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## Session 79TS Asset Allocation for Life Insurers

**Track:** Investment

**Moderator:** DAVID J. WEINSIER  
**Panelists:** FRANK J. CATULDO  
CHARLES FREDERICK HILL  
DAVID LANG ROSS

*Summary: Attendees learn the basics of asset allocation for life insurance companies, such as primary asset classes, asset allocation in a tax-free environment, and the impact of rating agencies on company management. Attendee benefits include an introduction to strategic versus tactical asset allocation and an understanding of the constraints imposed by various constituents.*

**MR. DAVID J. WEINSIER:** My name is David Weinsier. I work for the Atlanta office of Tillinghast-Towers, Perrin. I coordinate our asset liability management topic area, specializing in some market-conduct issues, and equity-index products as well. Before joining Tillinghast, I spent a good amount of time with ING. Charles Hill joined the financial services practice of Tillinghast-Towers, Perrin in June of 2001. Charles has more than 14 years of experience in the United States and Canadian insurance markets. He has developed a broad level of expertise in financial- and risk-management and has worked in reinsurance product development, corporate actuarial and investments. Most recently, Mr. Hill was with the Canadian operations of Employers Reinsurance Corporation acting as their appointed actuary.

Frank Cataldo is a vice president within the insurance advisory service unit of Conning Asset Management, where he is responsible for providing asset-liability and integrated risk-management advisory services to life insurance companies. Prior to joining the firm in 2001, Mr. Cataldo was an actuary for the Travelers Insurance

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**Note:** The chart(s) referred to in the text can be found at the end of the manuscript.

Company, responsible for pricing and asset/liability management for institutional investment products.

Finally, Mr. David Ross currently heads up the asset liability functions at Maritime Life, a subsidiary of John Hancock. Mr. Ross joined Maritime in 1983 and has held various positions throughout the company. Prior to accepting his current role in 2000, he was working in the investment division, managing their derivative portfolio.

**MR. FRANK J. CATALDO:** I'm here to start the session off by giving you an idea of how life insurance companies have invested their assets historically up until 2000. The presentation is going to be based on Conning's investment profile as a life insurance industry. There's an annual study that they've been doing for three years now.

I'm going to focus on investable general account assets. The study also covers separate account assets. I'm going to try to focus on general accounts. Investables are the assets that an insurance company actually has a decision on. It excludes things like affiliated stocks, common stocks, affiliated-preferred stocks, and occupied real estate, because those are more structured finance decisions. It also excludes policy loans because that is more of a policyholder type of decision. The study covers companies reporting over \$200 million in premium and deposits in 2000. That covers about 252 companies and about 94 percent of life insurance company assets.

I'm going to start off by talking about two very broad categories, fixed income and equities. Fixed income includes cash, mortgages and preferred stock. The equity category includes common stock, real estate and schedule BA assets. In these two broad categories the mix has been pretty steady at around 95 percent fixed income and 5 percent equity throughout the time of the latest study, 1996 to 2000. It really hasn't moved very much at all. Within the broad investment mix, the study also looks at stock companies versus mutual companies, and life companies versus annuity, versus accident and health (A&H). Basically, a product peer group is defined as a company that has two-thirds or more of its premium and deposits in a particular product line. This will probably be the last year that mutual companies are separated from stock companies. So many of them have demutualized, particularly in 2001, that there really isn't going to be a big enough study to provide meaningful results.

Within this broad mix, stock companies generally have more of the fixed-income assets and mutual companies have more of the equity investments. Within the product peer group, life companies have the highest allocation of equity at nine percent, while the reinsurance companies have the lowest, around two percent. Generally, larger companies tend to have more equity investments than smaller companies.

Within the fixed-income category, there are bonds, mortgages, cash and preferred

stock. The largest group is bonds, at 77.1 percent, followed by mortgages, at 13.4 percent. Since the early '90s, bonds and mortgages have been very steady. That wasn't always the case. Before that bonds were as low as below 60 percent and mortgages were more than 20 percent. A lot of problems occurred in the late '80s and early '90s and companies reduced their allocations quite drastically, but since that time they've stayed pretty steady.

Within bonds, structured products are also included. By structured products I mean the mortgage-backed securities, collateralized mortgage obligations (CMOs), commercial mortgage-backed securities and asset-backed securities. As a percent of bonds, the largest, ranging from 70.6 percent in 1996 and growing to 72.2 percent in 2000, is the issuer obligations. That's the typical corporate bonds and treasuries. Next are the single-class mortgage-backed and asset-backed securities, which dropped from 8.7 percent in 1996 to 6.9 percent in 2000. Then, there are the multi-class that are split into commercial, which ranged from 13.6 to 12.5 percent between 1996 and 2000, and residential, which deviated 1 or 2 percent a year starting at 7 percent in 1996 and ending at 8.4 percent in 2000. The difference between a multi-class and a single-class is a multi-class tranches up the payments. There's more option risk in the single-class mortgage-backed securities and asset-backed securities. That class has declined over time.

The mix of the low investment grade has increased over time from 5.5 to 7.7 percent, and the majority of that are the fallen angels. That's really what's driving that. Life insurance companies generally don't invest very much in below investment grade. Very rarely do they invest in the lowest classes, which are the NAIC 5 and 6s, and they may invest a little bit in the NAIC 3s and 4s, but the growth of that is primarily due to bonds falling from the investment-grade classes into the lower ones. Mutual companies tend to have more of the below investment grades than stock companies. In 2000 it was close to nine versus 7.5 percent. By peer group, the life and annuity companies tend to have the highest allocations, at 8.3 percent, and accident and health companies have the lowest allocations, at 4.6 percent.

Within the investment grade category, NAIC 1 class bonds were at about 69 percent with NAIC 2 at 31 percent in 2000. The NAIC 2, which are BBB bonds, has grown from only 25 percent in 1996. I think that growth is driven largely by the search for yield. As interest rates are falling, companies want to keep their portfolio yield up so they might move more into BBB assets. In the peer group mix, life and annuity companies, primarily those selling interest-sensitive products, tend to have the most in the BBB category, as a percent of investment grade, at 34 percent. The accident and health companies tend to have the least, at 24 percent. Mutual companies also have more NAIC 2 than the stock companies, 34 versus 31 percent. There's a common theme that runs through this in that the life and annuity companies tend to take on more risk, and mutual companies tend to take on more risk.

Within the mortgage category, it's steady at about 13 to 14 percent since 1996, and like I mentioned earlier, that wasn't always the case. There were much higher percentages in mortgages in the past. That's down significantly from historical levels. The vast majority of that is commercial mortgages. Commercial mortgages still represent 92 percent of mortgages.

