sigmoidal curve was found to fit best in all cases.

The input values for the baselines used in the linear method are shown in the table below:

Parameter	1. Consumer Price Index (% annual Increases)	2. 10 Year Treasury Spot Yields	3. S&P 500 Total Rate of Return	4. Corporate Baa Spot Yields
2004 Value	3.30	4.23	12.1	6.15
2024 Expected Value	3.45	5.89	7.84	7.60

The table below summarizes the values obtained in the curve fitting approach to establishing the baselines.

Parameter	1. Consumer Price Index (% annual Increases)	2. 10 Year Treasury Spot Yields	3. S&P 500 Total Rate of Return	4. Corporate Baa Spot Yields
Curve Type	y=a+b*cos(cx+d)	y=a+b*cos(cx+d)	Y=a+b*cos(cx+d)	y=a+b*cos(cx+d)
Standard Error	1.468	1.273	15.453	1.468
Correlation Coefficient[4]	0.859	0.866	0.295	0.859

Except for the S&P Total Rate of Return variable, the correlation coefficients are excellent. We considered the possibility of using regression techniques to form the baselines. However even if a good regression equation had been derived (with, say. *Consumer Price Index (% annual Increases)* as the dependent variable and employment and productivity as independent variables) the problem of forecasting the independent variables would remain.

The four graphs below show the two different baselines.

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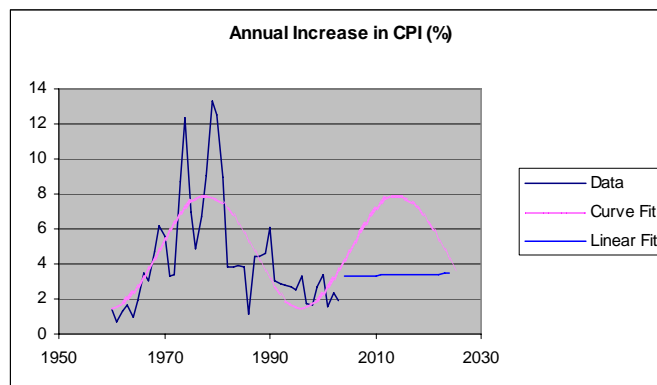
[4] "Correlation coefficient" is a measure of the "goodness of fit" of a given curve to a set of data points. A correlation coefficient of 1 means that the fit is exact and no error exists between the given points and the curve.

10 Year Treasury (%)

S&P Total Rate of Return (%)

Corporate Baa Yield (%)
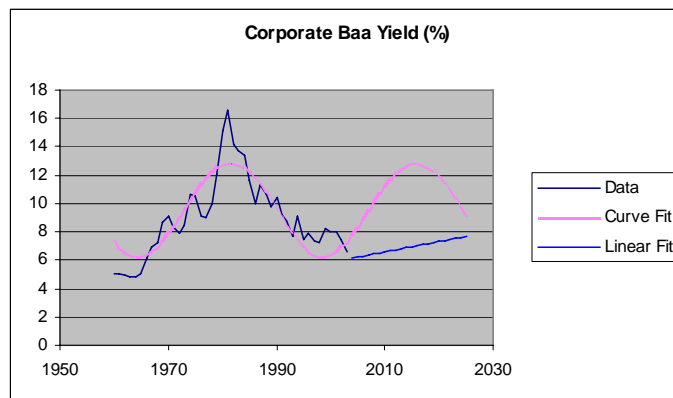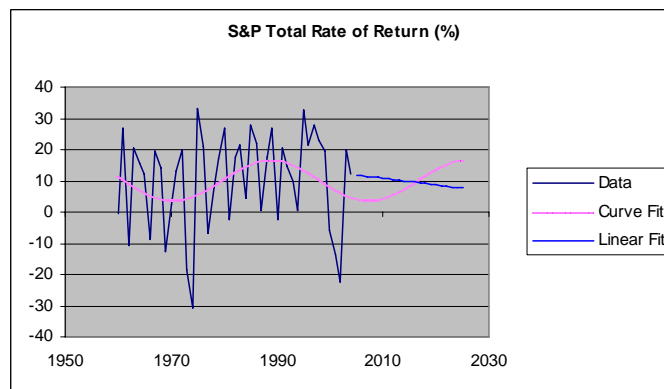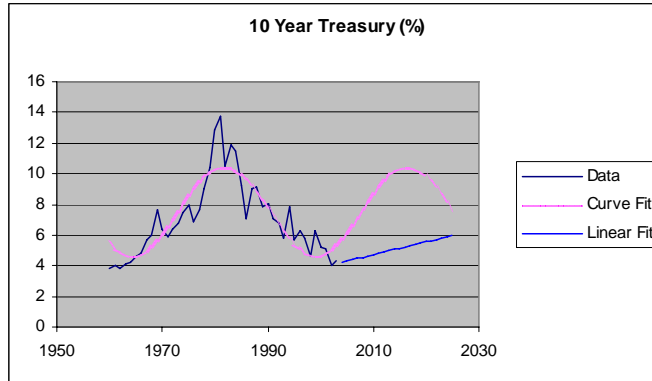
Although the curve fit approach produced excellent fits, use of a longer historical period would have undoubtedly resulted in different solutions. Both approaches tended to converge toward the same point in 2024 since the group's average expected value was used in both instances.

The table below lists the events that were included in TIA, and the probabilities and impacts of the events from the second round average responses. The panel provided probability estimates according to the scale:

5= Almost certain (90% or more)
4= Likely (65-90%)
3= As likely as not (35-65%)
2= Unlikely (10-35%)
1= Almost impossible (10% or less)

These estimates were converted to percentage estimates using the following equation:

$$EP = (20 * ES) - 10$$

Where EP is the event probability and ES is the estimate in terms of the average of the panel's responses based on the scale factor.[5]

The impacts are given in terms of basis points. The participants were asked to provide their judgments about the "peak impacts" of the developments; that is the maximum amount that the value of the variable would shift up or down within the next 20 years as a result of the occurrence of the development.

The question remained: when would this impact be felt? In the TIA computation, a number of runs are performed, each resembling a mini scenario. In each scenario, the probability of occurrence of each development is used as the basis for deciding when the development "occurred," in a particular year in that scenario. A time delay is assumed after the "occurrence" of a development until its peak impact is felt on the variables. The peak estimate was provided by the participants in the Delphi as shown in the table below. The time delay between the occurrence of a development and the realization of its peak impact was provided by the Principal Investigator and was generally less than five years. In the TIA more than 100 such scenarios are calculated and the outcomes on the course of the variables are used to determine the "fan" of future expectations for each variable. In our case, as the 90th percentile, median, and 10th percentile are used to describe the forecast expectations and ranges.

The developments, their probabilities in 2024, and their peak impacts are summarized in the table below.

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[5] This equation was selected to produce reasonable probability equivalents of the scale factors: e.g., a response of 5= 90%; a response of 4= 70%; a response of 3= 50%; a response of 2= 30%; and a response of 1= 10%.

| Development	Likelihood 2024 (Pct)	Peak Impact on variable 1	Peak Impact on variable 2	Peak Impact on variable 3	Peak Impact on variable 4
1. Oil prices rise over $ 60 / barrel for at least 5 years	67	246	211	-480	203
2. Global political instability, Iraq-like wars and terrorist activities and threats become the norm	46	255	177	-396	180
3. The terrorist threat under control (number of terrorist incidents 20% of current levels, worldwide, and remaining low)	48	-85	-78	377	-57
4. New technologies dropping costs of production of most products by 10% or more.	61	-125	-66	521	-60
5. The U.S. assuming and accepted in a moral, political, and economic leadership role.	46	-60	-51	409	-55
6. CPI pressures from growing budget deficits, rising demand for services (e.g., health care costs), stable or declining labor force, and concomitant growth in retirements.	63	320	285	-462	230
7. US balances its budget	30	-118	-142	381	-111
8. US dollar currency collapse vs. Euro	34	280	395	-589	355
9. Globalization lowers labor costs by 10% average.	59	-83	-34	500	-22
10. Savings rate grows 10%.	36	-123	-124	9	-89
11. Significant climate change affecting food supply and costs.	34	267	150	-187	87
12. New technologies improving productivity in services by more than 10%.	62	-134	-81	608	-58
13. Confidence in US drops; direct foreign investment reaching 50% of current levels.	38	225	241	-582	238

Development	Likelihood 2024 (Pct)	Peak Impact on variable 1	Peak Impact on variable 2	Peak Impact on variable 3	Peak Impact on variable 4
14. U.S. current account deficit increases to 10% of GDP	43	107	189	-337	156
15. U.S. investment climate proves attractive.	57	-55	-90	542	-77
16. Changes in Social Security permit individual investment decisions.	50	-59	38	360	20
17. Productivity increases 5% for five consecutive years.	38	-132	-107	654	-92
18. Significant corporate defaults (tripling over current rates)	36	44	-22	-750	258
19. Profit margins of most US companies drop to 50% of current levels for 10 years	28	-22	-57	-886	186
20. Economic depression for a seven year period	22	-200	-105	-1380	155
21. Significant bear market returns for a ten year period.	23	-81	-139	-1209	44
22. Prime rate above 9% for 5 years	35	215	278	-236	239

The disparity in results between the TIA and the direct projections highlights the importance of looking at things in different ways. In this study, we see how even a common group of professionals can come to different conclusions depending on how they look at an issue.

The TIA results are shown below (together with the panel's direct estimates of lowest plausible, expected and highest plausible values indicated by the "stars" on the right axis):

CPI Annual Change (%)

CPI Annual Change (%)
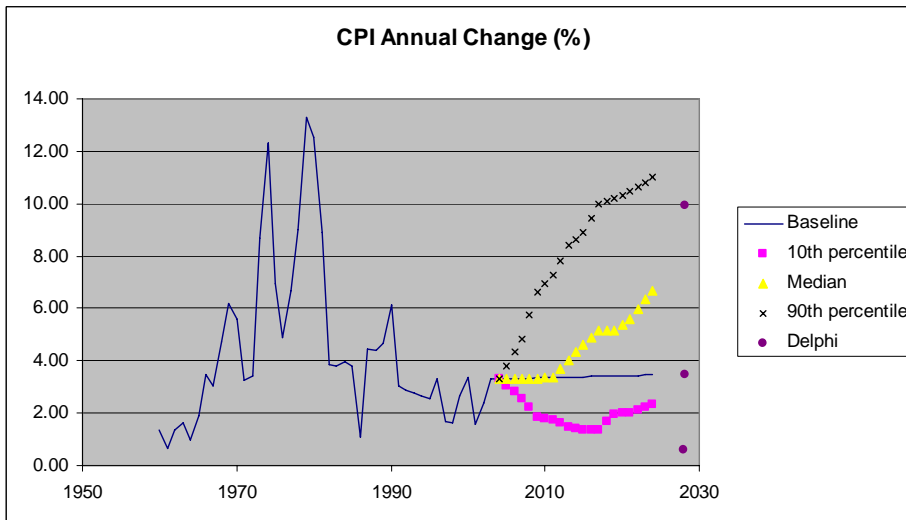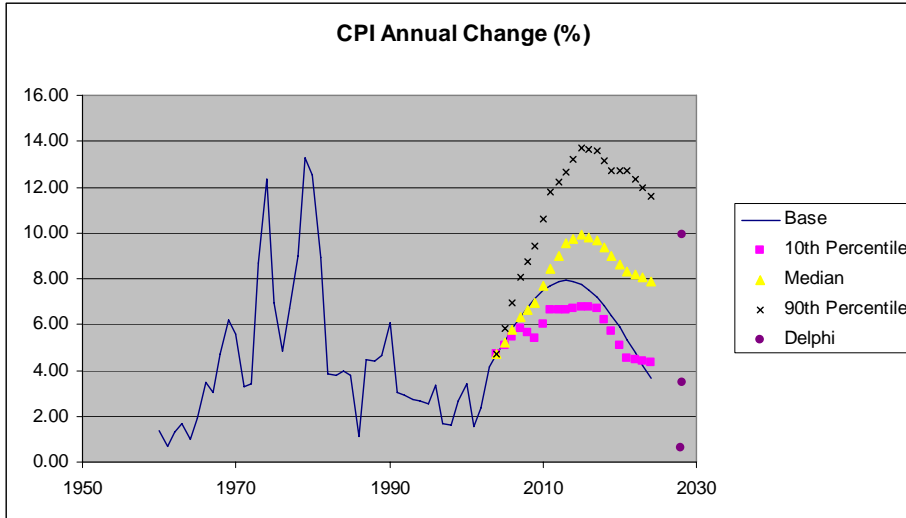
Both forecasts create a scenario in which inflation grows. In the case of the curve fit baseline, inflation grows to 9% or so shortly after 2010 and then begins to diminish; for the linear baseline inflation grows throughout the period reaching about 7% by 2024.

10 Year Treasury Spot Yield

10 Year Treasury Spot Yield
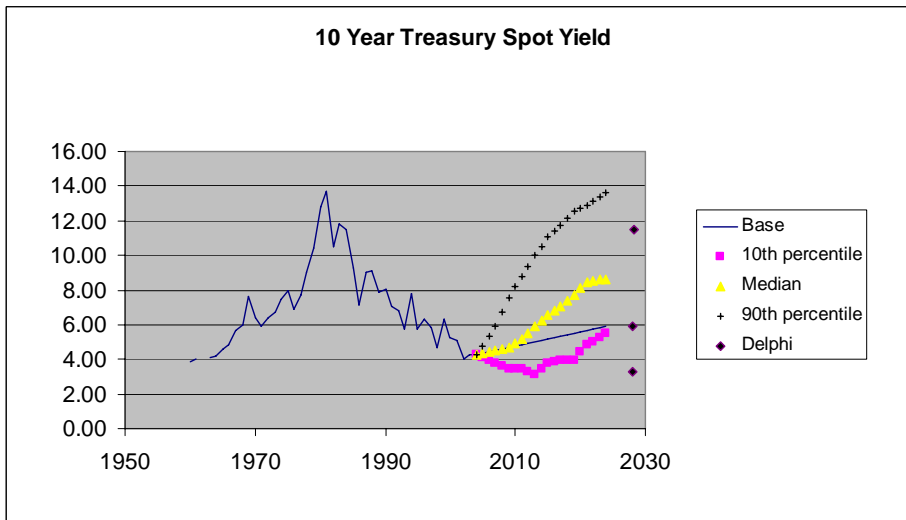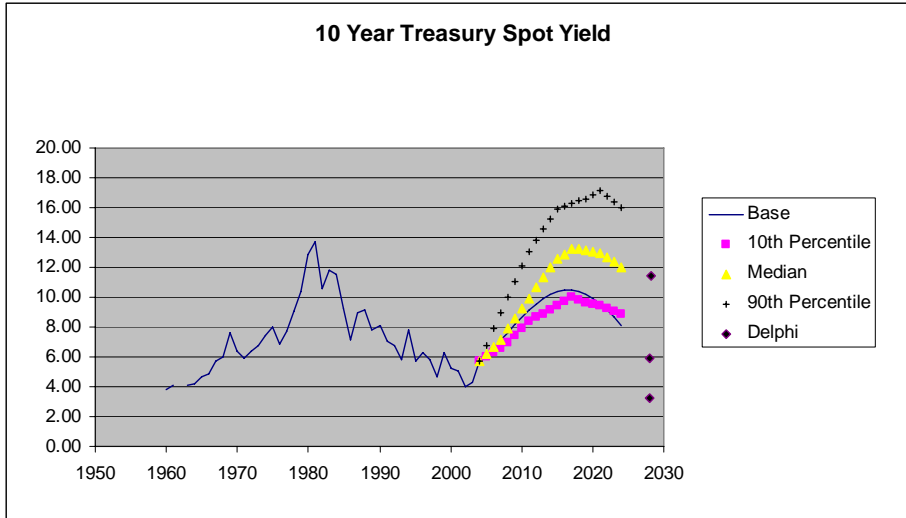
Ten year Treasury Bond Spot Yields follow the inflation forecasts, either peaking shortly after the mid period (curve fit) or rising throughout the period (linear fit) and reaching a return of about 9% by 2024.

S&P 500 Total ROR

S&P 500 Total ROR
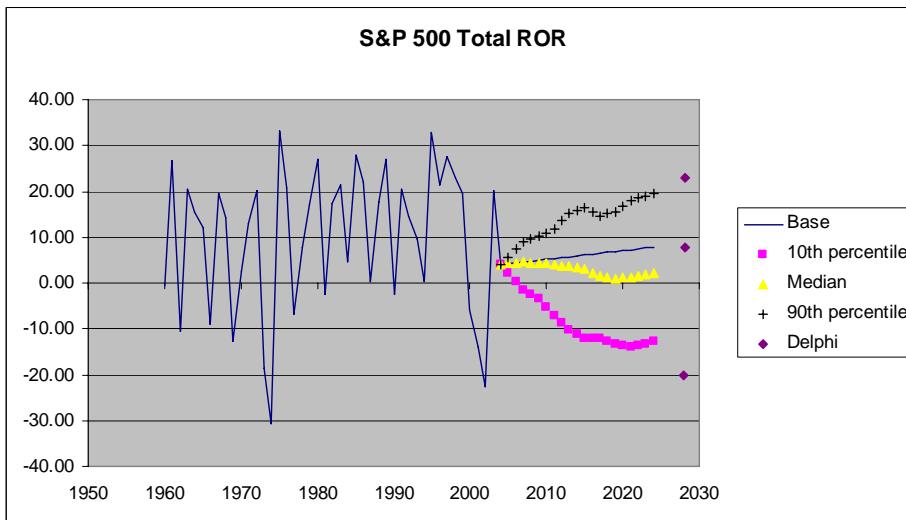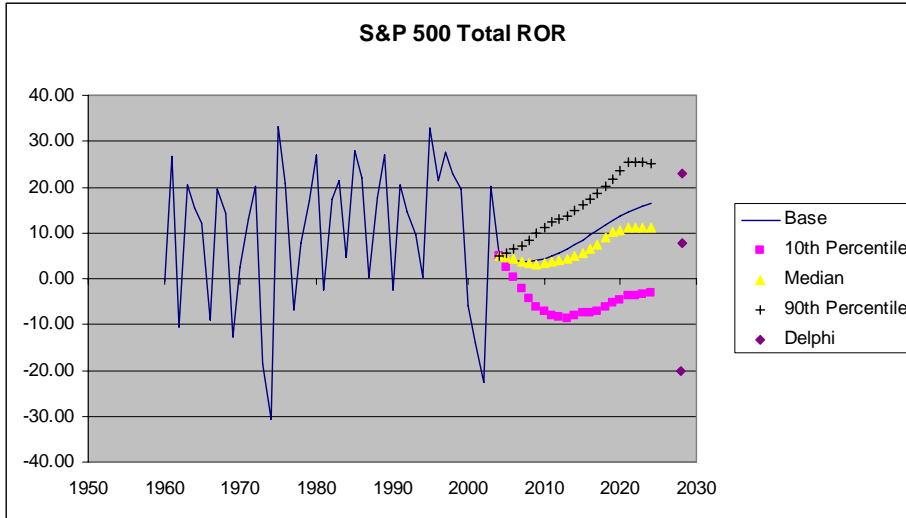
Here we see a difference between the two baseline extrapolation methods. For the curve fit approach, the return appears to rise throughout the period and for the linear fit, the return slowly diminishes to a value of about 2.5%.

Corporate Baa Rate (%)
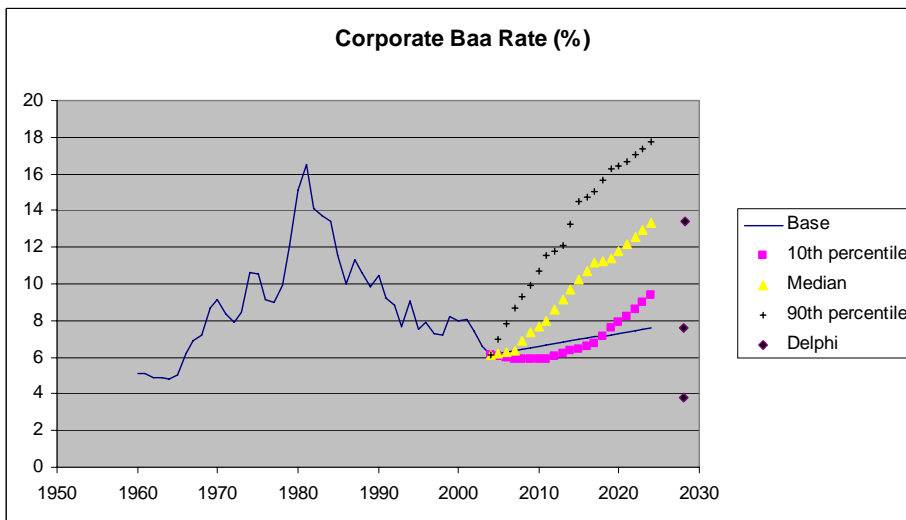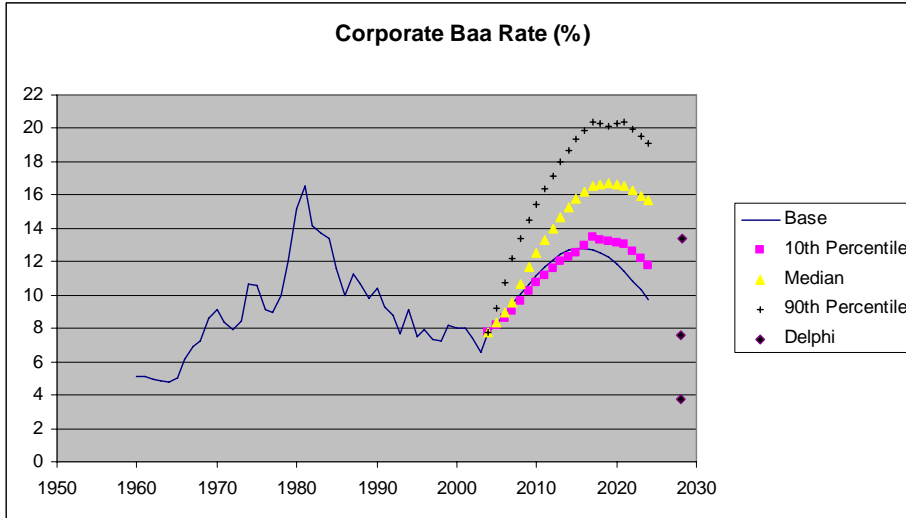
Corporate Baa Rate (%)

The pattern is repeated here. In the curve fit case, Corporate Baa Rates rise rapidly and then begin to diminish, peaking in the mid period; in the linear fit case the rates rise throughout the period to a value of over 13%

From this analysis we see that:

1. By considering the events that can change historical trends, TIA forecasts produce wide ranges in projections of the future courses of the variables, but somewhat narrower than the direct estimates discussed earlier.[6]

2. The TIA forecast indicated a higher potential for inflation and its consequences on the other variables than did the direct estimates.