Now, we're a little surprised, to be honest with you, that it's as high as 13 to 14 percent in mortgages. Generally mortgages have low liquidity, and over this time period the spread has tightened quite a bit versus other fixed-income classes. So, you're not getting paid as much for the low liquidity as you used to, and there are some alternative asset classes in the bonds category. There are all the structured-type products that will still give you exposure to mortgages and they have a much better risk-based capital (RBC) treatment. Mutual companies again have tended to allocate more to mortgages than stock companies at close to 15 percent, and accident and health companies again tend to have the lowest, at 2.2 percent. Life and annuity companies have the highest allocation at almost 15 percent.

Now, I'm going to move on to the equity group. Schedule BA is actually the highest within that category, at 2.7 percent, and then common stock, at 1.7 percent, and finally real estate, at 1 percent. An interesting thing with common stock is that the percentage has fluctuated over time, down from a peak at 2.2 percent in 1999, but it's still relatively low. The interesting thing is between 1996 and 2000, the Standard & Poor's (S&P) went up around 98 percent, but company allocations have not kept pace with that. Essentially they've been reducing their position over time to stay within this very narrow band of common stock allocation. Why has that happened? I think a large part of it is the high accounting volatility associated with common stock. Life insurance companies in general have fixed liabilities, and the equity bouncing around all over the place really wreaks havoc with the accounting. Another thing is the 30 percent RBC, that's a big hit.

Investment real estate has been falling. It was 2.3 percent in '96 and dropped to 1 percent in 2000. Actually, the study has a separate chapter that groups the mortgages and the real estate together and describes a lot of things that have been happening. They mirror each other—especially in the experience prior to the early '90s and later. Investment real estate is falling out of favor because of the limited liquidity and the high RBC. Insurance companies have found alternative investments. They invest in real estate investment trusts (REITs), or some of the schedule BA assets might be real estate related.

Schedule BA assets, the last group I'm going to cover, has grown quite a bit over time, from 1.4 to 2.7 percent. The larger companies tend to invest a higher percentage than the small companies do, and for them it represents a shift away from common stock. They get better treatment and still get exposure to high growth.

There are several key points to my presentation. First, over time there's been a

shift from option risk to credit risk. Prior to 1996 the mortgage allocation dropped, and there's also a higher allocation to lower-quality bonds. That's how companies are making up yield. The second key point is that there's also an interesting, very limited common stock allocation that occurs over time. Finally, mutual companies have tended to have riskier investment portfolios than stock companies.

**MR. CHARLES HILL:** For insurance companies, as has been pointed out, asset allocation is about stocks versus bonds. We invest in fixed-income assets and I want to get at the question of why no stocks? I'm going to try to get at that issue, and talk about some of the issues that drive that.

I worked in the investment management business for about five years doing insurance company asset/liability modeling (ALM) portfolio management. Speaking with the other investment professionals, we would always have these discussions about why insurance companies don't invest in stocks. The easy answer is the horrendous capital requirements. Therefore, the extra spread you need or the extra return is prohibitive. However, I think it really is deeper than that.

I've put together a framework that I think helps explain how you would invest your own money, how a pension plan would invest its money, and how we, as insurance companies, invest money. The checklist, or key driving factors, are what they call economic risk, leverage risk, earnings risk and capital requirements. I think there's more than just capital, so I'm going to talk about each of those. Then I'm going to apply that framework to how individuals allocate their assets, how pension plans allocate their assets, and then finally look at a life insurance example.

So when I refer to economic risk, I'm talking about cash flows. When we talk about stocks versus bonds, everyone knows where the cash flows are. For stocks, the cash flows are dividends, plus realized capital gains when you sell. For bonds, the cash flows are coupon payments and principal payments, so it's pretty easy to look at that. When you're looking at your own money or your pension plan, if you do any research on asset allocation, you typically encounter two primary universal truths. The first is that stocks are riskier than bonds, and the second is that stocks outperform bonds in the long run. There is tons of research on this. We don't see a lot of it in the insurance industry because we're so busy trying to figure out whether we should be in mortgages or A bonds, or that sort of thing, but there are some very controversial issues out there for pension plans in particular about whether stocks are going to outperform bonds or not. That boils down into this term called the equity risk premium. There's a lot of interesting research on that right now.

The equity risk premium measures the excess return from holding stocks over bonds for some particular holding period. Usually the studies that you look at compare the nominal rate on stocks to the nominal rate on bonds, so the spread or the equity risk premium is on a real basis. So, inflation backs out of both things. But some studies look at stocks versus inflation and look at real spreads on that basis. So when you do any research in this area, you have to be careful. There are

many different definitions of the equity risk premium. For example, on the bond return, some people use a one-year Treasury bill, some people use a 10-year Treasury, and some use a corporate bond index. The returns can be arithmetic year by year or they can be the compound geometric return. The bond return can be either the total return achieved over that particular period or it can be just the initial market yield available on the bonds. So you have to be careful when you look at these things, but the general idea is trying to measure the excess return that's out there.

The real difficulty is when you look at it historically. Ibbotson Associates produces data that everyone seems to refer to when they're researching this area. They show that in the last 75 years stocks have outperformed bonds by more than five percent. This is a so-called historical equity risk premium, and a lot of pension-plan allocations and individual investments are driven by it. There are periods of time where you actually see bonds outperform stocks, but over a long period of time that appears to be what has happened.

However, there are some real heavy weights that have come out and essentially said that, going forward, we shouldn't expect anything near that level. Essentially the consensus, even among the pessimists, is that the range going forward is more like two to four percent. It's not going to be five percent; it's going to be something lower than what we've seen historically. Some of the more recent and better-written articles present the pessimistic viewpoint.

One is called, "The Bubble Has Not Popped." That's by someone named Clifford S. Asness. You can pick up that paper for free at the AQR Capital Web site ([www.aqrcapital.com](http://www.aqrcapital.com)). That paper was written in October 2001. In the March/April 2002 version of the *Financial Analysts Journal* there's a paper by Robert D. Arnott of First Quadrant and Peter L. Bernstein, who has written books on risk and is very well respected. They've got this paper called, "What Risk Premium is Normal?" They conclude that a normal risk premium is 2.4 percent going forward, but you have to get to a normal starting point in the market first. They suggest that today the equity risk premium is actually negative or close to zero. In the actuarial domain, Richard Q. Wendt recently put something together that's in the February 2002 *Risk and Rewards* called, "Understanding Equity Risk Premium." Finally, in a real authoritative journal, the *Journal of Finance*, Fama and French have also done a lot of work in this area. I think the article was called, "The Equity Risk Premium".