3. The events that had the greatest impact on the course of the variables (and therefore should be carefully watched in the future) were:

Score	Development
18732	1. Oil prices rise over $ 60 / barrel for at least 5 years
16256	8. US dollar currency collapse vs. Euro
6660	6. CPI pressures from growing budget deficits, rising demand for services (e.g., health care costs), stable or declining labor force, and concomitant growth in retirements.
5892	4. New technologies dropping costs of production of most products by 10% or more.
5829	18. Significant corporate defaults (tripling over current rates)
5410	13. Confidence in US drops; direct foreign investment reaching 50% of current levels.
5110	2. Global political instability, Iraq-like wars and terrorist activities and threats become the norm
5109	12. New technologies improving productivity in services by more than 10%.
4844	15. U.S. investment climate proves attractive.
3976	9. Globalization lowers labor costs by 10% average.
3113	16. Changes in Social Security permit individual investment decisions.
2990	3. The terrorist threat under control (number of terrorist incidents 20% of current levels, worldwide, and remaining low)
2777	21. Significant bear market returns for a ten year period.
2555	22. Prime rate above 9% for 5 years
2511	17. Productivity increases 5% for five consecutive years.
2459	7. US balances its budget
2154	14. U.S. current account deficit increases to 10% of GDP
2071	20. Economic depression for a seven year period
2037	19. Profit margins of most US companies drop to 50% of current levels for 10 years
1630	5. The U.S. assuming and accepted in a moral, political, and economic leadership role.
747	11. Significant climate change affecting food supply and costs.
359	10. Savings rate grows 10%.

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[6] The reasons for these differences are not completely clear. The TIA requires an articulation of specific developments that can influence the course of the variables under consideration; if other developments had been nominated, or judgments about probability and impact had changed, the range might have been different.

To develop this listing of key events, a score was computed for each event using the following equation:

Score Event n= Prob 2011*(sum of absolute impacts of the development on all variables)/(average time to max impact)

where Score Event n is the calculated score of event n; Prob 2011 is the probability of the event in year 2011. Thus the score of a development is high if the probability and absolute peak impacts are high, and the time to impact is low.[7]

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[7] It may be useful to note that at the time of writing this report- September, 2005, the price of oil had for the first time in history surpassed $70 per barrel.

9. Study's Applicability to Forecasting Models

In Round 1, participants were invited to provide their views on how the judgmental process employed in this Study might influence the use and interpretation of traditional actuarial (e.g., stochastic, deterministic) estimation processes or to aid in planning. A number of possible uses were listed and the participants were asked to provide their answers using the following scale:

5= Use of judgmental processes is essential
4= extremely useful
3= somewhat useful
2= May help or hurt
1= Counter productive

The following table summarizes the results of Round 1 and 2:

Application	Av. Score	
	Rd 1	*Rd 2*
Identification of potential developments that could affect forecasts	4.42	4.21
Validity of outliers that stochastic models may forecast.	4.00	3.86
The volatility assumptions used in stochastic models	3.52	3.64
The historical period used to calibrate stochastic models	3.64	3.50
Expected values of variables.	3.64	3.43
Mean reversion assumptions in stochastic models	3.30	3.36
The period over which the current assumption reverts to the mean	3.05	3.21

It is apparent that the methods were highly regarded by the panelists since all were rated as "somewhat useful" or higher.

A count of the individual responses shows that a significant percentage of participants rated most of the applications as being "extremely useful" or "essential" by the following percentage of responses:

Application	Pct of responses "4" or "5"
Identification of potential developments that could affect forecasts	85.7
Validity of outliers that stochastic models may forecast.	57.1
The volatility assumptions used in stochastic models	64.3
The historical period used to calibrate stochastic models	57.1
Expected values of variables.	50.0
Mean reversion assumptions in stochastic models	35.7
The period over which the current assumption reverts to the mean	35.7

One respondent gave narrative answers rather than numerical assessments and commented on the highly rated applications as follows:

- (With respect to) "Identification of potential developments that could affect forecasts," this would teach actuaries how to think prospectively as well as retrospectively

- (With respect to) "Validity of outliers that stochastic models may forecast," (this would) allow one to consider possibilities."

Another said:

- I don't really believe in stochastic models and think that judgment is essential in any use of any of (the given model applications). .

More detailed follow-on questions were posed in Round 2 about each application. The questions and responses are summarized below; a more complete summary appears in Appendix E.

Item 1: The historical period used to calibrate stochastic models

Questions: Do you think that this Study provided potential developments and forecasts that could lead to revision of the historical period used in calibration? If yes, how would you revise the number of years you use to calibrate your models?

- Yes: 1
- No: 10

Selected Comments:

- I believe there is …. discontinuity between past and future, so that, while modeling needs some historical basis, impact of ….future changes must be considered in adjusting the model and the period used.

- Adjustment to number of years depends on what projected changes in the economy are under consideration. Adjustment might be more than just a change in period but include random shocks

- In my own statistical studies of the historical data, I found that if one eliminates the periods where government intervention was different from the norm, the interest rates, CPI and corporate bond behavior was stable and there were little to no outliers.

- For all variables it is important to determine if a structural shift in relationships has taken place. While Chow tests and other statistical techniques can be used to test for changes in relationships, judgment is still very important in selecting the relevant historical period for estimation of stochastic models to include all the of the historical period with the current model or relationships, but to exclude historical periods with different structural relationships

_____

Item 2: Expected Value of Variables

Questions: Do you think that this Study provided potential developments and forecasts that could lead to changes in estimates of the expected value of the variables? If yes, by how much do you think the expected values might change? (e.g., if you would now use 6% instead of 5%, enter 100).

- Yes: 7
- No: 2

Selected Comments:

- The modeler should layer …. his or her assumptions upon the 'tame' economic (projections).

- I have not been overly concerned about the role of baby boomers as they begin to retire in large numbers. Perhaps my thinking on the effect of this on investment returns and inflation needs to be refined. …. As a rough guess, a 10% reduction in investment returns and a 10% hike in inflation might be needed.
- (Based on the work reported here) I would now use a higher estimate of the lowest plausible values of CPI and 10 year interest rates. I would increase my estimate of this lower boundary by 50 to 100 basis points.
- Some of the events/developments discussed in this Study would change the expected values of the variables, but it is impossible to generalize on the magnitude of the change in expected values.

- Made me think more about the interactions between the variables and how the correlations might be impacted

_____

Item 3: Identification of potential developments that could affect forecasts

Questions: List one potential development or forecast identified in this Study that you think may cause changes in your model.

- Food supply; likely to raise cost of borrowing for the 10-T and spreads.

- Global climate change having meaningful economic impact by 2024; this would be so far out of the historical experience that many statistical relationships between relevant economic series may be changed in a significant way.

- Economic depression for a 7 year period; this development is actually related to others in the list (increase in corporate defaults, prime rate above 9% for 5 years)

- Rising cost of borrowing for the 10-T and spreads; increased uncertainty leads to increased volatility

- This development is actually related to others in the list (increase in corporate defaults, prime rate above 9% for 5 years)

- Gives a more rational basis for company selection of projected values, particularly if modeling an additional optimization component

_____

Item 4: Mean reversion assumptions in stochastic models

Questions: Do you think that this Study identified potential developments or forecasts that could lead to increasing or decreasing strength of reversion?

- Yes: 2
- No: 6

_____

Item 5: The period over which the current assumption reverts to the mean

Questions: Do you think that this Study identified potential developments or forecasts that could lead to a lengthening or shortening of the mean reversion period? If so, by how much?

- Yes: 0
- No: 7

Selected Comments

- If mean reversion does not take place over the 20 year span of this projection, then the process that is taking place is not a mean reverting one in any meaningful sense.

- My model is deterministic not stochastic, so many of these questions do not apply.

Item 6: The volatility assumptions used in stochastic models

Questions: Do you think that this Study identified potential developments or forecasts that could lead to an increase or decrease in volatility assumptions?

- Yes: 8
- No: 1

Selected Comments

- Some increase in volatility should be allowed for if one believes the impact of the baby-boomers will be significant. One needs to simulate a broader range of outcomes

- Yes, seeing the strong consensus of views on highest plausible values could lead to increased volatility assumptions in forecasting models. Forecasters might wish to calibrate the volatility of their variables to produce similar extreme values.

- The number of different situations that can impact variables leads me to favor higher volatility in the future than in the past.

- My starting point assumptions on volatility always are derived from historical experience. Economic theory gives us more insight on the mean or equilibrium value of variables than on the variance or volatility. The occurrence

of very low subjective probability events could have an impact on volatility, but it is difficult for me to quantify the impact.

- Future elements of instability should be used in establishing just how volatile each characteristic will be

- 20 years from now an Asian power (likely China) that own lots of dollars and wants to destabilize the US economically before attacking will have an additional tool in its belt.

Item 7: Validity of outliers that stochastic models may forecast

Questions: Do you think that this Study identified potential developments or forecasts that could cause you to reassess the influence of outliers. If so, which outlier do you now consider having more of an influence in your model? What outlier do you now consider having less of an influence in your model?

- Yes: 4
- No: 3

Selected Comments:

- We need to utilize deterministic models in addition to stochastic ones to get the impact of outliers.

- Outliers should be checked against actual outliers in the period 1890 and on.

- More of an influence: The US assuming and accepted in a moral, political, and economic leadership role.

- Judgment is always critical in assessing the validity of outliers. Outliers can help us identify missing independent variables, structural changes, but they can sometimes just be random outliers.

- Only historical studies give a known response to external stimuli, but the outliers there are obviously discrete and not easily incorporated in modeling. Outliers based on model characteristics are a better fit, but without careful judgment, cannot be easily said to be "real"

The following table supplies a rank ordered summary of the answers to the yes/no questions:

Question	Yes	No
Do you think that this Study identified potential developments or forecasts that could lead to an increase or decrease in volatility assumptions?	8	1
Do you think that this Study provided potential developments and forecasts that could lead to changes in estimates of the expected value of the variables?	7	2
Do you think that this Study identified potential developments or forecasts that could cause you to reassess the influence of outliers?	4	3
Do you think that this Study identified potential developments or forecasts that could lead to increasing or decreasing strength of reversion?	2	6
Do you think that this Study provided potential developments and forecasts that could lead to revision of the historical period used in calibration?	1	10
Do you think that this Study identified potential developments or forecasts that could lead to a lengthening or shortening of the mean reversion period?	0	7

10. Comparison of Responses of Actuaries and Non Actuaries

Although small sample sizes do not permit reaching any conclusions that have general statistical significance, it is possible to compare the responses of subgroups within this particular set of participants. The response data were divided into two subsets: self identified actuaries with ten or more years of experience and all others. There were 12 participants in each subgroup. Three comparisons were made: 1) values of the four variables expected in 2024, 2) the likelihood of the perturbing events, and 3) the potential for application of judgmental techniques to modeling approaches used by actuaries. The results are presented in the following charts.

As can be seen below, the actuaries believed that the value of the four variables would be closer to today's values than did the non actuary group, the most significant difference being in the expectation of total rate of return of the S&P 500 (9% vs. 6.5%). Judgments about the other variables were within 1% of each other.

Comparison of Responses

Actuaries and Non Actuaries
Average Expected Values
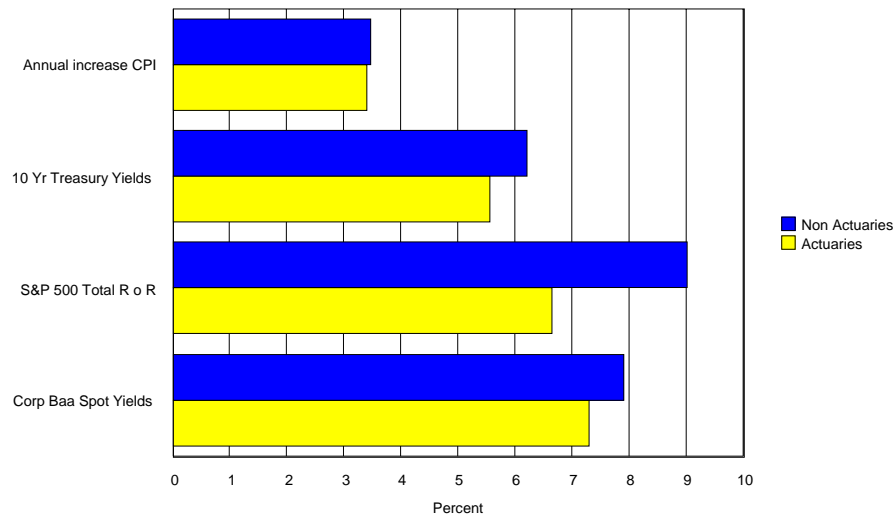
Comparisons were also made of the estimates of likelihood of the future developments used in the TIA's. Nine out of ten of the most likely developments were identical in each group; the table below presents the likelihood judgments ranked by the actuaries' assessments)

Development	Non Actuary	Actuary
1. Oil prices rise over $ 60 / barrel for at least 5 years	4.00	3.80
6. CPI pressures from growing budget deficits, rising demand for services (e.g., health care costs), stable or declining labor force, and concomitant growth in retirements.	3.75	3.64
4. New technologies dropping costs of production of most products by 10% or more.	3.67	3.36
12. New technologies improving productivity in services by more than 10%.	3.82	3.27
15. U.S. investment climate proves attractive.	3.50	3.22
16. Changes in Social Security permit individual investment decisions.	2.92	3.18
9. Globalization lowers labor costs by 10% average.	3.58	3.09
2. Global political instability, Iraq-like wars and terrorist activities and threats become the norm	2.92	2.73
17. Productivity increases 5% for five consecutive years.	2.17	2.70
3. The terrorist threat under control (number of terrorist incidents 20% of current levels, worldwide, and remaining low)	3.08	2.64

And graphically:

Comparison of Responses

Actuaries and Non Actuaries
Average Liklihood Estimates: Ten Most Likely
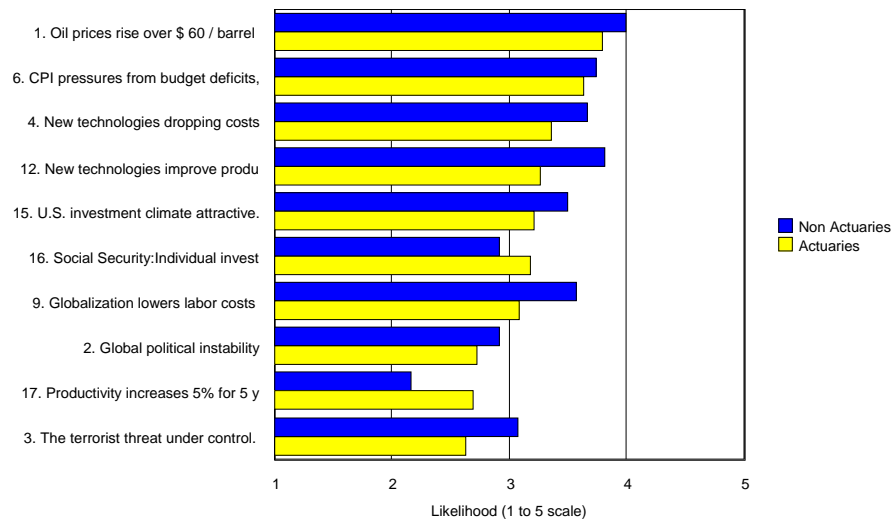
Finally, the responses of the two groups were compared in their assessments of the applicability of judgmental methods to modeling approaches used by actuaries. The chart below shows that judgmental methods were higher rated by the actuaries than the non actuaries, in all applications but one.

Comparison of Responses

Actuaries and Non Actuaries
Applicability to Forecasting Methods
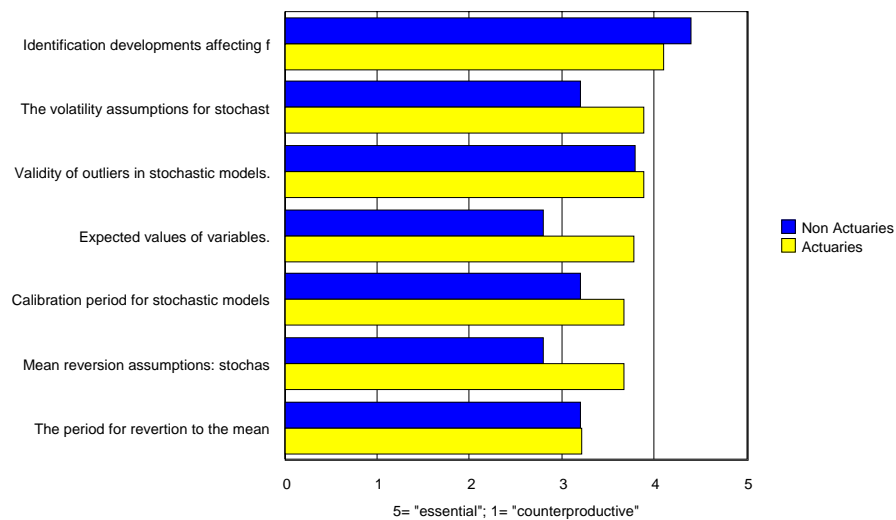
While the comparisons are interesting and suggestive, it is impossible to say whether the two groups are significantly distinguishable.

11. Characteristics of Study's Professional Participants

For Round 1, questionnaires were mailed to 86 potential participants who were suggested by the POG, WG, or members of the Study team. In general there were few contacts made prior to the emailing of the questionnaires; in the middle of the response period, follow-up calls were initiated to almost all of the people who had not yet responded. The response rate, while respectable (about 33%) undoubtedly could have been higher had there been an invitation phase prior to the emailing.

In Round 2, questionnaires were mailed to all of the original invitees (including both the group that responded and those that did not); all were invited to respond and were assured that even if they did not participate in Round 1, their responses to Round 2 would be most welcome. The response rate was a bit lower than in Round 1 (about 28%).

Characteristics of Respondents

Round 1

Organizations

Other 6.5%
Government Agency 6.5%
Insurance Industry 22.6%
Other Corporation or Bu 22.6%
NGO 3.2%
University 12.9%
Consultant 25.8%

Profession

Other 2.0%
Scientist 7.8%
Economist 21.6%
Actuary 23.5%
Investment Manager 7.8%
Futurist 17.6%
Modeler 19.6%
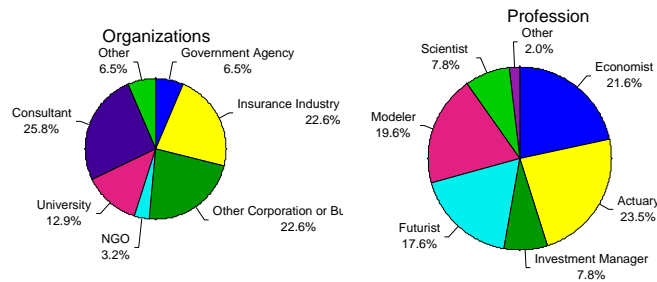
Characteristics of Respondents

Round 2
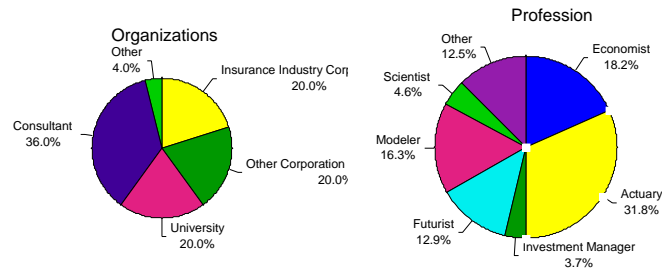
The panelists were extraordinarily experienced. Each was requested to provide the number of years they had been engaged in the listed professions (of course individuals could enter the number of years for more than one profession) and the average and total experience of the group was very high, as shown below. Some of the differences between Rounds 1 and 2 can be attributed to changes in the people who participated, but other differences can be attributed to different responses provided by the same respondent to the question in each round.

Experience of Respondents

Round 1

Experience of Respondents
Round 2

Avg Years Experience

30.3
19.7
25.7
22.5
18
22.6
25

Total Years Experience

121
177
45
158
308
125
36

■ Economist
□ Actuary
■ Investment Manager
■ Futurist
■ Modeler
■ Scientist
■ Other
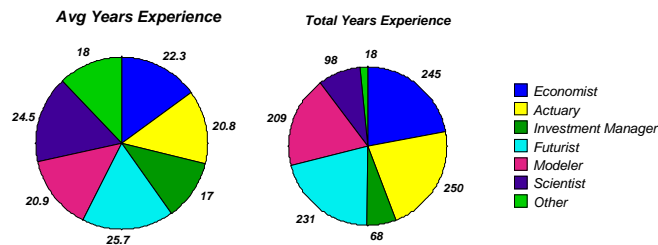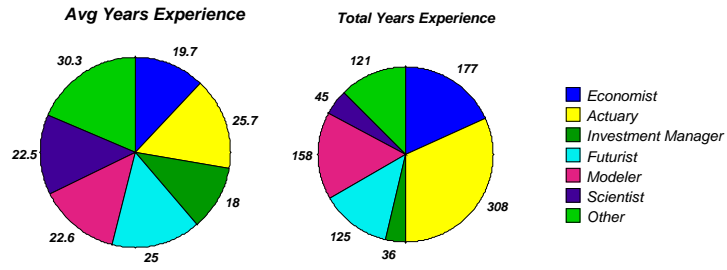
Appendix A
Round 1 Questionnaire

Round 1
Study of Selected Economic Variables
Using the Delphi Method

On behalf of the Society of Actuaries, I have the honor to invite you to participate in a Study to make long term (20 year) forecasts of four selected economic variables (annual increase in CPI, 10 Year Treasury yield, S&P500 total return, Corporate Baa yield) and the factors that can change their direction. You have been selected by members of the Society or its consultants because of your insight and knowledge underlying the variables we have chosen to include. Our focus in this Study is on your judgments, underlying analysis, methods of estimation and techniques used by you to quantify your estimates. We are interested in plausible future developments that could change these estimates and your rationale for the resulting change in your estimates.

The Society of Actuaries is a nonprofit <u>educational</u>, <u>research</u> and professional society of 17,000 <u>members</u> involved in the modeling and management of financial risk and contingent events. The mission of the SOA is to advance actuarial knowledge and to enhance the ability of actuaries to provide expert advice and relevant solutions for financial, business and societal problems involving uncertain future events. This Study is being conducted to provide actuaries and other financial professionals with an alternative framework with which to project future values of economic variables, an alternative which relies more on judgments from a diverse panel of experts than is usually utilized under more traditional stochastic and deterministic methods.

No attributions will be made, but respondents will be listed as participants in the final report which will, as appropriate, be widely disseminated in the professional literature.

A second round, based on the responses to the enclosed questionnaire, will be sent to you in two or three months. Please contact us with any questions and return your responses in time to arrive at the Society by December 1, 2004. You can respond (email preferred) to Ronora Stryker (email rstryker@soa.org, fax 847 273-8514, ph 847 706-3614) with a copy to Ted Gordon (email tedjgordon@att.net,
fax 860 434-0870).

We appreciate your willingness to participate in this initiative.

> Sincerely yours,
>
> Steven Easson, FSA, FCIA, CFA
> Chairperson of the Society of Actuaries Project Oversight Group on the Study of Selected Economic Variables Using the Delphi Method.

Round 1 Questionnaire

OVERVIEW OF QUESTIONNAIRE

Please complete the portions of this questionnaire in which you are expert or interested. You may omit any of these questions without affecting the analysis planned for this Study.

This first round questionnaire asks for your judgments about selected variables. As you will see, the four variables under consideration are:

1. Annual increase in the Consumer Price Index
2. 10 Year Treasury Spot Yields
3. S&P 500 Total Rate of Return
4. Corporate Baa Spot Yields

All data are for the U.S. and brief definitions and historical data sources for each variable appear at the end of this questionnaire.

This questionnaire has three parts. You will be asked:

➢ First, to provide your judgments about the values you expect each variable to attain in 20 years, and the "highest" and "lowest" plausible values you see for these variables, and the reasoning for your judgments.

➢ Second, to list for each variable some prospective developments that could significantly alter your estimates.

➢ Third, to provide your view about the usefulness of judgmental methods in various applications.

PARTICIPANT'S BACKGROUND

No attributions will be made, but for demographic analysis, please check the appropriate boxes (answering more than one slot in each list is OK).

Name: _____

My primary employment is in:

Government Agency _____
Insurance Industry Corporation_____
Other Corporation or Business _____
Non Government Organization _____
University _____

Independent Consultant _____
Other _____

Years of experience in the following fields:

Economist _____
Actuary_____
Investment Manager _____
Futurist _____
Modeler _____
Politician _____
Scientist _____
Other (Specify profession) _____

Mailing Address: (We plan to send a small token of appreciation for your participation)
_____
_____
_____

Phone Number: (for follow up if necessary)

_____

QUESTION 1.

Part (a)

The table below lists some historical data for each of the variables. Please provide your judgments as follows.

Imagine the world in 2024. Please enter your judgments about the values you think these variables may attain in that year. In:

Column 1, please enter the lowest plausible value; that is the value which you believe has a 90% chance of being exceeded.

Column 2, please enter the expected value; that is the value that is equally likely to exceed or fall below the actual result in 2024.

Column 3, please enter the highest plausible value; that is the value which you believe has a 10% chance of being exceeded.

				1	2	3
Variable	Highest Value in last 40 years	Lowest Value in last 40 years	Current Value (2003)	Lowest plausible Value in 2024	Expected Value in 2024	Highest Plausible Value in 2024
1. Consumer Price Index (% annual Increases)	13.30	1.00	1.90			
2. 10 Year Treasury Spot Yields (% monthly peak)	13.72	4.03	4.27			
3. S&P 500 Total Rate of Return (percent)	33.3	-30.6	20.1			
4. Corporate Baa Spot Yields (%)	16.55	4.81	6.60			

Part (b)

Since the actual values that will be realized in 2024 are dependent on what happens in the next 20 years, we also want your ideas on the key developments that can affect the course of the variables in that interval. For each of your answers in Columns 1-3, please give us reasons for your views, concentrating particularly on those situations in which you believe the variable will in the next 20 years exceed the historical highs and lows of the last 40 years. We are most interested in the thought processes/rationale(s) you used in making your estimates.

An example is given below:

> Variable number: 2   Reason: I think that 10 year Treasury bond yields will be over 14% sometime in the next 20 years is because of a return of inflation- driven by OPEC oil policies designed to destabilize Western economies.

Variable number 1:   Reason:

Variable number 2:   Reason

Variable number 3:   Reason

Variable number 4:   Reason:

QUESTION 2.

In the table below please list a few plausible future developments that you believe could, if they occurred, significantly impact on the course of each of the four variables. Developments may be listed under more than one variable since a future event may affect many variables. Several examples are provided; you may cross these out if you believe they are not plausible or significant. Remember we're asking about developments that may occur within the next 20 year period (we'll be asking about your rationales, timing of the development and the level of impact in Round 2). Several of the examples have blanks; if you choose to include them please fill in the blanks with your assumptions.

1. Annual increase in Consumer Price
1. Oil prices rise to above _____$/barrel for at least five years.
2. New technologies drop costs of production of most products by __ %

3.

4.

5.

2. 10 Year Treasury Spot Yields
1. Confidence in the US drops; direct foreign investment reaches ___% of current levels.
2. U.S. Government current account deficit increases to 10% of GDP.

3.

4.

5.

3. S&P 500 Total Rate of Return
1. Profit margins of most US companies drop to ___% of current levels for 10 years
2. Productivity increases _5% for five continuous years.

3.

4.

5.

4. Corporate Baa Spot Yields
1. Expanded R&D by most US companies substantially jeopardizes ability to service debt.
2, Rating agencies tighten maximum debt/equity ratio to ____%.

3

4.

5.

QUESTION 3.

We invite your views on how the judgmental process employed in this Study might be applied to enhance the traditional actuarial (e.g., stochastic, deterministic) estimation process or to aid in planning. Please provide your answers using the following scale, and add other applications if you wish to the end of the table:

5= Use of judgmental processes is essential
4= extremely useful
3= somewhat useful
2= May help or hurt
1= Counter productive

Possible Use	Applicability
The historical period used to calibrate stochastic models	
Expected values of variables.	
Identification of potential developments that could affect forecasts	
Mean reversion assumptions in stochastic models	
The period over which the current assumption reverts to the mean	
The volatility assumptions used in stochastic models	
Validity of outliers that stochastic models may forecast.	

Thank you for your participation. You will receive the second round in a few weeks.

DEFINITIONS OF STUDY'S U.S. ECONOMIC VARIABLES AND HISTORICAL DATA SOURCES

For your information, here are the definitions and sources of historical data for the four variables (time series data for the variables appear on the next page):

Variable	*Definition*	*Source*
1. Annual Percentage Increase in the Consumer Price Index	The Consumer Price Index (CPI) represents the average change over time in the prices paid by urban consumers for a market basket of consumer goods and services.	Bureau of Labor Statistics at http://www.bls.gov/cpi/home.htm
2. 10 Year Treasury Spot Yields (% annual)	Yields on Treasury securities at constant, fixed maturity are constructed by the Treasury Department based on the most actively traded marketable Treasury securities.	Federal Reserve Bank at http://www.federalreserve.gov/releases/h15/data/m/tcm10y.txt
3. S&P 500 Total Rate of Return (% annual)	Yearly S&P 500 TROR= 2* (S&P500 Index End + Dividends - S&P500 Index Beg)/ (S&P500 Index Beg + S&P500 Index End - Dividends)	Calculated from data on www.econ.yale.edu
4. Long Corporate Baa Spot Yields (% annual)	Average yield to maturity on selected long-term bonds	Federal Reserve Bank at http://www.federalreserve.gov/releases/h15/data/m/Baa.txt

CPI Annual Increase

10 Year Treasury Spot Yields; Monthly Peak

S&P 500 Total Rate of Return

Corporate Baa Yield
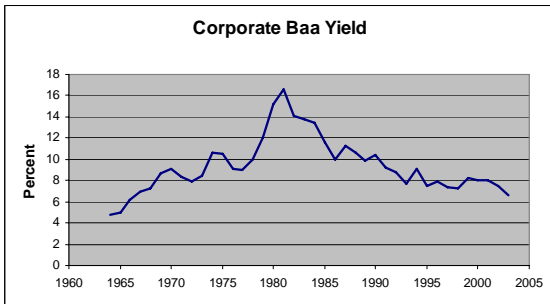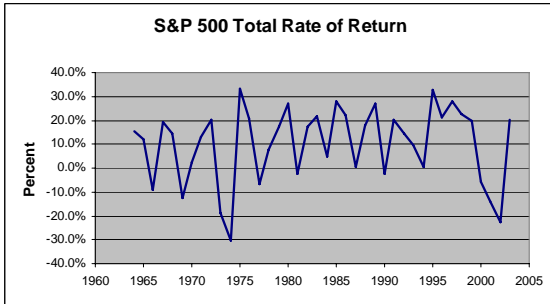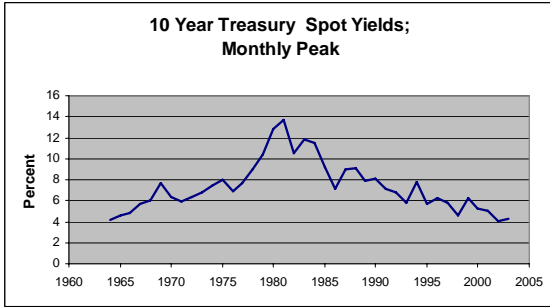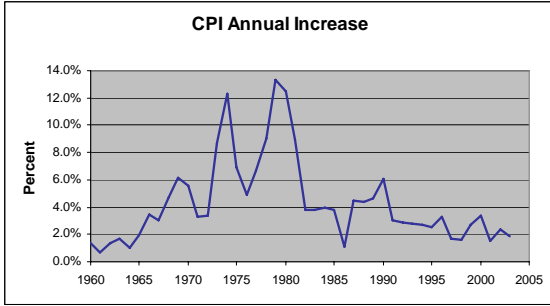
Appendix B
Round 2 Questionnaire
Study of Selected Economic Variables
Using the Delphi Method

On behalf of the Society of Actuaries, I have the honor to invite you to participate in the second Round of a Study to make long term (20 year) forecasts of four selected economic variables (annual increase in CPI, 10 Year Treasury yield, S&P 500 total return, Corporate Baa yield) and the factors that can change their direction. The first round was successfully completed in December of last year and involved experts who provided judgments about the likely course of these variables and the reasons for their views. The responses were extensive, imaginative, and very helpful.

In this questionnaire we present the results of the first Round and ask for reassessments and comments on some of the emerging perceptions. **You need not have participated in the first round to participate in this Round Two. As you will see, three questions are posed in this questionnaire; in the case of Question 3 a portion is directed only to those participants involved in modeling the future courses of economic variables.**

The Society of Actuaries is a nonprofit educational, research and professional society of 17,000 members in the modeling and management of financial risk and contingent events. The mission of the SOA is to advance actuarial knowledge and to enhance the ability of actuaries to provide expert advice and relevant solutions for financial, business and societal problems involving uncertain future events. This Study is being conducted to provide actuaries and other financial professionals with an alternative framework with which to project future values of economic variables, an alternative which relies more on judgments from a diverse panel of experts than is usually utilized under more traditional stochastic and deterministic methods.

No attributions will be made, but respondents will be listed as participants in the final report which will, as appropriate, be widely disseminated in the professional literature.

A final report will be issued based on the responses to the first round and the enclosed questionnaire for Round 2; it will be sent to you in two or three months. **Please contact us with any questions and return your responses in time to arrive at the Society by April 15, 2005**. You can respond (email preferred) to Ronora Stryker (email rstryker@soa.org, fax 847 273-8514, ph 847 706-3614) with a copy to Ted Gordon (email tedjgordon@att.net, fax 860 434-0870). If you find that you have questions about the questionnaire, please call Ted Gordon (860 434-8608) or Steve Easson (905 606-1214).

We appreciate your willingness to participate in this initiative.

Sincerely yours,

Steven Easson, FSA, FCIA, CFA
Chairperson of the Society of Actuaries Project
Oversight Group on the Study of Selected Economic
Variables Using the Delphi Method

Round 2 Questionnaire Draft

OVERVIEW OF QUESTIONNAIRE

Please complete the portions of this questionnaire in which you are expert or interested. You may omit any of these questions without affecting the analysis planned for this Study.

The first round questionnaire as well as this one asks for judgments about four variables:

> Annual increase in the Consumer Price Index
> 10 Year Treasury Spot Yields
> S&P 500 Total Rate of Return
> Corporate Baa Spot Yields

All data are for the U.S. and brief definitions and historical data sources for each variable appear in Appendix A of this questionnaire.

This Round 2 questionnaire has three parts. You will be asked:

- ➢ First, we have provided feedback on the projections made by the participants in Round 1 about the future values of the variables and their key reasons for high and low estimates. In view of these data, we ask you to provide estimates of expected value, lowest plausible value, and highest plausible value of the four variables in 2024 and the reasons for your responses.

- ➢ Second, we list some prospective possible developments provided by the experts in Round 1 for each variable that were suggested as being important to the track of the variables. We ask you to provide your judgments about the likelihood and impacts of these developments. We intend to use these judgments in a Trend Impact Analysis to project the ranges of the variables over time.

- ➢ Finally, we list answers to the question posed in Round 1 in which respondents were invited to provide their views on how the judgmental process employed in this Study might be applied to enhance the traditional modeling and estimation process or to aid in planning. A number of possible uses were listed and the respondents were asked to provide answers. Now, based on these answers, we ask more specific questions about the applicability of utilizing the judgments and forecasts obtained in this Study to enhance these forecasting methods.

PARTICIPANT'S BACKGROUND

No attributions will be made, but for demographic analysis, please check the appropriate boxes (answering more than one slot in each list is OK).

Name:

Address:

Phone:

My primary employment is in:

Government Agency _____
Insurance Industry Corporation_____
Other Corporation or Business _____
Non Government Organization _____
University _____
Independent Consultant _____
Other _____

Years of experience in the following fields:

Economist:
Actuary_____
Investment Manager _____
Futurist   _____
Modeler _____
Politician _____
Scientist _____
Other (Specify profession) _____

In this section we provide quantitative feedback from the first round about the projected values of the variables and some of the reasons given by the respondents for their views (in edited form). We ask you to please consider these results and provide new estimates for the variables in 2024.

The graphs and tables below show the respondents' expectations for each of the variables from Round 1. For example, in the graphs the vertical bars on the right show the inter-quartile ranges for the expected value, the highest plausible value, and the lowest plausible value of each variable in 2024. The round dots next to each bar show the median of the group's judgments.

The lists below each of the graphs present the reasons given by the respondents for high and low estimates,

The final table presents the numerical values used in the graphs; the median value is in **bold** type, and UQ and LQ refer to the upper quartile and lower quartiles of the group's responses, respectively.

In view of the group's Round 1 qualitative and quantitative responses, please enter your judgments about the values you think each variable may attain in 2024 in the third column of the final tables. Please enter three numbers for each variable:

> The lowest plausible value; that is the value that you believe has a 90% chance of being exceeded.

> The expected value; that is the value that is equally likely to exceed or fall below the actual result in 2024.

> The highest plausible value; that is the value which you believe has a 10% chance of being exceeded.

In the final column, please note the reasons for your views, particularly if you differ significantly with the median judgments of the group. You may refer to the lists by number or enter new information. If you participated in Round 1 and want a copy of your responses, please contact Ronora Stryker at 847 706-3614.

1. Annual increase in Consumer Price Index

Number of Respondents = 28
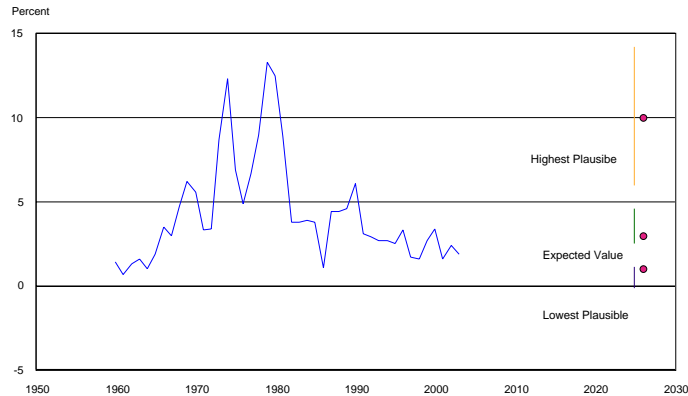
Reasons for high estimates

1. Tight energy and commodity markets: price shocks, oil shortages; rising oil prices
2. Widening of the US budget and trade deficits
3. The rise in China's economy with resulting higher wages and prices for exports to the U.S.
4. The retired baby boom generation demanding huge amounts of services, especially health care
5. Growth in the number of elderly and concomitant cost increase in medical care expenses
6. The current economic recovery slowly gaining strength
7. Consumers with a "buy now" attitude, discounting the future in pursuit of comfort in the present
8. The Fed increasing money supply to help avoid a collapse in housing and reduce the trade deficit
9. The Fed's credibility being eroded by deteriorating debt
10. Fiscal and trade issues triggering a return to more stimulative monetary and fiscal policies
11. Geopolitical issues: e.g., instability in the Middle East or wartime conditions, such as 1917 – 18
12. A shock due to terrorism or natural catastrophe (earthquakes, hurricanes, influenza pandemic)

Reasons for low estimates

13. Productivity increases continue
14. Commodities- even energy becoming less important
15. The Fed policy for controlling inflation remaining effective
16. Fed putting liquidity into the market
17. Global depression or a period of prolonged weak economic growth
18. A shift to rebuild savings by over-indebted consumers
19. Exchange rates not being allowed to adjust to offset competitive and trade imbalances.
20. Baby boomers & younger generation spending less, saving more over concern for social security
21. Deflationary pressures continuing as Asia develops
22. Jobs traveling to poorer countries and consequent dramatic growth in unemployment
23. A technology driven continued steady decline in the real prices of natural resources
24. Capital market discipline on government inflation.