So if you want to research, those are the most recent papers that are pretty good. What you realize when you look at this is there is this notion of a normal equity risk premium, but a lot of what these researchers are saying is that the current market is over-valued. This flies in the face of a lot of our schooling and the belief that markets are efficient. So when you're doing asset allocation, it becomes clear when you read some of these papers that there is some sort of requirement to make an assessment of what the starting point is in the market that's actually over- or under-valued. That's not typically done.

The second major piece of an asset allocation framework is what I call leverage risk. Essentially, I'm trying to get at the concept of borrowing money to invest against some small amount of capital. Leverage comes from a concept like a teeter-totter, which has two equal weights and a fulcrum in the middle. The closer you move that fulcrum to the other end, the more you can lift. That's the concept of leverage—using a small amount of capital to support a much larger risk. So when we borrow to invest, the money that policyholders gives us, our liabilities, are a form of debt. What investment management or asset allocation becomes about in that context is that when you have leverage, the more mismatch there is between the term of how you invest and what your debt is, the riskier that proposition. In fact, all of our work in the insurance industry is really about this. We're using other people's money, we have a significant amount of leverage in our business, and we can't afford to have large mismatches between our debts and our investing activity.

The longer the term of your debt, the more basis risk that you can handle. So you can absorb the short-term differences between your investing activity and your liabilities. They're going to average out to something more predictable. In addition, the more capital you have or the less leverage there is, and the more basis risk you can handle.

The third piece of the puzzle here is earnings or earnings risk. If you're an individual investor, you don't report earnings, so it's not really a relevant piece of that framework. For corporations and insurance companies, earnings clearly affects management through bonuses and share prices and possibly other things like covenants, loans and different triggers. They also impact your ability to repay any debts that you have or pay dividends or make further investments in your business. So those are the kinds of things that go into being concerned about earnings. For corporations, not individuals, there's a general feeling in the capital markets that the more stable your earnings are, the less risk there is in the business and the better managed it is, and therefore, share prices will be higher.

Finally, capital is obviously the big one that drives the asset allocations for financial institutions. It's explicitly required through things like the NAIC formula and that's required to have confidence by the public in a system that is going to be there to pay when it's needed. Obviously there is ongoing work to identify additional risk that the financial institutions are taking. The objective is to keep the probability on solvency, not to zero, but to some reasonable minimum. In other types of corporations, there is an implicit capital requirement when you look at stock analysts' reports and rating agency reports. They look at a company and examine not only the earnings from its business, but the other resources that that corporation has to pay its debt. So in fact, the better capitalized the company is, the better the ratings are. So it is sort of implicitly there for non-financial institutions.

So let's look at how these four factors apply to individuals. Economic risk, which is

whether stocks will outperform bonds, is very high. That's really the only issue that's there. Leverage risk doesn't really exist. There are hedge funds where they'll actually do some leveraging for you, so you can get it if you want, but generally it doesn't exist. Earnings risk, I think, is very low or zero, and there are no capital requirements. So when we look at investing our own assets, it's all about what's going to out-perform. So when you go around and search the Web and look at asset allocation for individuals, you'll find all these investor profile tools that insurance companies and mutual fund companies have to help you navigate through this decision. They'll ask a bunch of questions, such as, "Are you comfortable with investments that might go down in value from time to time but offer the potential for higher returns?" and "How do you react if you suffer a temporary 10 percent loss on your investment?" There are usually five to 15 questions. What I generally find is that there is a little bit of a bias in the questions. I think that's hard to assess, but there is a general bias in these questions that really gives you the impression that stocks will outperform bonds. I think they point out that -they will be risky in the short term, but if you can stomach those fluctuations and hold on for the long term, then you should be more into the stocks. I think the better way to approach it, and some companies do this, is to show you a profile. They'll say, "Here's three different plans, pick one of them that you're most comfortable with." In the plans they'll show the average return and then show the best- and worst-case scenario.

They ask questions about your investment objectives, the time horizon, how long until you need the money, and that sort of thing. Some of the most interesting questions are all about risk tolerances, which are stylized questions that get at how much risk you can stomach. They put this in the calculator, and they come out with a profile for you that slots you into the aggressive, moderate or cautious investor. Based on that, almost all of them put you in the stock fund if you're aggressive and balanced funds and bond funds and so on down to short-term funds. That's what is going on out there for individuals.

As you can see in Chart 1, this goes back to 1990. This is data provided by the Investment Fund Institute, I think. This represents all of the mutual funds in the United States. I think there's about \$7 trillion at the end of this. This is tracking asset allocation by individual investors in mutual funds over time. This is not looking at the name of the fund, it's actually looking at the holdings of all the funds itself. It's getting at the actual asset mix. What we can see is that stocks went from 20 percent in 1990 up to almost 60 percent at the end of 1999 and have scaled back. What's interesting is there's been a movement out of bond funds and people really haven't gone back, but rather they've sat more on the sidelines. So as people pulled away from the stock funds, they got into the short term, not back into bonds. Obviously people have looked at what's happening in the S&P and the bull markets going on and they keep getting sold about stocks outperforming bonds.

So what about pension plans? By pension plans here, I'm not talking about defined-contribution plans, in which you decide the asset allocation personally; this

is defined-benefit plans. I find it interesting because the defined-benefit plan, which is supported by a corporation, typically is making many of the same promises that we make on products like annuities. They're promising to pay certain benefits at retirement. I keep trying to figure out why pension plans can be 60, 70 or 80 percent in stocks when that doesn't work for insurance companies. It's pretty much the same kind of promise. So when you apply this framework to pension plans, you find that economic risk is high. It's the same thing for everybody trying to figure out whether stocks will outperform bonds. Leverage risk is what I would call medium, to the extent you view your promise to an employee or a former employee as a promise. That is a true liability, but they don't tend to think of it and not all of these things are even on the balance sheet. So you're not really playing with someone else's money, you're playing with the corporation. That makes it kind of a medium factor in my opinion. Earnings risk is also medium. What you find when you look at pension plans is that they have financial reporting that's very different than what we're used to and we should be very envious. They generally are allowed to smooth earnings over a five-year period, which is great when the market's going up. They don't reflect it at all in their funding requirements, but when the market's going down, it's also a little bit lagging. As for capital requirements, they don't have any.

So the key points here are that the accounting actuarial methods allowed for smoothing of actual investment returns, and we don't have that. When they predict or calculate the funding requirements for the corporation going forward, they're actually allowed to front end that equity risk premium. They're allowed to use that in their discounting. We can't do that. There are no capital requirements, however there are guarantee fund assessments. That's not all bad. These liabilities are long-term liabilities. With demographics changing, they are getting closer to being more in the payout phase overall, but they are long-term. Another key factor here is that they're illiquid. There's no possible run on the bank or cashability to these kinds of pensions. So it's similar to annuities that we would sell, but for some reason pension plans are regulated and report on a very different basis.

I went on to a Web site of one very large pension plan that has a large, very significant defined benefit plan for their employees, and I looked at it going back to 1991. I looked at 1991, 1996 and 2001. With their asset allocation, they've gone from 80 percent bonds to 80 percent equities. They're even doing things like hedge funds. I'm trying to figure out why can these guys do this and we can't. And at the same time, the surplus in this particular plan went from being unfunded to being over-funded. They generated a surplus and have been able to enhance benefits for their plan members. Obviously it's a result of the bull market that has happened, but if you think about the pieces of this framework, they've got a very different, very unusual reporting system. They have no capital requirements and they're able to do things very differently.

The good news for pension plans is that they have bet on this bull market and won. The bad news is that a lot of these plans have not reflected the recent downturn in

the market. If returns are averaged over five years, then the last two years the S&P's gone down 30 percent. Only a fraction of that is reflected in their funding requirements. What you see coming are things like the new financial reporting requirement in the UK. It's called FRS 17. Essentially, it requires no smoothing. It's a mark to market on the balance sheet for a corporation, for these kind of benefits. What you're seeing in the headlines if you do a search on this on the Web is that major pension plans are completely out of equities back into bonds. It's not just one company. Every day or every week there's another company that's done that. So clearly, the mark to market or earnings implications of equity volatility is a significant factor in asset allocation.

The bad news is also that to the extent that these individuals have dramatically increased their allocations in the stocks and so have pension plans, any sort of rush for the exit will further exacerbate the downward pressure on stock prices. Furthermore, if you look at a lot of these plans, some of them now have a majority of their liabilities for retirees, not for people who will retire in five or 10 years, but for people who are actually in retirement. So the liabilities are becoming shorter term and more certain in terms of their amount.

I looked at this information and I said it's great for pension plans that they've bet and they won, but there's some risk in there. Clearly this is the kind of trouble that we've avoided as an insurance company. So I looked at the Pension Benefit Guaranty Corporation. This is the corporation that bails out pension plans that go bust. The plan at the end of 2001 covered 33,500 single employer plans. It's now trustee to almost 3,000 under-funded plans. That's nine percent. Imagine if nine percent of the business that we ever wrote as insurance companies is now the responsibility of the guaranty corporation. I think that would be unacceptable. In 2001 alone there were 100 new plans that went belly up, and in their annual report they say there appears to be no end in sight for this kind of thing. The assets of the guaranty corporation itself were \$23 billion at the end of 2001 versus liabilities of \$15 billion. So, they now have a surplus, which is great, but it fell by \$2 billion in 2001. But, like the pension plan I discussed earlier, since 1992 they've actually bet on equities and have been able to eliminate the deficit that they had. It was a negative \$3 billion at the end of 1992. That's good. You look at this, you look at the way they report and smooth earnings, and you look at the way things are valued, and I think there's some cause for concern. This is the kind of thing that we've avoided.

Now, what about life insurance companies? Economic risk is exactly the same. Leverage risk is high. In most lines of business, it's an annuity. Someone gives us money and we've got to invest it to match. There's a very high degree of leverage that requires a close matching between the investing and the debt. There is obviously no leverage with the capital and surplus itself, so there's a different way to think about how your capital and surplus is invested. There you get into more of some of the other issues. Another point I wanted to make is when you look at something like XXX reserves and you truly view the excess or the GAAP reserves

as being redundant, that's just another form of capital. You're not playing with someone else's money, you're playing with your own money. So even though it is a liability or a debt, you're playing with your own money and there isn't leverage there. So that some different thinking to the table on investment or asset allocation.

Earnings risk is high under stat and GAAP. If stocks go down 20 percent, then you get creamed. Finally, we all know what the capital requirements are. Whether it's the NAIC or the S&P formula, I think it comes back to common sense. A lot of companies run their own assessments of what the capital should be, and a lot of the time they're in the same kind of ballpark on this stuff. What is dangerous is if you look at something like variable annuities. There have been no capital requirements and so people have written the business partly based on capital arbitrage. Now the capital requirements are coming, and companies that didn't price for that are going to be really hurt on their in force.

The way that the assessment of capital requirements is going in the future is toward do-it-yourself. In the UK they have this legislation that puts this all back in the companies. They say, "You do the modeling, you come and convince us that you have all your risk covered and you've made appropriate provisions for that." So I don't, personally, get too hung up on looking at the RBC formula or the NAIC and looking for arbitrage. It really comes down to common sense in the long run.

The next thing that I want to do is give this example of an insurance company that has to somehow solve the earnings and capital problems of investing in equities. I want to look at the economic issues there. First I want to pay tribute to a guy named Andrei Markov. I'm going to refer to him in my example. He was born in 1856 in Russia, and he essentially proved the Central Limit Theorem. He's most remembered for his study of Markov chains. These are essentially sequences of random variables in which the future variable is independent of the state of the variable or the path that led to that. This all led to the theory of stochastic process. So in a way, this guy is sort of the grandfather of stochastic modeling.

My example focuses on a company in which the actuary at the end of 1997 goes to the CFO and wants to talk about asset allocation for structured settlements. It's structured settlements because they're very long duration, they're very illiquid, they can't be cashed and if there's a place where you're going to contemplate putting equities, it's going to be at the long end of that kind of product line. So the actuary says, "Let's match our non-cashable, long-tail liabilities with equities. I found a way to do it with minimal RBC and smooth earnings." So maybe he came up with some structure.

The CFO says, "No, it's too risky." The actuary replies, "The stock return in 1997 was 33 percent as the S&P, 23 percent in 1996, and 38 percent in 1995." The CFO says, "No." The actuary comes back one year later at the end of 1998 and tries again. The CFO says, "No." The actuary says, "The return in 1998 was 29

percent, that falls under 33, 23 and 38; we're missing the boat." So the CFO says, "Maybe." He says, "Why don't you do the greatest stochastic analysis of all time? Show me the risks and rewards assuming a 30-year holding period and make me a proposal." So the actuary says, "Yes, boss." So during 1999 the actuary consults with Dr. Markov at the University of St. Petersburg and together they research the equity risk premium and they put together a fantastic stochastic analysis showing the distribution of annual returns of holding equities for 30 years. They decided that they'd be conservative using an equity risk premium of 3 percent and long treasuries yielding 6 percent. So they end up with an expected or mean return of nine percent and they use the volatility of 18 percent. Then they generate one billion stochastic scenarios. So this was as good as it gets.