Respondents' Estimates Of the Variable in 2024	Prior Panel Responses LQ MED UQ	Your Current Estimates (Please provide three numbers in each cell)	Reasons for your Responses
Lowest plausible value	-0.1 **1.0** 1.1		
Expected value	2.5 **3.0** 4.6		
Highest plausible value	6.0 **10.0** 14.2		

2. 10 Year Treasury Spot Yields
Number of Respondents = 27
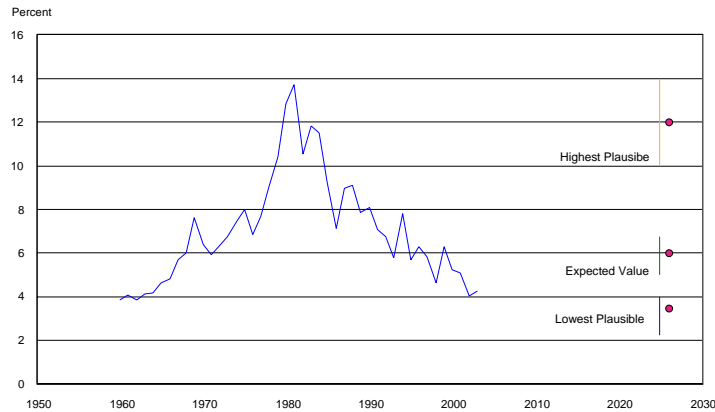
Reasons for high estimates

1. Tight energy and commodity markets: price shocks, oil shortages; rising oil prices
2. Labor unrest as the dependency ratio rises with the baby boomers retiring
3. Continuing wave of technological change driving robust economic growth
4. Need to attract foreign capital to finance the enormous U.S. budget deficit
5. High inflation from combination of the budget and trade deficit
6. Foreign investors diversifying portfolios away from U.S. dollar assets
7. Highly stimulative U.S. monetary and fiscal policies
8. Inability to generate domestic savings to reduce reliance on foreign borrowing
9. People continuing to favor current consumption over saving
10. Calls on government promises for retirement income and medical care straining federal budgets
11. The growth in demand for treasuries falling behind the growth in federal commitments
12. U.S. dollar losing value
13. Foreign governments switching to place funds in euros
14. Government inability to "manage" mid or long term rates
15. Competition to Treasury bonds for investment: other alternatives including global capital markets.
16. Combination of projected labor force growth, productivity growth and the achievement of the inflation target

Reasons for low estimates
17. Low CPI and the Fed putting liquidity into the market
18. Combination of projected labor force growth and productivity growth
19. Extreme Fed controls such as in the early cold war/McCarthy period
20. A prolonged period of US fiscal austerity in an attempt to balance its budget
21. The Fed commits to and achieves inflation in a 0-2% range
22. Delays in retirement and new retirement careers resulting in improved tax revenues and slowing the growth of calls on Social Security and Medicare
23. The extra productivity of the post-retirement workers increasing the amount of money looking for secure investments while reducing the need for government borrowing
24. Government policies reacting quickly to inflationary pressures

Respondents' Estimates Of the Variable in 2024	Prior Panel Responses LQ MED UQ	Your Current Estimates (Please provide three numbers in each cell)	Reasons for your Responses
Lowest plausible value	2.2 **3.5** 4.0		
Expected value	5.0 **6.0** 6.7		
Highest plausible value	10.0 **12.0** 14.0		

3. S&P 500 Total Rate of Return

Number of Respondents = 27
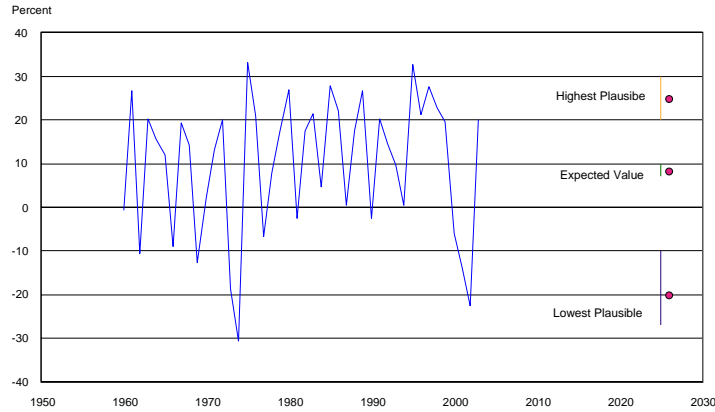
Reasons for high estimates
1. This is a highly volatile series: above 24% gain or below - 10% loss due to immediate growth, irrational exuberance, recession or under & over valuations in recent years
2. Exceptionally volatile, but globalization and cross-linking of exchanges dampening overall fluctuations
3. Very volatile; capital can be repositioned quickly. New records are possible
4. A continued wave of technological change should drive robust economic growth
5. Taxes being reduced and income taxes possibly being replaced by consumption taxes.
6. Good returns can be realized even in crisis years
7. An environment that supports the lowest plausible value of the other variables
8. Significant increases in service sector productivity, particularly medical services
9. Though implausible, an exuberant bull market in 2024
10. A balance existing between those who cash out their equity portfolios to meet current spending needs or to find more stable investments, and those who hold on to equities for their potential to deliver solid income
11. Many companies shifting their focus to provide solid dividend income to their shareholders, mitigating the impact of declines in equity prices

Reasons for low estimates
12. High interest rates and poor fiscal policy damaging corporate earnings and hurting investor confidence
13. Rising discount rate, but highly volatile
14. Poor and pessimistic years
15. Increased cross-border, competition in both goods and services reducing the return of equities
16. An environment that supports the highest plausible value of the other variables
17. A bear market
18. The baby boom reaching the Social Security retirement age, with the U.S. the last of the major industrialized nations to reach this point of a massive proportion of its population in retirement
19. A flight from equities resulting from retirees' needs for cash...
20. The next generation creating another bubble in the market, this will burst as always

Respondents' Estimates Of the Variable in 2024	Prior Panel Responses LQ MED UQ	Your Current Estimates (Please provide three numbers in each cell)	Reasons for your Responses
Lowest plausible value	-27.0 **-20.0** -10.0		
Expected value	7.2 **8.3** 10.0		
Highest plausible value	20.0 **25.0** 30.0		

4. Corporate Baa Spot Yields
Number of Respondents = 26
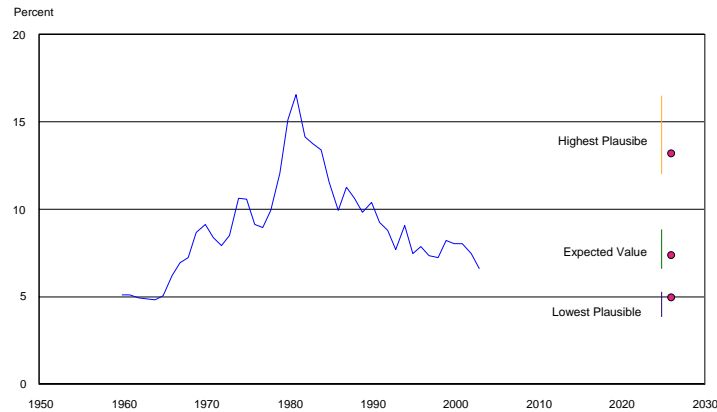
Percent

Reasons for high estimates

1. Tight energy and commodity markets: price shocks, oil shortages; rising oil prices
2. Labor unrest as the dependency ratio rises with the baby boomers retiring
3. A recession involving a credit crunch, raising yields
4. A continued wave of technological change driving robust economic growth
5. Rising inflation and a continuation of inflationary expectations
6. Need to attract foreign capital to finance the enormous U.S. budget deficit
7. Increasing competition for savings; the retirement of the baby boomers will mean dis-saving on a massive scale as they quit paying into IRAs and start withdrawing funds
8. High inflation
9. Lack of government prudence
10. A perception of relatively high corporate risk because of unhealthy balance sheets, low earnings momentum and unfavorable economic conditions
11. Investment grade corporate bonds appearing more conservative than the government bonds (as calls on government promises of retirement income and medical care accelerate)
12. Rising political risk

Reasons for low estimates

13. A boom, creating an excess of demand for credit risk, lowering yields
14. Extreme fed control as in the early cold war/McCarthy era
15. It is possible, incidentally, that the issuance of long-term corporate bonds will have ceased entirely by 2024. This would go along with aversion to long term liabilities generally
16. Good profitability and strengthened corporate governance keeping the spread over treasuries relatively tight
17. Government prudence and a perception of relatively low corporate risk because of healthy balance sheets, strong earnings momentum, and favorable economic conditions.
18. Credit spreads over treasury securities becoming smaller because of a growing preference for corporate bonds (resulting from a reduction in confidence in government bonds) as the credit risk seems increasingly insignificant compared to the large-scale federal commitments

Respondents' Estimates Of the Variable in 2024	Prior Panel Responses LQ MED UQ	Your Current Estimates (Please provide three numbers in each cell)	Reasons for your Responses
Lowest plausible value	3.8 **5.0** 5.4		
Expected value	6.5 **7.4** 8.9		
Highest plausible value	12.0 **13.2** 16.5		

Question 2

In the first round, respondents also provided judgments about plausible future developments that could influence the variables in the period from the present to 2024. The responses of the participants have been edited and where one or more were similar, combined. This question is based on a summary of the key responses.

In the tables below we ask for your judgments about the likelihood of these developments and their impacts on the variables. We are asking for this information as input to a Trend Impact Analysis that will amend extrapolations of the four variables to account, probabilistically, for the perturbing developments listed in this question, using Monte Carlo methods.

The first column lists the suggested developments.

The second column deals with the likelihood of the developments by 2024. Please use this scale in providing your judgments:

> 5= Almost certain (90% or more)
> 4= Likely (65-90%)
> 3= As likely as not (35-65%)
> 2= Unlikely (10-35%)
> 1= Almost impossible (10% or less)

The final four columns deal with the impacts of the developments. We define "peak impact" as the maximum amount that the value of the variable will shift up or down within the next 20 years as a result of the occurrence of the development.

To provide estimates of the impacts please assume each development occurs independently and judge its effect on the variable. **Please use a minus sign to indicate a downward impact.**

As an example please consider the first row in the table below. If you thought that the first development in this table

> Oil prices rise over $ 60 / barrel for at least 5 years

was almost certain to occur by 2024, you would enter a "5" in column 2.

If you also thought that an oil price of $60 / barrel over a five year period would result in a later change in the "CPI annual % change" from say 5% (your own estimate of CPI without this spike in oil prices) to 15% (your estimate of CPI with this spike in oil prices) at some point before 2024 you would enter 1000 in the third column.

If you wish, you may omit any answers. You may also add items to the bottom of the table and you may comment on and qualify your answers with notes.

1. Development	2. Likelihood by 2024	3. Peak Impact (basis points) Consumer Price Index (% annual Increases)	4. Peak Impact (basis points) 10 Year Treasury Spot Yields	5. Peak Impact (basis points) S&P 500 Total Rate of Return	6. Peak Impact (basis points) Corporate Baa Spot Yields
1. Oil prices rise over $ 60 / barrel for at least 5 years					
2. Global political instability, Iraq-like wars and terrorist activities and threats become the norm					
3. The terrorist threat under control (number of terrorist incidents 20% of current levels, worldwide, and remaining low)					
4. New technologies dropping costs of production of most products by 10% or more					
5. The U.S. assuming and accepted in a moral, political, and economic leadership role					
6. CPI pressures from growing budget deficits, rising demand for services (e.g., health care costs), stable or declining labor force, and concomitant growth in retirements					
7. U.S. balances its budget					
8. U.S. dollar currency collapse vs. Euro					
9. Globalization lowers labor costs by 10% average					
10. Savings rate grows 10%					
11. Significant climate change affecting food supply and costs					
12. New technologies improving productivity in services by more than 10%					
13. Confidence in US drops; direct foreign investment reaching 50% of current levels					
14. U.S. current account deficit increases to 10% of GDP					
15. U.S. investment climate proves attractive					
16. Changes in Social Security permit individual investment decisions					
17. Productivity increases 5% for five consecutive years					
18. Significant corporate defaults (tripling over current rates)					
19. Profit margins of most U.S. companies drop to 50% of current levels for 10 years					
20. Economic depression for a seven year period					
21. Significant bear market returns for a ten year period					
22. Prime rate above 9% for 5 years					

Question 3

In Round 1, respondents were invited to provide their views on how the judgmental process employed in this Study might be applied to enhance traditional modeling (e.g., stochastic, deterministic) and estimation processes or to aid in planning. A number of possible uses were listed and the respondents were asked to provide answers using the following scale:

> 5= Use of judgmental processes is essential
> 4= Extremely useful
> 3= Somewhat useful
> 2= May help or hurt
> 1= Counter productive

The table below summarizes the results from Round 1. The number responding ranged from 23 to 27 (out of 27 respondents).

Possible Use	Applicability (average)
The historical period used to calibrate stochastic models	3.64
Expected values of variables	3.64
Identification of potential developments that could affect forecasts	4.42
Mean reversion assumptions in stochastic models	3.30
The period over which the current assumption reverts to the mean	3.05
The volatility assumptions used in stochastic models	3.52
Validity of outliers that stochastic models may forecast	4.00

In this Round 2, based on the results of all three questions from Round 1, please again provide your assessment of the applicability of judgments and forecasts obtained in this Study. In the table below, potential uses are listed in Column 1. Using the same 1 to 5 scale above, please enter your judgments in Column 2.

Column 3 lists some additional qualitative and quantitative questions. Please provide your answers to these questions in Columns 4 and 5 and where appropriate, why you have reached this opinion. You may provide answers for as many of the four variables as you wish. We are interested in learning, specifically, how the methods and forecasts used in this Study would influence or change the use of forecasting models and estimation processes and your reasons for believing so. Since we are interested in learning about the uses of judgmental methods in conjunction with all types of models, please do not limit your comments to only those models which you currently use.

Due to the expanded length of this questionnaire, columns 3-5 are directed to those participants involved in modeling the future courses of economic variables.

Here is an example of an answer to this question; the actual question starts on the next page.

1. Possible Use	2.Please Provide Answer Applicability of Judgmental Methods	3. Qualitative/Quantitative Questions	4. Please Provide Answer to Qualitative/Quantitative Questions Please mention which variables you are commenting on; you may comment on more than one variable	5. Please Provide Reasons for Your Answers
The historical period used to calibrate stochastic models	**4**	Do you think that this Study provided potential developments and forecasts that could lead to revision of the historical period used in calibration? __**X**_ Y ___N If yes, how would you revise the number of years you use to calibrate your models?	Re 10 year treasuries: I have been using the low interest rate environment of 1951-1965 to calibrate my model, but now I am considering expanding the period into the late 1960s	Re 10 Year Spot Yields, seeing some of the potential high estimate developments has caused me to re-think my philosophy that the world will be operating in a low interest rate environment for decades to come

1. Possible Use	2.Please Provide Answer Applicability of Judgmental Methods	3. Qualitative/Quantitative Questions	4. Please Provide Answer to Qualitative/Quantitative Questions Please mention which variables you are commenting on; you may comment on more than one variable	5. Please Provide Reasons for Your Answers
The historical period used to calibrate stochastic models		Do you think that this Study provided potential developments and forecasts that could lead to revision of the historical period used in calibration? ___Y ___N If yes, how would you revise the number of years you use to calibrate your models?		
Expected values of variables		Do you think that this Study provided potential developments and forecasts that could lead to changes in estimates of the expected value of the variables? ___Y ___N If yes, by how much do you think the expected values might change? (e.g., if you would now use 6% instead of 5%, enter 100).		

1. Possible Use	2.Please Provide Answer Applicability of Judgmental Methods	3. Qualitative/Quantitative Questions	4. Please Provide Answer to Qualitative/Quantitative Questions Please mention which variables you are commenting on; you may comment on more than one variable	5. Please Provide Reasons for Your Answers
Identification of potential developments that could affect forecasts		List one potential development or forecast identified in this Study that you think may cause changes in your model.		
Mean reversion assumptions in stochastic models		Do you think that this Study identified potential developments or forecasts that could lead to increasing or decreasing strength of reversion? ___Y ___N		

1. Possible Use	2.Please Provide Answer Applicability of Judgmental Methods	3. Qualitative/Quantitative Questions	4. Please Provide Answer to Qualitative/Quantitative Questions Please mention which variables you are commenting on; you may comment on more than one variable	5. Please Provide Reasons for Your Answers
The period over which the current assumption reverts to the mean		Do you think that this Study identified potential developments or forecasts that could lead to a lengthening or shortening of the mean reversion period? ___Y ___N If so, by how much?		
The volatility assumptions used in stochastic models		Do you think that this Study identified potential developments or forecasts that could lead to an increase or decrease in volatility assumptions? ___Y ___N		

1. Possible Use	2.Please Provide Answer Applicability of Judgmental Methods	3. Qualitative/Quantitative Questions	4. Please Provide Answer to Qualitative/Quantitative Questions Please mention which variables you are commenting on; you may comment on more than one variable	5. Please Provide Reasons for Your Answers
Validity of outliers that stochastic models may forecast		Do you think that this Study identified potential developments or forecasts that could cause you to reassess the influence of outliers? ___Y ___N If so, which outlier do you now consider having more of an influence in your model? What outlier do you now consider having less of an influence in your model?		

Please list below other applications that have not been mentioned in this table that might also benefit from the use of judgmental methods of the sort employed in this Study.

Thank you for your participation. The final report will be sent to you in 2-3 months.

APPENDIX C

Round 1 Reasons For Projections

1. Annual increase in Consumer Price Index

Respondent 1

- The CPI in 2024 could be above 3.5% if there were a commodity price shock, such as oil.
- There could be labor unrest as the dependency ratio rises with the baby boomers retiring.
- Inflation could return to the 1950s, essentially zero expected inflation, if productivity increases continue and after many years of low and stable inflation.

Respondent 2

- A continued wave of technological change should drive robust economic growth

Respondent 3

- I don't think we will exceed historical highs. Commodities- even energy have become less important over time, as the economy has become increasingly service based. Even more importantly the late 1990's experience has inoculated the central bank against letting inflation out of hand. Volker was the cure to G. William Miller and the medicine was painful.

Respondent 4

- I believe the CPI could exceed 12% with in the next 20 years because of the ever-widening US budget deficit, dependence on ever-scarcer and more expensive foreign oil, and the fact that the retired and retiring baby boom generation will demand huge amounts of services pushing inflation (especially for health care) higher.

Respondent 5

- I think the CPI will rise both because there is pressure to reduce the foreign trade deficit and to avoid a crash in housing prices. The Federal Reserve will continue to keep increasing the money supply to achieve these goals

Respondent 6

- I think that CPI could be as low as -3% if the Fed is putting liquidity into the market and there is a shock due to terrorism or a serious natural catastrophe (volcanism, coordinated earthquakes/hurricanes, influenza pandemic). I think the CPI could be as high as 13% if the budget deficit and trade deficit combine with an oil shock or something similar to stimulate inflation.

Respondent 7

- I have used The Theory of Economic Series, which is described in Chapter 2 of my book published by Georgia State University: "protecting against inflation – and maximizing yield." (This book is in the SOA library.) I have also used subsequent data addenda and later articles. The theory takes into account underlying mood and business cycle

changes. I believe that this is a unique actuarial approach, and that the actuarial profession can make a valuable contribution in this very crowded field, in its own way.

- Specifically, I am projecting that 2024 will be a pessimistic "A" period, for reasons such as the following:
    - Continuation of the post 9/11 mode of distrust
    - Failure to control litigation abuse
    - Resumption of the draft in 2009
    - Inside interest buildup becomes taxable in 2012
    - Devastating earthquake in California in 2018

- In addition, my "Boca Raton" economic scenario projector (which had first been presented to the CCA in 1999) is currently forecasting 2012 as a pessimistic "A" year! But furthermore, I note that 20 24 will be an uncertain election year with a lame duck president finishing her largely successful eight year term.

- (Incidentally, my answers to Question 2 will assume "other developments" which, although less likely, would transform 2024 into an optimistic "C." year, and would change all of the answers to question 1(A).

- In all of my answers, I have used data for the entire 114 year. 1890 – 2003, and not just the last 40 years. But I believe that extreme conditions like those in the prior to 1950 could easily reoccur.

- With all of this being said as the thought process background, I will give detailed specific reasons for part 1(A) answers.
    - The expected inflation of 5% is the historic the average in pessimistic "A" periods. It is accompanied in 2024 by very low GNP growth and very modest money supply growth. A very flat yield curve is in effect. It is to be noted also, from part 1(A) response, that the real interest after inflation is negative.
    - The lowest plausible inflation rate (-7.2%) could occur if extreme depression exists, as in 1930 – 32. (Extreme mismanagement of foreign affairs and world trade could cause this.)
    - The highest possible rate (17.4%) could occur if 2024 is in the middle of extreme wartime conditions, such as prevailed in 1917 – 18.

Respondent 8

- The Consumer Price Index could fall below 1% sometime in the next 20 years because:
    - Potential introduction of an explicit 0-2% inflation target by the Federal Reserve could anchor inflation expectations and achieve the desired results. A period of prolonged weak economic growth precipitated by chronic fiscal and trade deficits, loss of competitive edge, a shift to rebuild savings by over-indebted consumers could also trigger a period of stagnation and borderline deflation. This risk would be higher in a world where exchange rates were not allowed to adjust to offset competitive and trade imbalances.

- I believe the Consumer Price Index could surpass 10.0% sometime in the next 20 years if the Fed's credibility is eroded by deteriorating debt, fiscal and trade issues and/or sub-par growth triggers a return to more stimulative monetary and fiscal policy settings. Instability in the Middle East, tight energy and commodity markets or sudden disruptions to global trade/production because of geopolitical issues could cause a spike in headline inflation

Respondent 9

- Variable number 1:   Reason:
- I expect inflation to be 2% in 2024 because the Federal Reserve has adopted, in my opinion, an inflation target of 2%, and it is reasonable to assume it will be successful, in the long run, in achieving this target. The downside risk to this forecast would materialize thanks to productivity gains. The upside risk would materialize if productivity growth slowed to 1970's norms, and rising demand in developing countries led to rising prices.

Respondent 10

- I expect that inflation will be accelerating in 2024. The big questions are: from what levels will it be accelerating? And, how soon will the acceleration begin?

- I expect the acceleration will be led by the cost of medical care. The U.S. population of older people (in or near retirement) will be growing rapidly in the coming years. With age comes increasing demand for care of age-related conditions.

- Before the acceleration, we may see years of very low inflation, perhaps even deflation. If this does happen, it will probably result from attempts by huge numbers of baby boomers to spend less, saving more for their retirement years. This could be exacerbated if younger generations, perhaps out of fear over the long-term viability of existing social security systems, become more conservative consumers than their parents.

- In contrast, the acceleration may have already begun. Although the current economic recovery has been spotty, it might slowly gain strength, with consumers discounting concerns for their future in pursuit of comfort in the present.

- I think we'll see more caution in consumer spending than that "highest plausible" scenario, but not so much caution that we see the "lowest plausible" scenario.

Respondent 11

- Reason: Global deflationary pressures are likely to continue as Asia develops. There is some risk of inflationary pressures

Respondent 13

- Inflation will be fueled by rising oil prices and the rise in China's economy with resulting higher wages and prices for exports to the U.S.

Respondent 14

- Reason: I think the CPI will be less volatile in the future because the FED has developed policy to control inflation and will be effective in managing it.

Respondent 15

- I believe that the energy inflation rate will dramatically increase due to the fact that all the current producers are at full capacity, unless there is a significant shift in the energy policy, we should start to see oil shortages. This is why I believe that there will be inflation in excess of 13%.

- I believe that there will be another deflationary period as well as a depression or major recession within that time frame and this would lead to a deflation percentage of -2%.

- This would because that a majority of jobs would travel to poorer countries and unemployment will grow dramatically.

Respondent 16

- The CPI is a metric combining core inflation with market price movements. I think we'll see a technology driven continued steady decline in the real prices of natural resources over the next two decades. This, coupled with ever increasing capital market discipline on government inflation, will continue to keep CPI changes in a socially tolerable range.

Respondent17

- My life has been as CEO of 4 corporate turn-arounds and 2 start-ups. These rates are a minor item I take into account as I run, primarily service enterprises. I draw on the knowledge, connections and business awareness of my CFO to inform me about how the items you are seeking effect the environment I am responsible for making decisions in.

- From a CEO perspective outside the insurance industry, I use future projections or ranges of rates, as a context to shape business strategy, and determine the tactics required to minimize or capitalize the rates. I need those rate estimates about every three years to shape strategy. I need those rate estimates every year to shape tactics.

Respondent 18

- Also, I don't believe, as a best estimate view, that any of the variables will go outside of the high/low range for the last 40 years. We have seen hyper inflation in the late 1970s/early 1980s and unprecedented low inflation from the early 1990s onwards, and it is difficult to envision inflation falling outside these ranges (at the 10th and 90th percentile levels) with anything other than the most extreme shock circumstances.

- It's helpful to consider why the extremes of the past have occurred:

- In the late 1980s, there was a huge structural shift in the industrialized economies as hugely improved technology meant much of the labor force was redundant. This had a large short-term supply side impact, as company structures were such that they could react only slowly to such change and rationalization couldn't take place overnight. Hence many companies were left operating inefficiently for some period. This, coupled with excessive consumer demand (in turn driven by excessive consumer borrowing), meant prices had to rise, and as the influences were worldwide, there were no compensating effects from cheaper import prices.

- In the early 1990s, the problems of excessive demand were properly understood and government monetary policy became remarkably effective at controlling money supply in times of interest rate pressure. Thus, at even the slightest hint of inflationary pressure, we have seen interest rates nudge up to combat the situation. Moreover, company structures are now such that they can react much quicker to technological change, so that there is a much shorter period when a company will be operating inefficiently.

- From the second bullet, my feeling is that the combination of tight monetary policy and an industrial environment that can respond much quicker to change is likely to persist for the

next 20 years, and therefore I would err towards the more optimistic end of the inflation scale in my best estimate. However, because of the uncertainties around oil prices and increasing import costs due to increased dollar weakness (dollar weakness is likely to persist as long as trade deficits persist, requiring a weaker currency to boost exports and dampen imports) I would not say inflation can stay as low as 1-2% for the next 20 years – 3% is my best estimate.

Respondent 19

- At some point in the next 20 years it could be as low as -2% due to deflationary pressures from full globalization, unit of production costs fall with nanotech, biotech reduces waste, falling fertility rates, Latin American and African production begins to kick in increasing competition

- At some point in the next 20 years it could be as high as 20% due to inflationary pressure from Indo-China oil demands, oil production irregularities, Indo-China labor rates have substantially increased by 2024 (as did Japanese leading to outsourcing to China and the Tigers), increases in life expectancy increasing social security, pension, health care costs, security costs being distributed throughout society increasing costs and credit demands.

Respondent 21

- Inflation risk may be on the rise. Technology can raise productivity, but cheap goods today are due to cheap labor markets in China, India and other developing countries. As wages rise, production costs will rise. If those countries develop a consumer class that can drive economic growth (beyond US consumer demand), then they can create additional demand for manufactured luxury goods. Also, if alternative fuel sources are not developed, fossil fuel costs will put upward pressure on prices.

- Innovation in energy resources can remove dependency on oil and perhaps lead to downward pressure on costs. Chances are that even if these are developed, 20 years may not be sufficient to completely replace plant, machinery, and auto dependence on oil.

Respondent 22

- I expect the CPI to rise considerably over the next two decades because of the declining value of the dollar abroad and increasing reliance on imported goods, aggravated by the trend toward outsourcing and increasing restrictions on immigration.

Respondent 23

- I think extremely high CPI inflation will less frequent in the next 20 years, as the Fed has made the commitment for price stability. In addition, the movement of the baby-boom generation into retirement will increase political pressure for low inflation. CPI inflation of less than 1% is very unlikely, as the risk of deflation is a major concern for the Fed.

Respondent 24

- As long as the monetary authorities refuse to accommodate any resurgence in inflation – whatever its origin – there is almost no prospect that inflation will rise above the (explicitly

or implicitly) targeted rate of 2%. The range is to allow for the possibility of recession (temporary) or overheating (also temporary).

Respondent 25

- CPI basket weightings will probably change over the next 20 years. Oil/fuel price component is volatile and this component could be subject to short-term periods of high inflation or deflation.

Respondent 26

- We could see sustained higher rates of inflation if the dollar enters a sustained period of weakness against other major world currencies. This scenario is plausible if the savings rate disparity continues between the US and our major trading partners.

Respondent 27
.
- Increasingly diverse economies, less resource driven, should be subject to somewhat lower than long-term average inflation in the future.

Respondent 28
.
- The dollar will not return to the status of the dominant world reserve currency and, with continuing globalization, consumer goods in the U.S. will experience price rises. These will be offset, however, by intense competition from Asia and Latin America.

2. 10 Year Treasury Spot Yields

Respondent 1
:
- Same reasons a 1.

- Yield is largely inflation driven.

- Could have very high or very low growth (boom or mild recession) in that particular year of 2024. Recessions occur about every 10 years, followed by boom

Respondent 2

- A continued wave of technological change should drive robust economic growth

Respondent 4

- I believe the 10-year Treasury could exceed 15% because of rising inflation and a continuation of inflationary expectations for many years to come. Also, to finance the enormous US budget deficit, interest rate will have to rise to attract foreign capital.

Respondent 5

- We can keep buying more than we sell internationally only if foreigners continue to invest in the US. This means that interest rates will have to be higher than elsewhere to attract foreign investment and purchase of government bonds.

Respondent 6

- Reason   Much the same reasoning as CPI. I think the 10T could be as low as 3% if CPI is low and the Fed is putting liquidity into the market due to a financial shock due to terrorism or a serious natural catastrophe (volcanism, coordinated earthquakes, / hurricanes, influenza pandemic). I think the 10T could be as high as 20% if the budget deficit and trade deficit combine with an oil shock or something similar to stimulate inflation. I also think there is a non-zero probability of a demographically motivated war that will cause rates to spike. The Chinese one child policy will leave many young males needing mates, along with many poverty stricken countries (e.g.,, Bangladesh or even Ireland) will have more youth than their economies can support.

Respondent 7

- Bond yields tend to be high in pessimistic "A." periods. 4.79% is intended as a historic average for ten year bonds in "A." periods.

- A high of 11.9% was seen in 1979 – 80, Accompanied by extremely high inflation of the Carter era.

- The low of 1.43% was seen in 1947, and was the result of extreme fed controls in the early cold war/ McCarthy period. Conditions like this could reemerge!

Respondent 8

- The 10-year Treasury yield could fall below 3.5% sometime in the next 20 years if:

    - U.S. government engineers a prolonged period of fiscal austerity to produce fiscal surpluses and ultimately adopts a policy of balancing budgets. At the same time, the Fed commits to keeping inflation in a 0-2% range. Even then, long-term interest rates have been trending lower for the past 2 decades and would have a hard time breaking much below 40-year lows in the absence of deflation/depression.

- The 10-year Treasury yield could exceed 14.0% sometime in the next 20 years if:

- Foreign investors diversify portfolios away from U.S. dollar assets as alternative global investments become more attractive, particularly if the U.S. does not solve its chronic trade and fiscal deficits and boost domestic savings to reduce its heavy reliance on foreign funds. Highly stimulative U.S. monetary and fiscal policies, rising inflation and the inability to generate domestic savings to reduce reliance on foreign borrowing (or pay for foreign debt services) could produce and unprecedented rise in rates across the yield curve.

Respondent 9

- Variable number 2:   Reason:

- I expect the yield on 10-year US Treasury notes to be 4.3% in 2002 because the combination of projected labor force growth, productivity growth and the achievement of the inflation target imply a growth rate of nominal GDP just somewhat above this level. The upside risk is due to the upside risk of the inflation expectation; the downside risk is also attributable to the same cause.

Respondent 10

- Regarding the "highest plausible value," although past peaks in the inflation rate have exceeded the 10-year treasury spot yield of the time, conditions in 2024 will be quite different from those peaks. If, the inflation rate is running high in 2024, it will be because people have continued to favor current consumption over saving for retirement. At the same time, calls on government promises for retirement income and medical care will be straining federal budgets. Even if a large proportion of investors turn to treasuries for security, the growth in demand for treasuries will fall behind the growth in federal commitments, pushing up real interest rates on these securities.

- In contrast, the same conservative mind-set that could result in some deflationary years might lead many people to delay retirement or to quickly seek ongoing employment in some form of retirement career. That, in turn, would contribute substantially to federal tax revenues, and might even slow the growth in calls on Social Security and Medicare. The extra productivity of these post-retirement workers could further increase the amount of money looking for secure investments while reducing the need for government borrowing.

Respondent 11

- A real return of 300 basis points seems reasonable. If inflationary expectations heat up yields could temporarily get into the double digit range.

Respondent 13

- U.S. Dollar will lose value and foreign governments will switch to place their funds in euros instead of dollars, forcing U.S. Treasury rates to rise to attract investments.

Respondent 14

- The treasury rates will predominately be a function of a real rate plus inflation. I would expect a real rate to be around 3.0% and the level of inflation to be a larger driver of treasury rate volatility.

Respondent 15

- Due to the fact of variable 1 max of 13% due to the oil shortages, I believe that the 10 year rate will be 13% - 3% = 10%.

Respondent 16

- 10 year Treasuries will maintain a 3-5% real rate of return over inflation. History shows that in our modern economy the government can "manage" short term rates, but not mid or long term rates. Supply and demand for domestic government debt is driven by the real rate of return vs. other alternatives, which now are many, including global capital markets.

Respondent 18

- Low 4% Expected 6% High 10%   Reason: My values are consistent with my inflation forecasts, generally a gap over inflation of 3-4%. I am confident that government policy will continue to react quickly to inflationary pressure, and therefore I would expect a strong correlation between short-term rates and inflation. I also assume that the yield curve will be upward sloping, so that there will be some differential between long-term and short-term rates.

Respondent 21

- Linked to inflation risk. Deficit reduction, given current levels, will take several years to accomplish, if at all. New service and manufacturing activities executed in US and exported overseas will be required to generate growth and keep interest rates down. Weak dollar – not just against Euro, but against Asian currencies – can also affect money flows leading to higher interest rates. At the high end, rate environment of the 1980s are plausible. Having experienced the 1980s, Fed is likely to act before that happens.

Respondent 22

- I expect the 10-year treasury rates to increase substantially in parallel with increased inflation and also due to the demands of service on the federal debt, which will be abnormally high for at least the next two decades.

Respondent 23

- My projection of 10-year Treasury rates is based on my view of inflation. On average I expect a real yield on Treasuries of about 2.5%, but there is a wide range around this average. In a very low inflation scenario we could get a period of very low real yields. On possible upside to real yields would be a major sell-off in the dollar at some point in the next 20 years in reaction to the very large U.S. current account deficit.

Respondent 24

- Because of my answer to variable number 1, 10-year rates will be limited in their upward movement; and downward as well. The range is to allow for recession or overheating. Not much risk to rates from budgetary pressures or currency re-alignments.

Respondent 25

- 10 year Treasury yields not as volatile as 90 day yields. FRB management has been effective in recent years but personnel/policy changes at FRB are possible.

Respondent 26

- We could see sustained higher rates of inflation if the dollar enters a sustained period of weakness against other major world currencies. This scenario is plausible if the savings rate disparity continues between the US and our major trading partners.

Respondent 27
.
- Best guess may be roughly long-term growth plus inflation and I am guessing long-term growth at about 3%

Respondent 28
.
- The dollar will be displaced as the world's reserve currency, adding at least 1% to Treasury bond yields. In addition, high deficits will discourage foreign investors, and the government will be forced to raise yields to attract capital.

3. S&P 500 Total Rate of Return

Respondent 1

- This is highly volatile series and could have above 24% or below minus 10% loss due to immediate growth, recession or under & over valuations in recent years.

- Or irrational fears or exuberance.

Respondent 2

- A continued wave of technological change should drive robust economic growth

- I believe the total return on US stocks could be less than -40% because high interest rates and poor fiscal policy will damage corporate earnings and hurt investor confidence.

Respondent 5

- I believe corporate rates of return will rise because taxes will be reduced, and income taxes may even be replaced by consumption taxes. This will increase investment and productivity.

Respondent 6

- Reason   I expect lower returns over the next 10-20 years as the discount rate rises. In any one year returns can range from +/-20%, but overall they will trend lower than 10%.

Respondent 7

- The answers given are the historic common stock results for the 21 "A" periods that have occurred since 1890. All turn out to be within the questionnaire's "range."

- The overall average of -4.2% is what would be expected in this very poor and Pessimistic "A" year 2024.

- It is noteworthy however, that good common stock yield can nevertheless occur in such periods! The highest plausible yield of 24.9% occurred in the "A." period 1979 – 80, as an example. (Despite the very high Carter-era inflation, and the Iranian hostage crisis, which was then taking place.)

- The lowest plausible yield -29.8% occurred, not surprisingly, in the depression years 1930 – 32.

- An overall fortuitous comment about common stocks: one is always surprised by the high average yield, measured over a long period. The yield has been increasing over the last twenty years.

Respondent 8

- Equity markets are exceptionally volatile, though globalization and cross-linking of exchanges should eventually dampen overall fluctuations. The -10% to +20% possible range reflects this somewhat less volatile possible outcome. Increased cross-border, competition in both goods and services may well reduce the average return of equities, though it would still need a reasonable spread over treasuries to attract investors, given the added risk associated with such investments.

Respondent 9

- I expect an 8.3% total return on the S&P 500 composed of a 5% price return and a 3% dividend yield. The 5% price return is in line with the nominal GDP growth assumption. The upside and downside risks represent my assessment of the "normal" volatility around this mean.

Respondent 10

- This variable can be quite volatile. The highest plausible value of this variable is most likely in an environment that supports the lowest plausible value of the other variables. Vice versa, the lowest plausible value of the variable would most likely coincide with the highest plausible values of the other variables.

- My "lowest plausible value" assumes that 2024 happens to be at or near the worst of a bear market. In 2024, the baby boom will be centered very close to the Social Security retirement age. The U.S. will be the last of the major industrialized nations to reach this point in its demographic transition to a massive proportion of its population in retirement. Stock markets might already be weak from foreign retirees' needs for cash. Many in the U.S., seeing their own retirement savings diminish, might flee from equities in order to preserve whatever principal they might have left.

- My "highest plausible value" assumes significant increases in service sector productivity. This would be especially helpful if this brought substantial improvements in the productivity of medical workers dealing with the concerns and conditions of the aging population. In contrast to the downside potential already mentioned, I think it is implausible (though not impossible) to see an exuberant bull market in 2024, which would seem to be almost a requirement for higher returns.

- My "expected value" sees somewhat of a balance between those who cash out their equity portfolios, either to meet current spending needs or to find more stable investments, and those who hold on to equities for their potential to deliver solid income in the coming years. The negative total return results from substantial numbers exiting the equity market. To mitigate the decline their stock prices, many companies will see the increasing demand for current income from people moving into retirement and will work to meet this demand by shifting their focus to provide solid dividend income to their shareholders. Those shareholders who can afford to hold their equities, will be willing to suffer some loss in nominal value, in exchange for the upside potential of rising dividend income. This, in turn, will mitigate the declines in equity prices.

Respondent 11

- Reason: I have no way to reliably guess equity returns. I am confident but not jubilant about equity returns over the next 20 years and 10% seems close enough to historical levels with a margin for conservatism that seems a reasonable expected value. Since this is a volatile variable there is no way to reliably guess bounds.

Respondent 13

- Stock market will be weak due to relative decline in U.S. economy. The heavy costs of the imperial overreach of the Bush administration will finally have to be paid. There is no such thing as a free lunch.

Respondent 14

- I think of equity returns will equate to a spread over treasuries on an expected basis but be subject to fairly large short term volatility.

Respondent 15

- Due to the fact that the economy had a major run in the 1990's, I believe that as this generation ages, the next generation will create another bubble in the market. This bubble will burst and hence the negative -33%.

Respondent 16

- In any given year the domestic equity market can exhibit large swings. The instant liquidity we enjoy can increase volatility, as capital can be repositioned quickly. I would not be surprised to see a single year's returns break new records, positive or negative.

Respondent 18

- Low -30% Expected 10% High 30%   Reason: This is probably the most meaningless of the forecasts for a number of reasons:

- Equity returns are extremely volatile from year-to-year. To predict the annual return in one particular year (2024) in many years time (20) is purely a guess.

- A better estimate would be the long-term annual growth of equities over 20 years, which would help minimize the volatility around a single year estimate and would be more meaningful.

- My high and low values are based closely on the 40 year high and low history – I think there is a reasonable chance -30% and +30% could be experienced in years to come. My "expected" value is really more an estimate of what I think the long-term annual growth of equities will be in the next 20 years, and I wanted to capture a reasonable equity risk premium over my long-term bond yield best estimate (6%).

Respondent 21

- Greater volatility than bonds, but I think that average will be about the same in the 2 markets over the 20 years. This implies greater upside potential, but also significant loss potential.

Respondent 22

- I foresee dampened performance in the equity markets not for want of available capital but for lack of feasible projects. Some of this was evident in the tech bubble of the late 90's when bushels of capital were squandered in pursuit of pecks of opportunity. Various factors will diminish the role of the US as a *situs* for new capital projects. Mainly innovative talent will stay where it is rather than immigrate to the US. The US will be well along toward second-rate status by 2024.

Respondent 23

- My projection for the average total return to the S&P500 is based on my outlook for nominal GDP growth of 5.5% to 6%. The total return on the S&P can be slightly higher,

but lower than the historical average given a lower inflation projection than the historical average. I see no reason to expect the volatility of S&P returns in the future to be lower than past volatility, so the upper and lower limits in my projection for 2024 are based on the distribution of returns over the past 30 to 40 years.

Respondent 24

- Better than fixed income returns due to equity risk premia and better than historical productivity growth rates.

Respondent 25

- Estimate reflects risk premium over fixed income returns as well as historic volatility in the equity markets.

Respondent 26

- Equity returns will always be volatile, so I'm not sure that the right question is being asked. I believe a more appropriate question would be "what will the annualized return of the S&P 500 be in the years surrounding 2024." The current consensus perspective on long-term returns in the equity market remains too strongly influenced by the experience of the last 20 years. For most of the last century the market has run in alternating 15-20 year cycles, with periods of double digit returns followed by periods of very low returns. I believe we're still in the relatively early stages of a low return cycle which may have another 10-15 years to run. By 2024 we could then be in the midst of another long bull cycle.

Respondent 27

.
- Total yield historically may be about 10% average and that is consistent with 3% growth, 3% inflation, and 4% risk premium.

Respondent 28

.
- Corporate ROI should continue broadly within historic ranges.

4. Corporate Baa Spot Yields

Respondent 1

- Same reasons as 2.

- A recession would involve a credit crunch, raising yields, a boom an excess of demand for credit risk, lowering yields

Respondent 2

- A continued wave of technological change should drive robust economic growth

Respondent 4

- See question 2. Basically same response except that corporate bond yields must necessarily be higher due to a default risk premium.