They came to management or the CFO and they showed him this cumulative probability distribution. If you think about six percent as what they can lock in by investing in long treasuries right now, they showed that 80 percent of the time they're going to beat that yield by holding this for 30 years. This is a slam-dunk. In fact, the annual return is never negative. However, they say there is a little bit of short-term risk here. We just want to make sure you're aware of that. So let's look at what the distribution of returns could be. After one year there's actually a 30 percent chance that we're going to have a negative return, so that's a big number. After two years there's still a 25 percent chance that we could be in negative territory. But by the end of 30 years we're going to have that first distribution to show you here. So on January 1 the CFO gives approval and they put 100 percent of their assets into equities backing the long tail. Everybody's totally pumped up not only because of this great stochastic analysis, but the S&P just went up another 21 percent.

One year later the S&P is down nine percent and people are kind of stressed out. So they ask the actuary and Dr. Markov to give an update on their analysis.

So what they show is Chart 2. They say there was our original projection, but given that we're off nine percent, we're still expecting nine percent going forward, but the 30-year distribution is now a little bit lower. It has gone from nine down to 8.5 percent. The CFO asks why the distribution has changed. Dr. Markov explains that while the market's sufficient, and going forward we have the same expectations of return, we're at  $-9$ , so now we're only expecting the same nine. The CFO asks if we have  $-9$ , shouldn't the mean going forward be a little bit higher to get back to the nine percent? Dr. Markov explains that that is not the way things work. So they all go away puzzled. One other footnote that Dr. Markov notes is that he is getting a little bit concerned about the three percent equity risk premium. Updating his analysis and factoring in the  $-9$  percent that just happened, he's thinking that it is maybe a little bit too aggressive now, but they stick with that.

One year later the S&P is down again and now there's a cumulative two year loss of  $-20$  percent and Dr. Markov comes in and does the same update and shows that using the same assumptions, the distribution's now changed to Chart 3.

Chart 3 shows what they expect at the end of 30 years, but he says he is no longer comfortable with the three percent equity risk premium. It's probably now closer to two percent.

So, the distribution shifted down in Chart 4. So now, the mean of what we were expecting is 6.7 percent. Everyone's extremely confused. They thought they were going to average out to this nine percent and we had this nice distribution and it has completely changed,. I'm just trying to highlight the difficulty of communicating some of this stuff and what can happen in reality.

Here are my overall conclusions for life insurance. I think that we've essentially painted ourselves into a corner. We have the worst financial reporting and capital requirements compared to anyone else. No wonder we're 95 percent in bonds, and here I'm thinking of the long-tail part of our business. We write a long duration business and why don't we have the framework that accommodates being in those sorts of things? For example, if you look at FAS 133, you could actually try and describe an equity investment as a perfectly effective hedge for a 30-year cash flow. If you look at that framework and try and apply those principles, maybe you can get a hedge accounting for a straight equity investment. Can we lobby for smoother earnings and lower capital requirements where equities are matched against long-term liabilities? Maybe as we move to a do-it-yourself capital framework some of that stuff will be possible.

I think another positive spin on all this is that this could actually lead to a viable annuity business. Presently there is tons of money coming into the payout phase and the immediate annuities that we sell just aren't competitive. We're going to need to get into these asset classes and this kind of framework in order to be able to offer competitive products.

Finally, the last point is if you're going to be a good chief risk officer you've got to think out of the box about what could happen. I put forward that maybe the market is still well over-valued and I think there's implications there for variable lines.

**MR. DAVID L. ROSS:** My presentation is going to take a little bit of a different tact. It's going to assume you've done the macro allocation process, you've talked to your various experts, you've talked to your investment personnel, and you know what the company's optimal asset mix is going forward. So what's left is the process of trying to divide that among the business units while insuring that you still meet the company's targets.

My talk is going to discuss the decision and what's involved in segmenting your liabilities, how to insure that you have effective communication among the various parties, and, then finally, cover the task of asset allocation. During the presentation I'll touch on any reporting or adjustments that are needed as you move along to

make sure that everything stays on track.

Generally speaking, ALM is a shared responsibility with the business units on one side, the investment portfolio managers on the other and you sit in the middle and you translate and take information from the two sides. You make sure they understand each other and you keep everybody well informed in the whole process. ALM itself usually has primary responsibilities for the day-to-day business of keeping the company risk-free or optimizing its risks where you're doing that, and that would include the process of allocation. The more strategic issues are usually subject to some sort of an ALM committee that has senior representation from the board, the business units and the investment managers. That's the sort of business model I'm going to assume you're working under.

Why segment? That's the first question. If you don't segment your liabilities, then the sum total of what you have to do is make sure you've given proper instructions to the portfolio managers with respect to the kind of volume of assets they need so that you get at this optimal asset mix. On the other hand, if you're going to segment, you still have that exact same goal, but now you have the competing needs of all the business units who obviously have their own agenda when it comes to the assets. So why segment? You segment for statutory or regulatory requirements such as the par versus non-par, or life versus health. You do it to value the policy liabilities in accordance with generally accepted actuarial practice, however that's not technically true in Canada any more. The new Canadian asset liability valuation method doesn't require you to segment. You do it to measure the performance of the business units and to keep track of distinct or unique investment matching strategies, such as variable annuities, universal life, and equity-linked GICs. For policyholder reporting if you're doing third-party management, you probably want to establish a separate segment for that. Finally, just to get a good or better understanding of profit emergence.

Materiality is a consideration. If you're not required to segment, you should only be doing it where the cost-benefit equation works for your company. That depends in large part on the quality of your systems and how easy or expensive it is to set up a segment or to run a segmented balance sheet.

If you set up your segments properly, you should find that they roll up nicely. As long as you have a many to one relationship when you start down at the product level and roll up to the total company, your reporting will fall out nicely. You want to avoid having a segment that points to more than one business unit and/or a product that rolls up into more than one segment. If you do this, then you can't get at your system or your information systemically, and that's going to complicate your reporting.