Respondent 5

- I believe corporate spot yields will rise because of increasing competition for savings. The retirement of the baby boomers will mean dis-saving on a massive scale as they quit paying into annuities, IRAs, etc., and start withdrawing funds.

Respondent 6

- I expect Baa spot spreads to be consistent with the past, so yields will be driven by the Treasury curve.

Respondent 7

- Corporate bond to bond yields seem to average 107% of the long-term treasury coupon yields. I have used that relationship in arriving at these responses. But I have used data only for the 21 "a" periods that have occurred since 1890.

- But the plausible low of 2.4%, which is out of the questionnaires range, occurred in the "a" year 1947, as result of extreme fed control during this early cold war/McCarthy era.

- The plausible high of 12.0% occurred in the "a" time. 1979 – 80, accompanied by Carter era inflation and the hostage crisis.

- But it is possible, incidentally, that the issuance of long-term corporate bonds will have ceased entirely by 2024. This would go along with aversion to long term liabilities generally. But any such development (which I am not formally "predicting") might make question 4 somewhat "moot."

Respondent 8

- Corporate paper is priced off the Treasury curve, adjusted for perceived relative risk. The lowest plausible value assumes both government prudence and a perception of relatively low corporate risk because of healthy balance sheets, strong earnings momentum, and favorable economic conditions. The highest plausible value assumes the reverse, resulting in sharply higher spreads over treasuries.

Respondent 9

- The central expectation for the Baa yield has been driven as a relationship with the 10-year Treasury yield. Good profitability and strengthened corporate governance should keep this spread relatively tight.

Respondent 10

- At the high end, as calls on government promises of retirement income and medical care accelerate, investment grade corporations will appear to many as more conservative than the government. Still, being of smaller scale and lacking the power to effect legal changes in monetary policy, corporate bonds will require positive credit spreads over treasury securities. The spreads will, however, become smaller as the credit risk seems increasingly insignificant in relation to the large-scale federal commitments.

- At the low (optimistic) end, credit risk will seem about as significant in 2024 as at has been in the past.

Respondent 11

- I expect Baa (i.e. BBB) corps to behave at a modest spreads to Treasuries. Unless there is a major change in attitudes to credit risk, an average 200-250 basis point spread to Treasury seems reasonable. At high and low extremes it is pure guesswork as to how market panic or market jubilance might influence Baa yields through expectations about corporate profits or through a thirst for increased yield (thereby reducing the spread over Treasury).

Respondent 14

- Assumed BBB spreads could range from 75 – 250 bps over the 10 year treasury with an average around 150 bps.

Respondent 15

- My assumptions are based on a average 2.8% spread over the 10 year interest rate.

Respondent 16

- I believe that basic business risks are reasonably transparent and well diversified amongst the mid-cap companies. However, political risk is on the rise, and is quite unpredictable (Marsh Mac, Enron, Citi, etc.). These political risks could cause abnormally high credit spreads in the future.

Respondent 18

-
  Low 5% Expected 9% High 14%   Reason: The key feature to capture here is a reasonable credit spread over Treasuries. My expected yield of 9% is 3% above the 10 year Treasury which is consistent with the history and has a reasonable feel to it as a long-term best estimate notwithstanding the recent narrowing of spreads generally in the

markets. The 9% is also a little under my equity bets estimate of 10%, which looks consistent.

Respondent 21

- I believe that we are in a low rate environment today, so expectation over the long run is for rates to rise. Range reflects expectation on range for Treasuries.

Respondent 22

- Rates on corporate debt will move in parallel with other factors. Issues with corporate creditworthiness will also arise as ill-advised accounting reforms produce surprising results and distract attention from corporate governance and management conduct issues.

Respondent 23

- My projection of the Baa corporate rate is based on a differential above the 10-year Treasury yield. Based on the experience since the late 1960s, Baa yields have on average been about 200 basis points above 10-year Treasuries, but there have been instances of much wider spreads. I tried to incorporate this historic volatility in Baa-Treasury spreads into my upper and lower limit projections.

Respondent 24

- Normal corporate/government spreads

Respondent 25

- Estimate reflects premium over 10 year Treasury for credit risk/liquidity

Respondent 26

- We could see sustained higher rates of inflation if the dollar enters a sustained period of weakness against other major world currencies. This scenario is plausible if the savings rate disparity continues between the US and our major trading partners.

Respondent 27
.
- Total yield historically may be about 8 average and that is consistent with 3% growth, 3% inflation, and 2% risk premium.

Respondent 28
.
- Corporate bond issuers will need to offer a premium over government instruments, but probably less of a premium than historically because of the erosion of the appeal of U.S. government debt.

APPENDIX D

Round 2 Reasons For Projections

1. Annual increase in Consumer Price Index

Lowest Plausible

Respondent 1

- Historical Basis

Respondent 2

- The Fed is unlikely to tolerate getting closer than 1% to risk deflation

Respondent 3

- Possible ongoing deflation as developing world plays ever increasing role in manufacturing and services.

Respondent 4

- Global depression or a period of prolonged weak economic growth

- A shift to rebuild savings by over-indebted consumers

- Exchange rates not being allowed to adjust to offset competitive and trade imbalances.

- 23. A technology driven continued steady decline in the real prices of natural resources

Respondent 5

- Oil/fuel price component of CPI is volatile and subject to short-term periods of high inflation or deflation

Respondent 7

- 21. Deflationary pressures continuing as Asia develops

- 22. Jobs traveling to poorer countries and consequent dramatic growth in unemployment

Respondent 8

- Historic cycle

Respondent 9

- Productivity

- Nanotechnology

Respondent 10

- Fed will keep inflation relatively constant

Respondent 11

- 13. Productivity increases continue

- 15. The Fed policy for controlling inflation remaining effective, Should keep inflation low but…

Respondent 12

- 13. Productivity increases continue and accelerate by repeating in service sector what happened to manufacturing in the 20th Century.

- 18 A shift to rebuild savings by over-indebted consumers

- 20. Baby boomers & younger generation spending less, saving more over concern for social security

Respondent 15

- Economic collapse of US based on debt and deficits

Respondent 16

- 13. Productivity increases continue

Respondent 17

- 17. Global depression or a period of prolonged weak economic growth

- 21. Deflationary pressures continuing as Asia develops

Respondent 18

- 13 Productivity increases continue

- 23. A technology driven continued steady decline in the real prices of natural resources

- 24 Capital market discipline on government inflation.

Respondent 19

- 14. Commodities- even energy becoming less important

- 21. Deflationary pressures continuing as Asia develops

- 22. Jobs traveling to poorer countries and consequent dramatic growth in unemployment

Respondent 21

- Energy breakthrough lowers value of oil reserves; intensely competitive global markets; breakthroughs in remote manufacturing

- 13. Productivity increases continue

- 22. Jobs traveling to poorer countries and consequent dramatic growth in unemployment
.

Respondent 23

- Possibility of deflationary pressures continuing as Asia develops

Respondent 24

- No chance of deflation given mega-budget deficits and demands for inflation-prone services like health care from retired baby boomers

Expected Value

Respondent 1

- Historical Basis

Respondent 2

- Slightly higher than the Fed's target for price stability

Respondent 3

- Developing world will exert deflationary pressures resulting in average inflation being slightly below last century's US average of about 3.2%

Respondent 4

- 1.Tight energy and commodity markets: price shocks, oil shortages; rising oil prices

- 2. Widening of the US budget and trade deficits

- 13. Productivity increases continue

- 15. The Fed policy for controlling inflation remaining effective

- 21. Deflationary pressures continuing as Asia develops

Respondent 8

- Historic cycle

Respondent 9

- New Fed Chairman

Respondent 10

- Fed will keep inflation relatively constant

Respondent 11

- The following mean inflation won't stay as low as 1-2% for the next 20 years
  1. Tight energy and commodity markets: price shocks, oil shortages; rising oil prices
  2. Widening of the US budget and trade deficits

Respondent 12

- 4. The retired baby boom generation demanding huge amounts of services, especially health care

- 5. Growth in the number of elderly and concomitant cost increase in medical care expenses

- 13. Productivity increases continue and accelerate by repeating in service sector what happened to manufacturing in the 20th Century.

- 18 A shift to rebuild savings by over-indebted consumers

- 20. Baby boomers & younger generation spending less, saving more over concern for social security

Respondent 15

- Debt (consumer and government)

- Trade and current account deficits

Respondent 16:

- 1. Tight energy and commodity markets: price shocks, oil shortages; rising oil prices

- 3. The rise in China's economy with resulting higher wages and prices for exports to the U.S.

- 5. Growth in the number of elderly and concomitant cost increase in medical care expenses

Respondent 17

- 13. Productivity increases continue

- 14. Commodities- even energy becoming less important

- 15. The Fed policy for controlling inflation remaining effective

- 21. Deflationary pressures continuing as Asia develops

- 23. A technology driven continued steady decline in the real prices of natural resources

Respondent 19

- 3. The rise in China's economy with resulting higher wages and prices for exports to the U.S.

- 4. The retired baby boom generation demanding huge amounts of services, especially health care

- 8. The Fed increasing money supply to help avoid a collapse in housing and reduce the trade deficit

- 10. Fiscal and trade issues triggering a return to more stimulative monetary and fiscal policies

Respondent 22

- High global growth, esp developing countries plus resource constraints

Respondent 24

- Factors listed above, energy shocks/shortages, inflationary monetary policy

Highest Plausible Value

Respondent 1

- Historical Basis

Respondent 2

- Temporary surge in inflation due to commodity prices, dollar depreciation, other accident

Respondent 3

- I believe it unlikely that the Federal Reserve will allow long-term inflationary trends to accelerate to the levels seen in the post WWI, post WWII, and oil crisis. Although high levels are possible, I assign a probability below 10% that they exceed 6%.

Respondent 4

- 9. The Fed's credibility being eroded by deteriorating debt

- 10. Fiscal and trade issues triggering a return to more stimulative monetary and fiscal policies

- 11. Geopolitical issues: e.g., instability in the Middle East or wartime conditions, such as 1917 – 18

- 12. A shock due to terrorism or natural catastrophe (earthquakes, hurricanes, influenza pandemic)

Respondent 5

- 4. The retired baby boom generation demanding huge amounts of services, especially health care

- 11. Geopolitical issues: e.g., instability in the Middle East or wartime conditions, such as 1917 – 18

Respondent 7

- 1. Tight energy and commodity markets: price shocks, oil shortages; rising oil prices

- 2. Widening of the US budget and trade deficits

- 3. The rise in China's economy with resulting higher wages and prices for exports to the U.S.

- 4. The retired baby boom generation demanding huge amounts of services, especially health care

- 5. Growth in the number of elderly and concomitant cost increase in medical care expenses

Respondent 8

- Historic cycle

Respondent 9

- 3. China

- 1. Oil

- 11. Unrest

Respondent 10

- Fed will keep inflation relatively constant

Respondent 11

- The strength of 13 and 15 also means that even the extreme high for inflation should be dampened
    13. Productivity increases continue
    15.   The Fed policy for controlling inflation remaining effective

Respondent 12

- 1. Tight energy and commodity markets: price shocks, oil shortages; rising oil prices

- 3. The rise in China's economy with resulting higher wages and prices for exports to the U.S.

- 4. The retired baby boom generation demanding huge amounts of services, especially health care

- 7. Consumers with a "buy now" attitude, discounting the future in pursuit of comfort in the present

- 9. The Fed's credibility being eroded by deteriorating debt

Respondent 14

- Strong monetary policy will prevent very high inflation

Respondent 15

- 1. High oil prices drive future inflation

Respondent 16:

- 1. Tight energy and commodity markets: price shocks, oil shortages; rising oil prices

- 3. The rise in China's economy with resulting higher wages and prices for exports to the U.S.

- 5. Growth in the number of elderly and concomitant cost increase in medical care expenses

Respondent 17

- 10. Fiscal and trade issues triggering a return to more stimulative monetary and fiscal policies

- 11. Geopolitical issues: e.g., instability in the Middle East or wartime conditions, such as 1917 – 18

Respondent 18

- Increase in monetization of government debt caused by entitlement programs outpacing productivity increases

Respondent 19

- 2. Widening of the US budget and trade deficits

- 3. The rise in China's economy with resulting higher wages and prices for exports to the U.S.

- 4. The retired baby boom generation demanding huge amounts of services, especially health care

- 11. Geopolitical issues: e.g., instability in the Middle East or wartime conditions, such as 1917 – 18

Respondent 21

- 1. Tight energy and commodity markets: price shocks, oil shortages; rising oil prices

- 3. The rise in China's economy with resulting higher wages and prices for exports to the U.S.

- 5. Growth in the number of elderly and concomitant cost increase in medical care expenses

- 8.The Fed increasing money supply to help avoid a collapse in housing and reduce the trade deficit

- 11. Geopolitical issues: e.g., instability in the Middle East or wartime conditions, such as 1917 – 18

- 12. A shock due to terrorism or natural catastrophe (earthquakes, hurricanes, influenza pandemic)

- Dollar loses relative value

Respondent 22

- 8. The Fed increasing money supply to help avoid a collapse in housing and reduce the trade deficit

- 10. Fiscal and trade issues triggering a return to more stimulative monetary and fiscal policies

- 14. Commodities- even energy becoming less important

Respondent 24

- Factors listed above, energy shocks/shortages, inflationary monetary policy

2. 10 Year Treasury Spot Yields

Lowest Plausible Value

Respondent 1

- Historical Rationale

Respondent 2

- Low inflation and low real rate

Respondent 3

- Do not expect prolonged deflation and thus it is unlikely the 10-year rate will be lower than this level.

Respondent 4

- 20. A prolonged period of US fiscal austerity in an attempt to balance its budget

- 21. The Fed commits to and achieves inflation in a 0-2% range

Respondent 5

- 17. Low CPI and the Fed putting liquidity into the market

- 21. The Fed commits to and achieves inflation in a 0-2% range

Respondent 7

- 20. A prolonged period of US fiscal austerity in an attempt to balance its budget

- 22. Delays in retirement and new retirement careers resulting in improved tax revenues and slowing the growth of calls on Social Security and Medicare

- 23. The extra productivity of the post-retirement workers increasing the amount of money looking for secure investments while reducing the need for government borrowing

Respondent 8

- Historic cycle

Respondent 9

- Corporate governance problems lead to need for liquidity

Respondent 12

- 22. Delays in retirement and new retirement careers resulting in improved tax revenues and slowing the growth of calls on Social Security and Medicare

- 23. The extra productivity of the post-retirement workers increasing the amount of money looking for secure investments while reducing the need for government borrowing

Respondent 14

- In recessionary times the Fed will lower rates aggressively as we've seen recently

Respondent 16

- 24. Government policies reacting quickly to inflationary pressures

Respondent 17

- 18. Combination of projected labor force growth and productivity growth

- 21. The Fed commits to and achieves inflation in a 0-2% range

- 22. Delays in retirement and new retirement careers resulting in improved tax revenues and slowing the growth of calls on Social Security and Medicare

Respondent 18

- 21. The Fed commits to and achieves inflation in a 0-2% range

Respondent 19

- 22. Delays in retirement and new retirement careers resulting in improved tax revenues and slowing the growth of calls on Social Security and Medicare

- 23. The extra productivity of the post-retirement workers increasing the amount of money looking for secure investments while reducing the need for government borrowing

- 24. Government policies reacting quickly to inflationary pressures

Respondent 21

- Technology breakthroughs lead to rapid increases in productivity,

- 22. Delays in retirement and new retirement careers resulting in improved tax revenues and slowing the growth of calls on Social Security and Medicare

- 23. The extra productivity of the post-retirement workers increasing the amount of money looking for secure investments while reducing the need for government borrowing

Respondent 23

- Competition to Treasury bonds for investment: other alternatives including global capital markets

Respondent 24

- Higher inflation implies higher short term yields, big budget deficits, weak dollar

Expected Value

Respondent 1

- Social Security estimated amount

Respondent 2

- Trend real interest rate plus expected value for inflation

Respondent 3

- I expect that inflation will not be an ongoing problem in the next 20 years. Therefore, bond holder's inflationary expectations should remain modest and 5.5% seems a reasonable nominal yield.

Respondent 4

- 4. Need to attract foreign capital to finance the enormous U.S. budget deficit

- 12. U.S. dollar losing value

- 13. Foreign governments switching to place funds in euros

- 15. Competition to Treasury bonds for investment: other alternatives including global capital markets.

Respondent 8

- Historic cycle

Respondent 9

- Possible war with China

Respondent 11

- 21. The Fed commits to and achieves inflation in a 0-2% range

- 24. Government policies reacting quickly to inflationary pressures

Respondent 12

- 10. Calls on government promises for retirement income and medical care straining federal budgets

- 22. Delays in retirement and new retirement careers resulting in improved tax revenues and slowing the growth of calls on Social Security and Medicare

- 23. The extra productivity of the post-retirement workers increasing the amount of money looking for secure investments while reducing the need for government borrowing

Respondent 15

- 2% premium over long-term inflation

Respondent 16

- 1. Tight energy and commodity markets: price shocks, oil shortages; rising oil prices

- 4. Need to attract foreign capital to finance the enormous U.S. budget deficit

- 5. High inflation from combination of the budget and trade deficit

- 8. Inability to generate domestic savings to reduce reliance on foreign borrowing

- 12. U.S. dollar losing value

- 13. Foreign governments switching to place funds in euros

Respondent 17

- 18. Combination of projected labor force growth and productivity growth

- 3. Continuing wave of technological change driving robust economic growth

- 9. People continuing to favor current consumption over saving

Respondent 19

- 1. Tight energy and commodity markets: price shocks, oil shortages; rising oil prices

- Highly stimulative U.S. monetary and fiscal policies

- 10. Calls on government promises for retirement income and medical care straining federal budgets

- 13. Foreign governments switching to place funds in euros

- 23. The extra productivity of the post-retirement workers increasing the amount of money looking for secure investments while reducing the need for government borrowing

Respondent 23

- Competition to Treasury bonds for investment: other alternatives including global capital markets

Respondent 24

- Recession could bring low-end down, but inflationary factors cited above + incentive to monetize fed debt push high end up expectation up

Highest Plausible Value

Respondent 1

- I believe that if the new Fed chairman will continue to manage as Greenspan, we will not see a dramatic swing upward. We saw the rates above 10% after Volcker set limits on Bank Reserves. This methodology is not longer popular in Western Governments (except Brazil)

Respondent 2

- High inflation plus high real rate

Respondent 3

- I arrived at 12% by assessing a 6% highest plausible inflation rate and assuming investors might demand a high real return of 6% in the face of inflationary uncertainty.

Respondent 4

- 5. High inflation from combination of the budget and trade deficit

- 6. Foreign investors diversifying portfolios away from U.S. dollar assets

- 7. Highly stimulative U.S. monetary and fiscal policies

- 8. Inability to generate domestic savings to reduce reliance on foreign borrowing

Respondent 5

- 1. Tight energy and commodity markets: price shocks, oil shortages; rising oil prices

- 10.Calls on government promises for retirement income and medical care straining federal budgets

- 12. U.S. dollar losing value

- 14. Government inability to "manage" mid or long term rates

Respondent 7
- 1. Tight energy and commodity markets: price shocks, oil shortages; rising oil prices

- 2. Labor unrest as the dependency ratio rises with the baby boomers retiring

- 4. Need to attract foreign capital to finance the enormous U.S. budget deficit

- 6. Foreign investors diversifying portfolios away from U.S. dollar assets

- 10. Calls on government promises for retirement income and medical care straining federal budgets

Respondent 8

- Historic cycle

Respondent 9

- Shortage of commodities

- Service economy catches up

Respondent 12

- 10. Calls on government promises for retirement income and medical care straining federal budgets

- 11. The growth in demand for treasuries falling behind the growth in federal commitments

Respondent 14

- Originally I had a lower value but after reading the other responses I was probably influenced too much by recent history

Respondent 16

- 1. Tight energy and commodity markets: price shocks, oil shortages; rising oil prices

- 4. Need to attract foreign capital to finance the enormous U.S. budget deficit

- 5. High inflation from combination of the budget and trade deficit

- 8. Inability to generate domestic savings to reduce reliance on foreign borrowing

- 12. U.S. dollar losing value

- 13. Foreign governments switching to place funds in euros

Respondent 17

- 5. High inflation from combination of the budget and trade deficit

- People continuing to favor current consumption over saving

Respondent 18

- 12, U.S. dollar losing value

- Increased monetization of debt as a result of entitlement spending outpacing productivity gains. Increases inflation and supply of debt, raising interest rates

Respondent 19

- 1. Tight energy and commodity markets: price shocks, oil shortages; rising oil prices

- 10. Calls on government promises for retirement income and medical care straining federal budgets

- 6. Foreign investors diversifying portfolios away from U.S. dollar assets

- 14. Government inability to "manage" mid or long term rates

Respondent 21

- 4. Need to attract foreign capital to finance the enormous U.S. budget deficit

- 5. High inflation from combination of the budget and trade deficit

- 8. Inability to generate domestic savings to reduce reliance on foreign borrowing

- 12. U.S. dollar losing value

- 10. Calls on government promises for retirement income and medical care straining federal budgets

Respondent 24

- Recession could bring low-end down, but inflationary factors cited above + incentive to monetize fed debt push high end up expectation up

3. S&P 500 Total Rate of Return

Lowest Plausible Value

Respondent 1

- Extrapolation from historical value

Respondent 2

- Any 1 year can be extremely volatile

Respondent 4

- 1. This is a highly volatile series: above 24% gain or below - 10% loss due to immediate growth, irrational exuberance, recession or under & over valuations in recent years

- 2. Exceptionally volatile, but globalization and cross-linking of exchanges dampening overall fluctuations

- 15. Increased cross-border, competition in both goods and services reducing the return of equities

Respondent 5

- 16. An environment that supports the highest plausible value of the other variables

- 17. A bear market

- 20. The next generation creating another bubble in the market, this will burst as always

Respondent 7

- 13.Rising discount rate, but highly volatile

- Increased cross-border, competition in both goods and services reducing the return of equities

- 16. An environment that supports the highest plausible value of the other variables

- 17. A bear market

- 18. The baby boom reaching the Social Security retirement age, with the U.S. the last of the major industrialized nations to reach this point of a massive proportion of its population in retirement

- 19. A flight from equities resulting from retirees' needs for cash...