The ALM work itself is going to take place at three levels. It's going to take place at the segment level to insure that you meet the objectives of that segment, at the business unit to optimize any risks and profitability, and then finally at the total

company level. At the total company level you're looking to make sure that you are still on track for the optimal asset mix and you're trying to make sure that you're not managing the segments with blinders on where there may be natural offsetting risks within those segments. You want to do a high fly by at 30,000 feet and make sure you take advantage of those.

One of the biggest steps and one of the most important steps is to set up segmented investment objectives. These are essentially mini investment policy statements. They need to be clear and measurable so that you can accurately quantify how good a job you're doing at managing them. With respect to the segments themselves, they need to be fully defined. That would include a rationale for why you have a segment, a look at a thorough description of the liabilities, including any optionality that might have been sold and what the optimal asset mix to back that segment would be including any credit risk appetite. You also want to evaluate what the liquidity requirements are, and any other ALM metrics, like duration targets, partial duration or convexity. You also want to line up the reporting frequency that's going to change by segment. If you've got a stable segment like whole life or you have a closed block of business that's running predictably, then possibly getting together every month or once a quarter with the business units to discuss things is fine. If you've got GICs or institutional investments you're going to want to get together with them daily or weekly to monitor any issues that have come up in the markets.

The last one, and this is one of the more important ones, is that you need them to be internally consistent. Once you set all this up, you want to make sure that when you then evaluate and roll up all these asset needs, they're actually going in the same direction as the rest of the company. Sometimes you've got to go back to the business lines and that involves some give and take on their part. At this point there's no give and take on the investment side. The investment people have decided what the asset mix is going to be and you've got to work the business units in to make them understand that direction and make sure that the whole thing rolls up smoothly.

The communication process is circular in nature. Basically, you start off with getting liability cash flows from the business units. You know the assets that are already backing those and from that you can determine what the new asset needs are for that segment going forward. You overlay that with the segment investment objectives and you have a complete picture by term and asset class of what that segment needs. You roll these all up and you take them over to investments. You don't take over all that detail, because, generally speaking, your investment guys aren't interested in all that detail. So, you roll it all up and you get a picture of the total volume of assets that are needed at the various points on the yield curve and you sit down with the investment people to try to determine what sort of yield or spread over the benchmark curve they can get you for that. At this point you don't want to handcuff them. So they're going to say to you, for instance, we can't find five-year money. Nobody is interested in five-year money, so we're not going to be

able to give you much in a way of a return at the five-year level.

On the other hand, you can back up the truck in ten-year; we can add all kinds of value there. So you discern from that what I call the investable returns and that's just strictly letting them have their reign, with what kind of returns can they give you on various points in the yield curve. You overlay that with the ALM returns, which are the derivatives necessary to make sure you're handing back to the business lines the profile of cash flows they're looking for. From that you now have a fully robust pricing curve that you give to the business units and they use that to post their accredited rates. This continues on. You just keep going through this, through whatever reporting cycle you happen to have, whether it's weekly, monthly or quarterly, and you keep following it up as necessary.

That leads us to the asset allocation process. Effectively, whenever the new asset comes on board, be it a renewal or a new fixing, or whenever investments are going to fix rate on something, you need to find the best place is to allocate those new funds. Well, you already know what the needs of the business lines are—you've developed those fully. You know the profile of the asset that's coming in and it's quite simply a process of knowing both sides of that equation. You set up the optimal allocation for that particular asset. Because you've done all the legwork, the actual process of splitting it up is quite simple. You need to establish an allocation protocol with your trading area. The reason for doing this is that investments tend to come in rather lumpy and the asset needs of the lines are usually fairly steady, so you need your trading area to be moving in and out of government bonds to make sure you're not exposing yourself to any interest rate risks.

You can't communicate enough. It's really important—the more advanced information that you can get from your investment guys, the better. If you know two weeks from today that they're going to fix rate on a private and you have a thorough description of that private, you have all that time to make sure that you're perfectly prepared for where you're going to place that new asset. You can also overlay any distinct philosophy your company may have here. If your company's philosophy is to treat all the segments in the units equitably, then you just have to make sure that each asset that comes in is divided up so everybody gets a nice good cross section of all the new assets. On the other hand, the company may want to make sure that all of one asset class or the higher spread assets go into a certain product, because that will give them a competitive advantage, and be able to bring in some funds, as long as you know that in advance, you can set that up to run as well.

Finally, assuming that your trading desk has kept you well matched, then the last thing you have to do is to evaluate the cash flows that have come in, the actual assets that are on board, as well as whatever trading the desk has done in terms of government bonds or futures. That's where you're going to now overlay your permanent derivatives so that the profile of the cash flows that you're sending to

the business units is what they expected.

Maritime Life is a Canadian company with a U.S. parent, so as such we've got to report on your two distinct bases, Canadian and U.S. GAAP. That adds some complications to our life. This is a good news/bad news kind of story. The good news is you may have a sophisticated investment accounting system that can handle multiple allocations. Those are out there. They're still a lot of work because you have to set up all the processes to handle that, but the systems do exist. Once you set up all the groundwork, everything should roll out nicely.

The bad news is your system can't handle it. We fall into that category. Our system can only handle one set of allocations, so we need to come up with some way to approximate those results. At the end of the day, you still have some decisions that you have to make. Even if your system can handle multiple allocations, you ultimately have only one bond. You can only buy or sell it once, so you have to decide under which basis you're going to make your optimal business decision. That involves a bit of a reality check. So, in our case, we try to do things that work under the Canadian GAAP basis. That's our reporting basis. At the same time we have to be aware of what's going on on the U.S. GAAP side. If it wins on both sides, that's great; we do it and we move on. If it works under Canadian GAAP but doesn't work under U.S. GAAP, then we try to see if there another way we can accomplish what we'd like to do under the Canadian GAAP that minimizes some of the implications for our parents.

I'm going to assume your system can't handle it at this point, because if it can, as I said, you have a systemic approach to it. Under the two bases, the definition of both your assets and your liabilities, and hence, your surplus, are different (Chart 5). Under Canadian GAAP you may have \$100 million of liabilities, but under U.S. GAAP it's \$125 million or it's \$90 million. So what you need to do or what we do is effectively we adjust for this in our surplus account. For every segment we determine the amount of difference between the value of those two sets of liabilities and we set up what we call a mirror segment in our surplus account. Those can be positive or negative. Effectively, if it's positive, it's stealing a piece of surplus to send it over under U.S. GAAP and vice versa if it's negative. Now, when we go to do our reporting and we roll up under our regulatory Canadian GAAP basis, a large rectangle on the left, the surplus box, includes all those little mirror segments (Chart 6). The investment income from that is the Canadian GAAP investment income for surplus.