Respondent 8

- Tech revolution

Respondent 9

- Normal fluctuations

Respondent 11

- 1. This is a highly volatile series: above 24% gain or below - 10% loss due to immediate growth, irrational exuberance, recession or under & over valuations in recent years

Respondent 12

- 12. High interest rates and poor fiscal policy damaging corporate earnings and hurting investor confidence

- 18. The baby boom reaching the Social Security retirement age, with the U.S. the last of the major industrialized nations to reach this point of a massive proportion of its population in retirement

- 19. A flight from equities resulting from retirees' needs for cash...

Respondent 16

- 12. High interest rates and poor fiscal policy damaging corporate earnings and hurting investor confidence

- 13. Rising discount rate, but highly volatile

Respondent 17

- 17. A bear market

- 19. A flight from equities resulting from retirees' needs for cash...

- 20. The next generation creating another bubble in the market, this will burst as always

Respondent 18

- - Profit margins damaged by political settlements, reducing confidence in equity investing

Respondent 19

- 17. A bear market

- 19. A flight from equities resulting from retirees' needs for cash...

Respondent 21

- Happen to hit a low in 2024, malaise among investors from long term outlook for lagging growth in the U.S., resource shortages

- 12. High interest rates and poor fiscal policy damaging corporate earnings and hurting investor confidence

- 19. A flight from equities resulting from retirees' needs for cash..,

Respondent 24

- Highly volatile series

Expected Value

Respondent 1

- I believe that the long term average will balance out

Respondent 2

- A bit faster than trend nominal GDP growth

Respondent 4

- Reasonable spread over base case 10yr Tsy scenario

Respondent 8

- Tech revolution

Respondent 11

- 4. A continued wave of technological change should drive robust economic growth (plus gives a reasonable equity risk premium over long-term bond yields)

Respondent 12

- 18. The baby boom reaching the Social Security retirement age, with the U.S. the last of the major industrialized nations to reach this point of a massive proportion of its population in retirement

- 19. A flight from equities resulting from retirees' needs for cash...

Respondent 16

- 1. This is a highly volatile series: above 24% gain or below - 10% loss due to immediate growth, irrational exuberance, recession or under & over valuations in recent years

- 2. Exceptionally volatile, but globalization and cross-linking of exchanges dampening overall fluctuations

- 4. A continued wave of technological change should drive robust economic growth

Respondent 17

- 4 A continued wave of technological change should drive robust economic growth

- 8. Significant increases in service sector productivity, particularly medical services

Respondent 18

- -increased compliance costs creating artificial economies of scale, driving small cap companies out of the public markets – reduces volatility

Respondent 19

- 10. A balance existing between those who cash out their equity portfolios to meet current spending needs or to find more stable investments, and those who hold on to equities for their potential to deliver solid income

- 11 a. Many companies shifting their focus to provide solid dividend income to their shareholders, mitigating the impact of declines in equity prices Still need a reasonable spread over corporate bonds to make the equity risk worthwhile

Respondent 23

- Increased cross-border competition in both goods and services reducing the return of equities

Respondent 24

- Expected returns from equities will be more modest in the future as interest rates will be higher and demand will fall; Rise in interest in foreign stocks reduce demand for US securities

Highest Plausible Value

Respondent 1

- Historical Basis

Respondent 2

- Any 1 year can be extremely volatile

Respondent 3

- You have asked for the value in 2024, NOT the average value from now to 2024. Equity returns are volatile and historically a high return is not a rare event. My round 1 estimate was based on my examination of the wrong data set.

Respondent 4

- 2. Exceptionally volatile, but globalization and cross-linking of exchanges dampening overall fluctuations

Respondent 5

- 1. This is a highly volatile series: above 24% gain or below - 10% loss due to immediate growth, irrational exuberance, recession or under & over valuations in recent years

- 9. Though implausible, an exuberant bull market in 2024

Respondent 7

- 2. Exceptionally volatile, but globalization and cross-linking of exchanges dampening overall fluctuations

- 4. A continued wave of technological change should drive robust economic growth

- 7. An environment that supports the lowest plausible value of the other variables

- 10.A balance existing between those who cash out their equity portfolios to meet current spending needs or to find more stable investments, and those who hold on to equities for their potential to deliver solid income

- 11.Many companies shifting their focus to provide solid dividend income to their shareholders, mitigating the impact of declines in equity prices

Respondent 8

- Tech revolution

Respondent 9

- Normal fluctuations

Respondent 11

- 1. This is a highly volatile series: above 24% gain or below - 10% loss due to immediate growth, irrational exuberance, recession or under & over valuations in recent years

Respondent 12

- 8. Significant increases in service sector productivity, particularly medical services

- 11. Many companies shifting their focus to provide solid dividend income to their shareholders, mitigating the impact of declines in equity prices

Respondent 14

- Over reaction in the market can cause any single year to deviate above or below normal levels

Respondent 16

- 1. This is a highly volatile series: above 24% gain or below - 10% loss due to immediate growth, irrational exuberance, recession or under & over valuations in recent years

- 2. Exceptionally volatile, but globalization and cross-linking of exchanges dampening overall fluctuations

- 4. A continued wave of technological change should drive robust economic growth

Respondent 17

- 4 A continued wave of technological change should drive robust economic growth

- 8. Significant increases in service sector productivity, particularly medical services

- 9. Though implausible, an exuberant bull market in 2024

Respondent 18

- 5. Taxes being reduced and income taxes possibly being replaced by consumption taxes.

- New technologies dramatically drop cost of natural resources

Respondent 19

- 9. Though implausible, an exuberant bull market in 2024

- 11. Many companies shifting their focus to provide solid dividend income to their shareholders, mitigating the impact of declines in equity prices a) Still need a reasonable spread over corporate bonds to make the equity risk worthwhile; b) potential changes in the make up of the S&P 500 dropping poor performers and replacing them with stronger companies gives an upward bias to the index. This is not as common as with the Dow Jones but is still possible as companies can go into bankruptcy and be dropped (e.g., Enron).

Respondent 21

- Happen to hit a peak in 2024

- 8. Significant increases in service sector productivity, particularly medical services

Respondent 24

- In any given year, falling interest rate, econ recovery could send the market up

4. Corporate Baa Spot Yields

Lowest Plausible Value

Respondent 1

- As money tightens the Spread will need to increase

Respondent 2

- Low T-bond rate plus compressed spreads

Respondent 3

- Baa yields depend on inflation, treasury yields, and credit market perceptions. It is unlikely that appetite for lesser quality investment grade bonds will be high enough to justify a spread of less than 200bp to treasury (particularly in a low interest rate environment where corporate profits might be squeezed by deflationary pressures) and my low estimate for treasury is 3.5%.

Respondent 4

- 16. Good profitability and strengthened corporate governance keeping the spread over treasuries relatively tight

- 17. Government prudence and a perception of relatively low corporate risk because of healthy

Respondent 5

- Consistent with lowest plausible value for 10 year Treasury

Respondent 7

- 18. Credit spreads over treasury securities becoming smaller because of a growing preference for corporate bonds (resulting from a reduction in confidence in government bonds) as the credit risk seems increasingly insignificant compared to the large-scale federal commitments

- 19. Little way to avoid credit risk

Respondent 8

- Equity will be more attractive.

Respondent 11

- Values need to be consistent with bond yields (see section 2 above) and reflective of widening or narrowing credit spreads

Respondent 12

- 18. Credit spreads over treasury securities becoming smaller because of a growing preference for corporate bonds (resulting from a reduction in confidence in government bonds) as the credit risk seems increasingly insignificant compared to the large-scale federal commitments

Respondent 16

- 13. A boom, creating an excess of demand for credit risk, lowering yields

- 17. Government prudence and a perception of relatively low corporate risk because of healthy balance sheets, strong earnings momentum, and favorable economic conditions.

Respondent 17

- 18. Credit spreads over treasury securities becoming smaller because of a growing preference for corporate bonds (resulting from a reduction in confidence in government bonds) as the credit risk seems increasingly insignificant compared to the large-scale federal commitments

Respondent 18

- 16. Good profitability and strengthened corporate governance keeping the spread over treasuries relatively tight

Respondent 19

- 13. A boom, creating an excess of demand for credit risk, lowering yields

Respondent 21

- Low rates in response to poor economy with few investment opportunities

- 17. Government prudence and a perception of relatively low corporate risk because of healthy balance sheets, strong earnings momentum, and favorable economic conditions.

Respondent 24

- US may be flush with foreign capital, like today, keeping interest rates low

Expected Value

Respondent 1

- As money tightens the spread will need to increase

Respondent 2

- Trend real rate, expected inflation plus normal spreads versus Treasuries

Respondent 3

- I believe that recent Baa spreads are too low and that spreads will return to historical levels in the 250bp range.

Respondent 8

- Equity will be more attractive.

Respondent 11

- Values need to be consistent with bond yields (see section 2 above) and reflective of widening or narrowing credit spreads

Respondent 15

- 4% risk premium

Respondent 16

- 1. Tight energy and commodity markets: price shocks, oil shortages; rising oil prices

- 3. A recession involving a credit crunch, raising yields

- 6. Need to attract foreign capital to finance the enormous U.S. budget deficit

Respondent 17

- 18. Credit spreads over treasury securities becoming smaller because of a growing preference for corporate bonds (resulting from a reduction in confidence in government bonds) as the credit risk seems increasingly insignificant compared to the large-scale federal commitments

- 3. A recession involving a credit crunch, raising yields

- 9. Lack of government prudence

Respondent 19

- 16. Good profitability and strengthened corporate governance keeping the spread over treasuries relatively tight

- 4. A continued wave of technological change driving robust economic growth

Respondent 23

- Need to attract foreign capital to finance the enormous U.S. budget deficit

Respondent 24

- Modestly higher inflation

Highest Plausible

Respondent 1

- As money tightens the spread will need to increase

Respondent 2

- In high inflation, high real interest rate world with wide spreads

Respondent 3

- If treasury rate do wind up at the high end then it is likely that credit markets will demand high risk premiums for loaning to Baa grade corporations.

Respondent 4

- 3. A recession involving a credit crunch, raising yields

- 5. Rising inflation and a continuation of inflationary expectations

- 8. High inflation

- 9. Lack of government prudence

- 10. A perception of relatively high corporate risk because of unhealthy balance sheets, low earnings momentum and unfavorable economic conditions

Respondent 5

- Consistent with highest plausible value for 10 year Treasury

Respondent 7

- 1. Tight energy and commodity markets: price shocks, oil shortages; rising oil prices

- 2. Labor unrest as the dependency ratio rises with the baby boomers retiring

- 4. A continued wave of technological change driving robust economic growth

- 5. Rising inflation and a continuation of inflationary expectations

- 6. Need to attract foreign capital to finance the enormous U.S. budget deficit

Respondent 8

- Equity will be more attractive.

Respondent 11

- Values need to be consistent with bond yields (see section 2 above) and reflective of widening or narrowing credit spreads

Respondent 12

- 7. Increasing competition for savings; the retirement of the baby boomers will mean dis-saving on a massive scale as they quit paying into IRAs and start withdrawing funds

- 8. High inflation

Respondent 14

- Increased this value to reflect a change in 10 yr treasury value

Respondent 16

- 1. Tight energy and commodity markets: price shocks, oil shortages; rising oil prices

- 3. A recession involving a credit crunch, raising yields

- 6. Need to attract foreign capital to finance the enormous U.S. budget deficit

Respondent 17

- 5. Rising inflation and a continuation of inflationary expectations

- 10. A perception of relatively high corporate risk because of unhealthy balance sheets, low earnings momentum and unfavorable economic conditions

Respondent 18

- 5. Rising inflation and a continuation of inflationary expectations

- 10. A perception of relatively high corporate risk because of unhealthy balance sheets, low earnings momentum and unfavorable economic conditions

- 12. Rising political risk

- Increased risk from government litigation (e.g., Spitzer) vs. regulation

Respondent 19

- 7. Increasing competition for savings; the retirement of the baby boomers will mean dis-saving on a massive scale as they quit paying into IRAs and start withdrawing funds

- 10. A perception of relatively high corporate risk because of unhealthy balance sheets, low earnings momentum and unfavorable economic conditions

Respondent 21

- Investors insist on higher returns to offset high perceived risk & volatility

- 1. Tight energy and commodity markets: price shocks, oil shortages; rising oil prices

- 6. Need to attract foreign capital to finance the enormous U.S. budget deficit

- 2. Labor unrest as the dependency ratio rises with the baby boomers retiring

- 10. A perception of relatively high corporate risk because of unhealthy balance sheets, low earnings momentum and unfavorable economic conditions

Respondent 24

- Huge fed deficits may crowd out private investment forcing businesses to offer high yields

APPENDIX E

Round 2: Comments on Application of Judgmental Methods

Item 1: The historical period used to calibrate stochastic models

Questions: Do you think that this Study provided potential developments and forecasts that could lead to revision of the historical period used in calibration? If yes, how would you revise the number of years you use to calibrate your models?

Respondent 2

- No

Respondent 3

- No

Respondent 5

- No

Respondent 7

- Yes

Respondent 9

- No

Respondent 10

- No

Respondent 13

- No

Respondent 16

- No

Respondent 17

- No

Respondent 22

- No

Answers

Respondent 1

- No

Respondent 7

- Believe there is likelihood of discontinuity between past and future, so that, while modeling needs some historical basis, impact of divined future changes must be considered in adjusting the model and the period used. Adjustment to number of years depends on what projected changes in the economy are under consideration. Adjustment might be more than just a change in period but include random shocks

- (Applies to all

Reasons

Respondent 1

- In my own statistical studies of the historical data, I found that if one eliminates the periods where government intervention was different from the norm, the interest rates, CPI and corporate bond behavior was stable and there were little to no outliers. My historical period is: 1935 to Oct 1979, Oct 1982 to current. Here, I removed all data prior to the formation of the SEC and all data during the period when Volcker was controlling Bank Reserves. This creates the "tamest' model. Any other economic behavior to be modeled should be calibrated separately and layered upon this.

Respondent 2

- For all variables it is important to determine if a structural shift in relationships has taken place. While Chow tests and other statistical techniques can be used to test for changes in relationships, judgment is still very important in selecting the relevant historical period for estimation of stochastic models to include all the of the historical period with the current model or relationships, but to exclude historical periods with different structural relationships

Respondent 13

- My model is deterministic. Not stochastic, so many of these questions do not apply

Respondent 17

- I'm pretty confident of my world view.

Item 2: Expected Value of Variables

Questions: Do you think that this Study provided potential developments and forecasts that could lead to changes in estimates of the expected value of the variables? If yes, by how much do you think the expected values might change? (e.g., if you would now use 6% instead of 5%, enter 100).

Respondent 3

- Yes

Respondent 5

- Yes

Respondent 7

- Yes

Respondent 9

- Yes

Respondent 10

- Yes

Respondent 13

- Yes

Respondent 16

- No

Respondent 17

- No

Respondent 22

- Yes

Answers

Respondent 1

- Yes, but the modeler should layer what his or her assumptions upon the 'tame' economic that I discussed above.

Respondent 3

- I have not been overly concerned about the role of baby boomers as they begin to retire in large numbers. Perhaps my thinking on the effect of this on investment returns and inflation needs to be refined. At present I am not changing the way I approach modeling but more thought is needed. As a rough guess, a 10% reduction in investment returns and a 10% hike in inflation might be needed.

Respondent 5

- I would now use a higher estimate of the lowest plausible values of CPI and 10 year interest rates. I would increase my estimate of this lower boundary by 50 to 100 basis points.

Respondent 7

- All

Respondent 9

- Lower S&P by 100 bps.

Respondent 13

- Studying data over a long period such as 114 years automatically leads to more volatility in all variables.

Reasons

Respondent 2

- Some of the events/developments discussed in this Study would change the expected values of the variables, but it is impossible to generalize on the magnitude of the change in expected values.

Respondent 5

-
- My original answers for the lowest plausible values were well below the range given by the other respondents.

Respondent 7

- Gives a more rational basis for company selection of projected values, particularly if modeling an additional optimization component

Respondent 9

- Made me think more about the interactions between the variables and how the correlations might be impacted

Respondent 13

- More volatility is a real world fact.

Item 3: Identification of potential developments that could affect forecasts

Questions: List one potential development or forecast identified in this Study that you think may cause changes in your model.

Respondent 9

- Food supply

Answers

Respondent 1

- The layered approach of modeling as discussed above should allow for any specific potential development to be place on the 'tame' model.

Respondent 2

- Global climate change having meaningful economic impact by 2024

Respondent 3

- None noted except for the need to change parameter calibration from the previous question.

Respondent 5

- Economic depression for a 7 year period.

Respondent 7

- All

Respondent 9

- Likely to raise cost of borrowing for the 10-T and spreads.

Respondent 13

- I have no plans to change my model.

Respondent 16

- Had not considered structural shift where corporate bond or Treasury issuance volume falls significantly

Reasons

Respondent 2

- This would be so far out of the historical experience that many statistical relationships between relevant economic series may be changed in a significant way.

Respondent 5

- This development is actually related to others in the list (increase in corporate defaults, prime rate above 9% for 5 years)

Respondent 7

- Gives a more rational basis for company selection of projected values, particularly if modeling an additional optimization component

Respondent 9

- Increased uncertainty leads to increased volatility

Respondent 16

- Impacts reinvestment assumptions made in long term models, not just in terms or reinvestment assets but performance of outstanding securities

----
Item 4: Mean reversion assumptions in stochastic models

Questions: Do you think that this Study identified potential developments or forecasts that could lead to increasing or decreasing strength of reversion?

Respondent 3

- No

Respondent 5

- No

Respondent 7

- No

Respondent 9

- No

Respondent 10

- No

Respondent 13

- No

Respondent 14

- Yes

Respondent 16

- Yes

Answers

Respondent 1

- Same as above

Reasons

Item 5: The period over which the current assumption reverts to the mean

Questions: Do you think that this Study identified potential developments or forecasts that could lead to a lengthening or shortening of the mean reversion period? If so, by how much?

Respondent 3

- No

Respondent 5

- No

Respondent 7

- No

Respondent 9

- No

Respondent 10

- No

Respondent 13

- No

Respondent 16

- No

Respondent 17

- No

Answers

Respondent 1

- Same as above

Reasons

Respondent 2

- If mean reversion does not take place over the 20 year span of this projection, then the process that is taking place is not a mean reverting one in any meaningful sense.

Respondent 13

- My model is deterministic not stochastic, so many of these questions do not apply.

Item 6: The volatility assumptions used in stochastic models

Questions: Do you think that this Study identified potential developments or forecasts that could lead to an increase or decrease in volatility assumptions?

Respondent 2

- Yes

Respondent 3

- Yes

Respondent 5

- Yes

Respondent 7

- Yes

Respondent 9

- Yes

Respondent 10

- No

Respondent 13

- Yes

Respondent 16

- Yes

Respondent 17

- Yes

Answers

Respondent 1

- Same as above

Respondent 3

- Some increase in volatility should be allowed for if one believes the impact of the baby-boomers will be significant. One needs to simulate a broader range of outcomes

Respondent 5

- Yes, seeing the strong consensus of views on highest plausible values could lead to increased volatility assumptions in forecasting models. Forecasters might wish to calibrate the volatility of their variables to produce similar extreme values.

Respondent 7

- All

Respondent 9

- The number of different situations that can impact variables leads me to favor higher volatility in the future than in the past.

Respondent 13

- Studying data over a long period such as 114 years automatically leads to more volatility in all variables.

Reasons

Respondent 2

- My starting point assumptions on volatility always are derived from historical experience. Economic theory gives us more insight on the mean or equilibrium value of variables than on the variance or volatility. The occurrence of very low subjective probability events could have an impact on volatility, but it is difficult for me to quantify the impact.

Respondent 5

- Forecasters might wish to calibrate the volatility of their variables to produce similar extreme values.
-

Respondent 7

- Future elements of instability should be used in establishing just how volatile each characteristic will be

Respondent 9

- 20 years from now an Asian power (likely China) that own lots of dollars and wants to destabilize the US economically before attacking will have an additional tool in its belt.

Respondent 13

- More volatility is a real world fact.

Item 7: Validity of outliers that stochastic models may forecast

Questions: Do you think that this Study identified potential developments or forecasts that could cause you to reassess the influence of outliers. If so, which outlier do you now consider having more of an influence in your model? What outlier do you now consider having less of an influence in your model?

Respondent 2

- No

Respondent 3

- No

Respondent 5

- Yes

Respondent 9

- Yes; greater combination of events

Respondent 10

- No

Respondent 13

- Yes

Respondent 16

- Yes

Answers

Respondent 1

- Compare to the tame period of time, attempt to explain the outliers and adjust the layer that allows for these.

Respondent 5

- More influence – lowest plausible values of CPI and 10 year interest rates.

- Less influence – outliers on S&P 500.

Respondent 9

- We need to utilize deterministic models in addition to stochastic ones to get the impact of outliers.

Respondent 13

- Outliers should be checked against actual outliers in the period 1890 and on.
- Number 5 on page 10: The US assuming and accepted in a moral, political, and economic leadership role.

Respondent 17

- Treasuries

Reasons

Respondent 2

- Judgment is always critical in assessing the validity of outliers. Outliers can help us identify missing independent variables, structural changes, but they can sometimes just be random outliers.

Respondent 5

- My modeling focuses on interest rate variables. This is driven by the types of businesses I am modeling and the risks I am quantifying.

-

Respondent 7

- Only historical studies give a known response to external stimuli, but the outliers there are obviously discrete and not easily incorporated in Modeling. Outliers based on model characteristics are a better fit, but without careful judgment, cannot be easily said to be "real"

Respondent 13

- To see if they seem reasonable.

Respondent 17

- Survey caused me to think more about the possibility that the government may not do anything about social security till the mess occurs.

APPENDIX F
Round 1 Future Developments

This Appendix presents paraphrased responses to the questionnaire's request for future developments that could affect the course of the four variables. As noted in the text, the responses are grouped into the following categories:

- Commodity Prices
- Productivity
- New Technology
- Foreign Affairs
- Energy and Resources
- The Dollar
- Corporate Factors
- Trade and Foreign Investment
- Social Factors
- Inflation and Investment Climate
- US Deficit

1. Annual increase in Consumer Price Index

Commodity Prices
- Oil prices rise $30 bbl in one year, pushing inflation above 3.5%
- Oil prices rise to above $30 bbl for a period of at least 5 years.
- Oil prices rise to above $ _60_ / barrel for a period of at least 5 years
- Oil prices rise to above $100 / barrel for a period of at least 5 years
- Energy prices rise sharply on a sustained basis
- Oil prices rise to above $ _70_ / barrel for a period of at least 5 years
- Oil prices surge frequently, interspersed with periods of steady or slightly declining prices, as demand grows rapidly in developing nations, in addition to slow growth or steady demand in industrialized nations.
- Oil prices rise to above $ _100_ / barrel for a period of at least 5 years but this might lead to an economic collapse and deflation in the longer run.
- Oil prices rise to above __70___$/barrel for at least five years.
- Oil prices rise to above $ _55_ / barrel for a period of at least 5 years
- Oil prices rise to above __70___$/barrel for at least five years.
- Oil prices rise to above $ 70 / barrel for a period of at least 5 years
- Oil prices rise to above $ 50/barrel for a period of at least 5 years
- Oil prices rise to above $80 / barrel for a period of at least 5 years

Productivity
- Productivity gains lower inflation to close to zero
- Rapid shrinkage of the labor force as population ages contributes to lower productivity growth.
- Stable labor force as population ages helps to keep productivity growth high.
- Productivity improves 1% per year for an extended period of time

New Technology
- New technologies dramatically increase the number of people who can be served per worker, leading to a significant drop the costs of high-demand services.
- New technologies drop costs of production of most products by 20%
- New technologies drop costs of production of most products by _20_ %

- New technologies drop costs of production of most products by 20 %
- New technologies drop costs of production of most products by 10 %
- New technologies drop costs of production of most products.
- New technologies drop costs of production of most products by _2_ %
- New technologies drop costs of production of most products by _10_ %
- New technologies drop costs of production of most products by 10__ %
- New technologies drop costs of production of most products by _10_ %
- New technology driven productivity gains cause lower market prices masking government inflation.
- New technologies drop costs of production of most products by 40 %
- New technologies drop costs of production of most products by _50_ %
- New technologies drop costs of production of most products by 10 %
- New technologies drop costs of production of most products by 1.5%
- New technologies dramatically drop costs of natural resources.

Foreign Affairs
- The U.S. reasserts and further develops its moral, political, and economic leadership of the west: that leadership is essentially accepted throughout the world.
- The impact of prolonged war in Iraq, and new conflicts in other parts of the world, plus the ever-present threat of terrorism are all very uncertain areas that could have a huge impact on all major financial indicators.
- Terrorism events escalate, increasing cost of production
- Terrorist/ war-related events drive up costs of security and insurance.
- Global instability (Islam, China-India push for power) creates spot shortages.
- NATO, a western institution, essentially succeeds in its new anti-terrorist and I Islamic extremist role. Such problems become under control by 2008. .
- Extended war in the middle east leads to large sustained increase in the price of oil

Energy and Resources
- New technologies further reduce general dependence on fossil fuels.
- Energy costs and availability, exacerbated by climate change constraints on fossil fuels will make energy a very costly commodity.
- Oil shortages due to exhaustion of natural resources
- Materials and resource depletion will give rise to feedstock substitutions made possible by advances in technology, but these opportunities will come at a higher cost.
- As people realize oil production will peak and slowly fall, alternatives at higher cost kick in keep all energy costs high.
- China and India will be a giant factor in keeping energy prices low, but they too will begin to have higher labor costs and their water and energy access limits their grown in production of low cost items.
- New sources of oil are developed in the United States (e.g., Arctic drilling)
- Shift in sources of energy (e.g., nuclear, solar, wind, hydroelectric, natural gas) leads to change in cost of energy supply
- Shift in usage of energy (e.g., energy-efficient home design) leads to shift in mix of CPI basket

The Dollar
- Depreciation of the US dollar vs. euro by 30% for more than 5 years
- Collapse of US dollar as world reserve currency.
- U.S. dollar weakens considerably from present levels, pushing up import prices.
- US Dollar currency collapse vs. Euro.

Corporate Factors

- A rapidly rising retired population outpaces productivity gains, severely straining the ability of businesses and workers to meet demand. This is especially true in medical fields, where access to the newest technologies, procedures, and medications for common age-related conditions is widely seen as a basic entitlement.
- Highly successful globalization which leads to consistent reductions in cost of labor and thus maintains deflationary pressures. [However, my forecast of CPI implicitly assumes this trend will continue.

Trade and Foreign Investment
- Very extensive trade agreements (essentially customs unions) are made before 2015, encompassing the Americas, Europe, Australia, and New Zealand. .
- Massive foreign investment in the U.S. resumes by 2012, because U.S. investment climate has again become attractive. .

Inflation and Investment Climate
- Long term weather patterns affect supply/cost of food

2. 10 Year Treasury Spot Yields

Foreign Affairs

- The U.S. reasserts and further develops its moral, political, and economic leadership of the west: that leadership is essentially accepted throughout the world.
- NATO, a western institution, essentially succeeds in its new anti-terrorist and I Islamic extremist role. Such problems become under control by 2008. .
- Extended war requires heavy military expenses/deficit spending

The Dollar

- Euro is increasingly accepted as a reserve currency amid USD weakness.
- US Dollar currency collapse vs. Euro, lowering demand for debt, lowering prices (increasing interest rates)
- Euro becomes the currency of choice.
- Major collapse in the value of the U.S. dollar prompted by foreign investors turning away from U.S. dollar assets.

Trade

- Developing nations out-compete developed nations for market share of manufactured goods. Room at the top of the food chain for developed nations is pressured, and profitability of intellectual/service based economies are called into question.
- Trade restrictions resulting from inability of non US countries to alter their policies to pro-growth..

Social Factors

- Litigation abuses come under control in 2006.
- Fears about the collapse of social safety nets and the adequacy of savings prompt many baby boomers to delay retirement, resulting in increased tax revenue and maybe a reduced call on federal promises of retirement income and medical care.

- Tax and Social Security changes are made in the U.S., before 2010 which greatly increases savings rate.
- Mass exodus from US government bonds.
- Large scale re-allocation of pension assets out of equities and into fixed income
- Tax and Social Security changes are made in the U.S., before 2010 which greatly increases savings rate . .
- Litigation abuses come under control in 2006. .
- Fears about the collapse of social safety nets and the adequacy of savings prompt many baby boomers, and younger generations, to significantly curtail consumption in an attempt to reduce debt and save more for the future.
- The aging of the industrialized world leads to a critical mass in demand for age-related medical care. With this transition, it becomes possible for providers and their suppliers to compete profitably on price.
- An increase in natural catastrophes increases costs and inflation
- Health care costs increase substantially
- Immigration drops by 20%
- Ratio of retired workers to active exceeds 2.5:1 after baby boomers retire
-

US Deficit
- U.S. Government current account deficit increases to 6% of GDP, dollar drops, and yields must rise to attract capital
- Government deficit rises above 5% of GDP and yields rise above 6%
- U.S. Government current account deficit increases to 13% of GDP.
- U.S. Government current account deficit increases to _4__% of GDP.
- U.S. Government current account deficit increases to 10% of GDP.
- U.S. Government current account deficit increases to 10% of GDP.
- Investors diversify holdings away from U.S. capital markets in response to widening current account deficit.
- The U.S. fiscal deficit continues to deteriorate and/or the Fed adopts more ad hoc strategies to sustain growth.
- U.S. Government deficit increases to _10__% of GDP.
- U.S. Government current account deficit continues at current levels for a prolonged period...
- Budget deficit worsens for a prolonged period.
- U.S. Government current account deficit increases to 10% of GDP.
- U.S. Government current account deficit increases to 10% of GDP.
- U.S. Government current account deficit increases to _20__% of GDP.
- U.S. Government current account deficit increases to 10% of GDP.
- U.S. Government current account deficit increases to 30% of GDP.
- Federal deficit stays at the current level.
- U.S. Government current account deficit increases to 8% of GDP.
- Failure to control entitlement spending – U.S. Federal budget deficit persistently exceeds 5% of GDP.
- The US current account deficit is more a problem for the rest of the world; the concern of currency speculators
- U.S. steps up spending (e.g., additional wars, health care) combined with further cuts taxes, resulting in severe debt problems that would put upward pressure on real rates
- Improvements in the current account mean less pressure on the dollar and cheaper imports.)
- Budget deficit will catch up, probably much faster than the 20 years.
- Current account deficit grows by > 5%/year
- US credit no longer seen as the AAA standard due to high budget deficits/ high trade deficits

Foreign Investment
- Confidence in US drops due to twin deficits, foreigners bail out of US securities
- Confidence in US drops; direct foreign investment reaches 53% of current levels
- Confidence in US drops; direct foreign investment reaches _60__% of current levels

- Direct foreign investment will continue to be attracted by high Treasury yields .
- Confidence in US drops; direct foreign investment reaches 20% of current levels
- Confidence in US drops; direct foreign investment reaches __% of current levels DELETE
- Massive foreign investment in the U.S. resumes by 2012, because U.S. investment climate has again become attractive.
- Confidence in US drops; direct foreign investment dries up with a prolonged large net outflow.
- Confidence in the US drops; direct foreign investment reaches 20__% of current levels.
- Confidence in the US drops; direct foreign investment reaches __50_% of current levels.
- Confidence in US drops; direct foreign investment reaches _200__% of current levels
- Confidence in US drops; direct foreign investment reaches __70_% of current levels
- Confidence in US drops; direct foreign investment reaches 85% of current levels
- Massive foreign investment in the U.S. resumes by 2012, because U.S. investment climate has again become attractive. .

Inflation and Investment Climate
- An improvement in the risk characteristics of Asian and Latin American investments relative to U.S. alternatives draws global savings away from U.S. markets.
- Treasury Department resumes issuance of 30-year bond.
- Inflation rises to 12% for any length of time
- Inflation due to oil shortages will drive up inflation and the treasury will resort to restricting bank reserves similar to Volcker in 1979 to 1982.
- Increased government monetization of debt caused by entitlement costs outpacing productivity gains or tax receipts. Increases inflation, and also supply of debt, lowering prices (increasing interest rates)
- Changes in demand for Treasuries across the yield curve leading to a change in yield curve shape could mean short-term rates behave quite differently to long-term rates.
- Prolonged economic stagnation as in Japan in the 1990s.
- A shift in monetary policy proves inflationary
- Inflationary expectations build after US budget deficit exceed 4% of GDP for 3 years
- Fed adopts explicit inflation target and/or Congress focuses on sustaining balanced budgets.
- U.S. can no longer afford to buy many foreign products as their prices rise.
- Rising health care costs, and their share of expenditure, push up the all-items CPI inflation above 3.5%
- Significant commodity price inflation (including but not limited to oil) which does not cause a collapse of the global economy could lead to high CPI rates.
- Continued increase in the money supply
- Increased government monetization of debt caused by entitlement costs outpacing productivity gains or tax receipts. Could cause CPI above range.
- Change in the independence of the Federal Reserve.
- Collapse in home prices as in Japan.
- Fed controls inflation (not precisely, and not at every moment) but the sustainable rate.
- The Fed may not be able to effectively offset a global recession (especially a serious one), so fighting deflation may be less effective than containing renewed inflation.
- Inflation increases

3. S&P 500 Total Rate of Return

Commodity Prices
- Oil prices rise by more than 50% for more than 2 years = 40% drop
- Here, too, energy prices will strangle US and other companies.   Also, see argument in 2.3. above.

Productivity
- Productivity gains are above/below 2% and the expected value rises/falls by same amount
- Productivity increases 4% for five consecutive years.
- Productivity increases _5% for five continuous years.

- Productivity increases 5% for five continuous years.
- Productivity increases 10% for five continuous years.
- Productivity increases _5% for five continuous years.
- Productivity increases _5% for five continuous years.
- Productivity increases _8_% for five continuous years.
- Productivity increases _5% for five continuous years.
- Productivity increases _10_% for five continuous years. .
- Productivity increases 1% for five continuous years.
- Productivity increases 4% for five continuous years.
- Strong productivity growth

New Technology
- New technologies dramatically drop costs of natural resources, opening up new markets and infrastructures.

Foreign Affairs
- The U.S. reasserts and further develops its moral, political, and economic leadership of the west: that leadership is essentially accepted throughout the world.
- NATO, a western institution, essentially succeeds in its new anti-terrorist and I Islamic extremist role. Such problems become under control by 2008.
- War with China or Russia leads to economic turmoil.
- Global political instability creates problems for business
- Terrorism and war-related issues induce investors to shift portfolios into less risky, more liquid fixed income alternatives.

Corporate Factors
- Increased compliance costs for public companies drive small cap players out the market, removing a source of the most dramatic returns – tendency to reduce volatility.
- Companies fail to invest in innovation due to a perceived inability to profit from the expenditures. Drug companies are one example.
- Tax law changes favor corporate earnings

Trade
- Very extensive trade agreements (essentially customs unions) are made before 2015, encompassing the Americas, Europe, Australia, and New Zealand.

Social Factors
- Depression will cause major drop in the S&P for a period exceeding 5 years
- Litigation abuses come under control in 2006.
- The baby boom generation's need for spending money during retirement leads to a large scale shift in corporate focus from earnings growth to dividend growth. Despite the resulting growth in dividend income, stock prices decline as many boomers sell to obtain funds needed for daily living expenses and to protect against further price declines.
- Large scale re-allocation of pension assets out of equities and into fixed income.
- Tax and Social Security changes are made in the U.S., before 2010 which greatly increases savings rate .
- Retiring baby boomers begin selling large accumulated stock holdings

Foreign Investment

- Massive foreign investment in the U.S. resumes by 2012, because U.S. investment climate has again become attractive.

Inflation and Investment Climate
- Profit margins of most US companies drop to _40__% of current levels for 10 years.
- Profit margins of most US companies drop to 100% of current levels for 10 years. (not an issue)
- Global competition leads to a sustained narrowing of earnings margins
- Profit margins of most US companies drop to _50_% of current levels for 10 years
- Profit margins of most US companies drop to _50_% of current levels for 10 years
- Profit margins of most US companies drop to _90__% of current levels for 10 years.
- Profit margins of many US companies continue to be damaged by political settlements – negative impact in stock prices.
- Profit margins of most US companies drop to _2_% of current levels for 10 years
- Profit margins of most US companies drop to _80__% of current levels for 10 years.
- Profit margins of most US companies drop to 75% of current levels for 10 years.
- Bear market returns and S&P falls by more than 10%
- Loss of confidence in equities as a long-term investment and preference for other forms of investment (e.g.,, property). Also, foreign investment is very important for equities – a loss of overseas confidence in the US could be really problematic for the US equity markets.
- Prolonged high interest rates kill business activity.
- Greater transparency of corporate risks leads to shareholders differentiating between corporations on the basis of their risk management experience; increased cost of risk management dampens profits for companies that are not good at ERM (deadweight cost) while boosting returns for companies that are good at it (better returns on risks undertaken). .
- Rates of return will rise through a combination of increased productivity and replacement of baby boomers by younger and lower-paid workers.
- Competition and or investor caution triggers a repricing of equities, reducing earnings multiples
- The U.S. market becomes less attractive relative to alternatives in Asia and Latin America.
- Profit margins of most US companies drop to 66% of current levels for 10 years.
- Upward spike in bond yields drops P/E ratios.
- Prolonged economic stagnation as in Japan in the 1990s.
- Low inflation
- Extended period of high stock volatility leads to higher equity risk premium
- Social security reform causes large increase in equity purchases

4. Corporate Baa Spot Yields

Foreign Affairs
- The U.S. reasserts and further develops its moral, political, and economic leadership of the west: that leadership is essentially accepted throughout the world.
- NATO, a western institution, essentially succeeds in its new anti-terrorist and I Islamic extremist role. Such problems become under control by 2008.
- Terrorism and war-related concerns trigger a flight to safe and secure investments, widening corporate spreads.

The Dollar
- Concern about U.S. dollar valuation or U.S. growth and/or a downgrading of U.S. government securities undermines confidence in U.S. corporate paper.

- Major collapse in the value of the U.S. dollar prompted by foreign investors turning away from U.S. dollar assets.

Corporate Factors
- Expanded R&D by most US companies substantially jeopardizes ability to service debt.
- A sharp deterioration or improvement in corporate earnings fundamentals widens/narrows spreads of the treasury curve.
- U.S. corporations become less/more aggressive in issuing paper relative to the U.S. government.
- Major decline in corporate profitability.
- Major increase in corporate bankruptcies.

Trade
- Very extensive trade agreements (essentially customs unions) are made before 2015, encompassing the Americas, Europe, Australia, and New Zealand.

Social Factors
- Retirement of baby boomers and resultant dis-saving will increase competition for limited savings, forcing spot yields up.
- Tax and Social Security changes are made in the U.S., before 2010 which greatly increases savings rate .
- Litigation abuses come under control in 2006.

US Deficit
- U.S. Government current account deficit increases to 8% of GDP.
- Failure to control entitlement spending – U.S. Federal budget deficit persistently exceeds 5% of GDP.

Foreign Investment
- Massive foreign investment in the U.S. resumes by 2012, because U.S. investment climate has again become attractive.

Inflation and Investment Climate
- Excessive borrowing leads to a credit crisis and high yields
- Strong and stable growth, coupled with low and falling inflation lowers yields below 4.8%
- Investors diversify holdings away from U.S. dollar assets.
- Prolonged economic stagnation as in Japan in the 1990s.
- Low inflation, responsible fiscal policy (which is never a guarantee), open trade are all factors that will keep spreads from widening dramatically.
- Extended downturn in credit cycle causes wider credit spreads

Appendix G
The Participants

ROUND 1

1. Atkinson, Lloyd
2. Bragg, John
3. Boushek, Randy
4. Bursinger, Mark
5. Chalke, Shane
6. Craighead, Steve
7. Dardis, Tony
8. Francis, Jonathan
9. Gibson, Jack
10. Glenn, Jerome
11. Gottsman, Jack
12. Halal, William
13. Hartwig, Bob
14. Heckman, Philip
15. Hughes, Barry
16. Jaquette, Peter
17. Jestin, Warren with (Stephen Malyon)
18. Jolissaint, Van
19. Karl, Kurt
20. Linstone, Hal
21. Malerich, Steven
22. Martino, Joe
23. Pederson, Hal
24. Perrottet, Charles
25. Rudolph, Max
26. Shimpi, Prakash
27. Tilley, Peter
28. Vallario, Bob

ROUND 2

1. Bishop, Peter
2. Bragg, John *
3. Bursinger, Mark *
4. Chalke, Shane *
5. Christiansen, Sarah
6. Craighead, Steve *
7. Dardis, Tony *
8. Gibson, Jack *
9. Gottsman, Jack *
10. Gould, John
11. Halal, William *
12. Hartwig, Bob *
13. Heckman, Phil *
14. Hughes, Barry *
15. Jaquette, Peter *
16. Jestin, Warren with (Stephen Malyon) *
17. Jolissaint, Van *
18. Karl, Kurt *
19. Malerich, Steven *
20. Pederson, Hal *
21. Perrottet, Charles *
22. Rudolph, Max *
23. Shimpi, Prakash *
24. Tilley, Peter *

* Indicates participants in Round 2 who also participated in Round 1. (21 out of 24)