When we report under U.S. GAAP, all we end up reporting is the surplus star here and each one of the mirror segments. The investment income from those flows through to the liability segment that created it, so in effect we end up creating the correct investment income for each of the segments under both regimes. While not perfect, we find that this works pretty well in practice.

Finally to wrap up, if you have well-defined, segmented investment objectives, then

a good part of your job is done. It's a fairly painful process to go through with the business units, but once it has been established, everything tends to flow out quite nicely from that. Again, communication is very important and it doesn't always have to be a formal thing. Just setting up regular get-togethers where you can share ideas is very helpful. Because you're sitting in the middle, as long as you're fully aware of the issues, constraints and opportunities on each side, then you can be nimble enough to change your allocations as you move along and keep the company going in the right direction. You want to circle back as often as you can. Obviously there are system constraints and limitations to that, but looking at things daily is better than weekly, which is better than monthly. The more you can look at it, the better. If you're only reviewing your whole allocation and your ALM issues on a quarterly or semi-annual basis, then things will have had a lot of time to fester. And the markets, as we all know, don't stand still.

**MS. KITTY HSAIO-YUAN CHING:** I have a quick question regarding alternative investment strategy. I haven't heard much discussion about that new asset group, but I think some Asian companies have been investing a little in that type of group. I'm not sure if any of you know what type of assets are under that kind umbrella and experience in general so far.

**MR. HILL:** Those type of investments, I think, generally would be reported under schedule BA, and schedule BA has grown over the study that I was showing. I don't know particularly what within schedule BA may have been going on. The majority of them I think are joint ventures generally in schedule BA, but I don't know specifically about the type of assets you may be asking about.

**MR. HILL:** I would expect that other companies do, particularly large companies. I think a lot of companies have kind of moved into these alternative investments. As I mentioned before, people moving out of common stock into schedule BAs and alternative investments like that, would be in that category to do the same things that you mentioned. They're expecting good, long-term returns, and I've seen things about hedge funds and lower volatility and these output funds and low correlation, so I think a lot of companies have been moving into that area.

**FROM THE FLOOR:** Could you provide a description of schedule BA?

**PANELIST:** Schedule BA actually refers to the schedule that they're on in the blue blank and it's kind of an all other. It's everything else that doesn't fit into one of the other categories.

**MR. DAVID J. WEINSIER:** I do recall that I worked with a company recently that had quite a number of joint ventures and they would have all been under BA.

**FROM THE FLOOR:** regarding Mr. Hill's comment with the single-premium immediate annuities or long-term, tail-structured, settlement-type arrangements, my personal feeling is that if you're using equities and those types of structures in which you do have a fair number of bonds and mortgages backing more the early-

side liability structure, but you have some equities to boost your return, and if they are effectively hedged against the down-side potential in the market on the equities, it doesn't seem that the RBC factors allow for reduced target capital requirements for assets that are effectively hedged. Your downside exposure in the equity market is not a 30 percent drop because you may have purchased a good number of put options or something, out of the money at a set price or an eight percent drop in the market in a year's time frame. After that period of time, we know our downside potential in our stock holdings because we have such a broad diversity of stock that the downside potential is not there. So, therefore, the RBC factor should not be 30 percent. It should be more like whatever your expected maximum drop in exposure is. So if you have a five percent out-of-the-money put option, it should hold something more like what an expected asset class that would have a five percent default rate would. I was wondering what the panel's comments are on that topic.

**MR. HILL:** My comment is that when you look at the RBC formula there are a lot of things wrong with it, and that's bad news in your case where you've actually done something and the risk is less than what the formula is saying. There are also people who try and arbitrage the flaws in it to their advantage. You could take a portfolio of stocks, put them in a special purpose vehicle, and issue a couple of bonds. Call one of them the A tranche and one the B tranche and get them rated and all that kind of stuff, and you've created a couple of bonds, but the collection of them behaves exactly like a portfolio of stocks. So you apply the RBC factors and you end up with something different than if you hold them differently. So that's my comment. There are flaws in there and you can try to work around them, or whatever. My hope is that in the future companies will be demonstrating to regulators that they know what the risks are and they've quantified them and it's set on more of an individual basis reflecting risk management.

**MR. ROSS:** I would like to add to that. It's actually kind of interesting, because I think under the RBC formula, you take a hit for your stock and I think you'll probably take a hit for your derivative as well, but you're using the hedge. The different scenarios don't tie together. So that's unfortunate, but I agree with Charles in that the formula isn't perfect. It wasn't meant to be perfect. It was just kind of an early warning type of system and companies now have used it a lot and I think the NAIC is forced to fix it over time. They're making some strides, but I agree that it is a problem with the formula.

**MR. DAVID J. WEINSIER:** It's a formulaic approach and it doesn't properly measure a company's true asset liability match, and the RBC is moving more toward a scenario-based approach there. They're currently just forcing companies to hold extra reserves based on this new approach. They find interest-rate risk and equity risk that come with your variable products, but they could eventually replace the current formulaic factors, moving it toward a scenario-based approach. In this situation where you've had equities but then you've also got puts or swaps or some type of derivative giving yourself a limited down-side risk, maybe that change

from formulaic to scenario-based; it would allow you to hold a more realistic and proper amount of capital instead of hurting yourself simply based on the fact that you have equities.

**MR. HILL:** I think you can go on to S&P's Web site (and I think it's free) they have this financial model in which if you do not want to use their factors, and you sit down with them and show them what you actually do on, I think, market risk and credit risk, you can move off the factors. They say it's for companies that believe they've got strong risk management and their risk is actually lower than what their factors are. So there's a good example of where everything is.

**FROM THE FLOOR:** I'm glad you brought that up. I know S&P, Moody's, and A. M. Best all have their own perceptions of risky and non-risky. Whether or not you tell them it's effectively hedged, sometimes they give you the I-don't-care look and tell you that you need this amount of capital because I said so. So I didn't know with the NAIC, it looks like NAIC is progressing, I think, in the right direction in terms of setting the RBC as more of a stochastic modeling approach. If you are effectively hedged and you have the appropriate vehicles to limit your default risks, your credit risks and your downside risk, then your RBC, from a pricing standpoint, can effectively lower your capital requirements quite a bit and then design products that have much higher returns and are much better to the consumer.. How do you feel the rating agencies would react if you target 250 percent of new NAIC, which is supposed to be substantially lower? If they go in that direction will Best still say I don't care that NAIC RBC factors are lower, we're still going to target you at this level, which ends up being 400 percent of RBC? So you price a product that you feel comfortable with and you've hedged your risks and everything, but the rating agencies may still look negatively upon that.

**MR. HILL:** Like I said, this document is a clear example that S&P for one has thought this stuff through pretty well. They've laid out in very specific detail how they will look at the interest-rate risk after the risk management and credit risk and these credit derivatives. They outline it all and they say sit down with us and show us what you got. I would bet ten years from now setting capital requirements will not exist as it does now. The technology is a big part of this. It's going to allow us to do all kinds of things, so it's all coming. I think the rating agencies look at what the NAIC has, but they clearly set their own standards on this level.

**FROM THE FLOOR:** I just want to follow up on Mr. Hill's comment. I was involved with working with the S&P financial-products capital model and we did a presentation that will address exactly your issues. You will get compensated for the cost of hedging by holding less capital and it's truly getting at your delta and gamma risk. I think more companies will be moving toward that and S&P is definitely on the leading edge. Hopefully the other rating agencies will follow.

Individuals - US Mutual Fund Assets

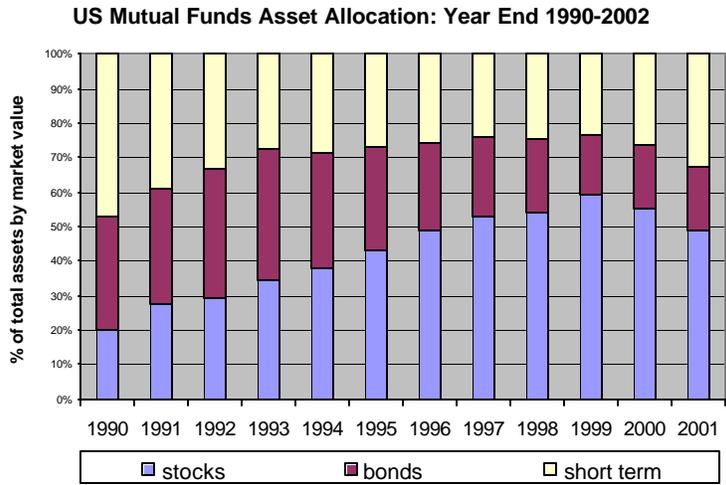


Chart 2

Insurance Example

Expected 30 Year Compound Returns  
After Losing 9% in Year 1  
Cumulative Probability Distribution

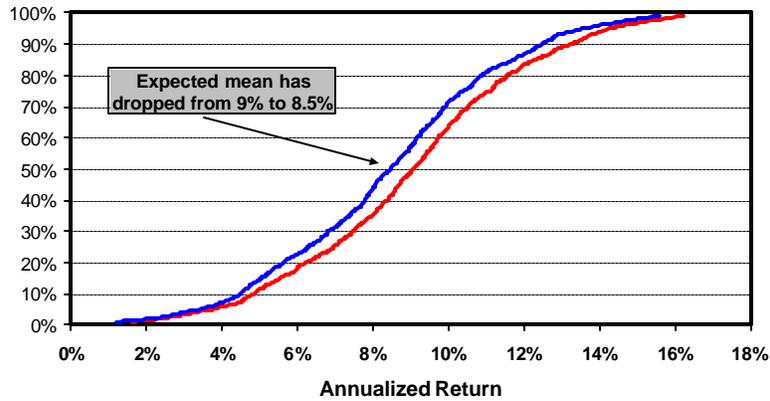


Chart 3

Insurance Example

Expected 30 Year Compound Returns  
After Losing 20% over 2 Years  
Cumulative Probability Distribution

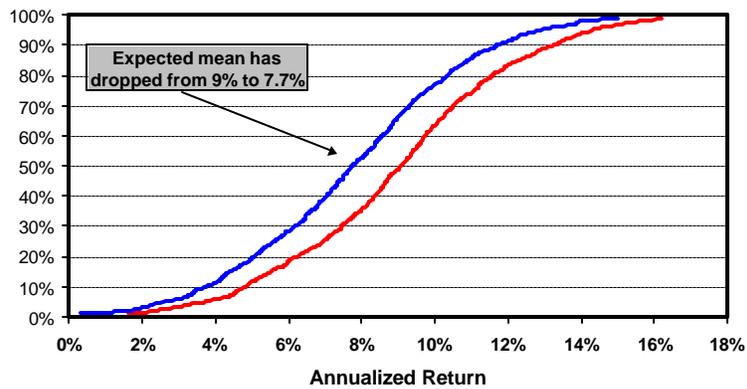


Chart 4

Insurance Example

Expected 30 Year Compound Returns  
 After Losing 20% over 2 Years  
 And Reducing Equity Risk Premium from 3% to 2%  
 Cumulative Probability Distribution

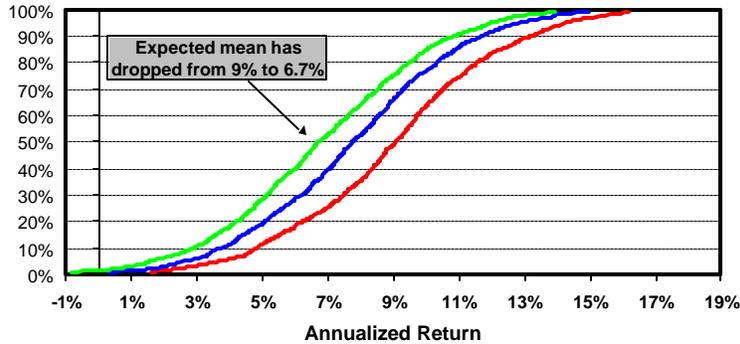


Chart 5

Multiple Allocation (continued)

- Assume the system can't handle it

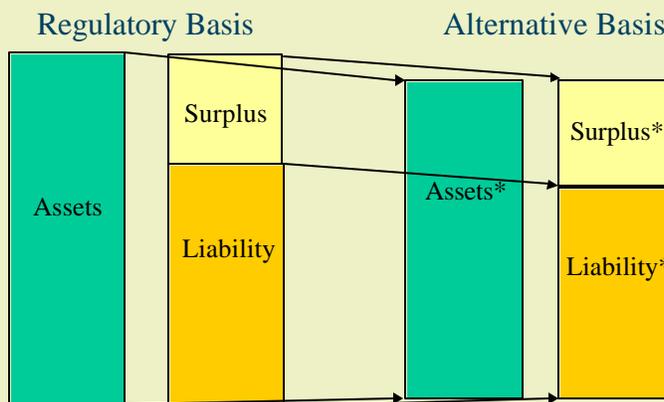


Chart 6

Multiple Allocation (continued)

