

# RECORD, Volume 27, No. 3\*

---

New Orleans Annual Meeting

October 21-24, 2001

## Session 10PD

### Embedded Value In Practice

**Track:** Investment/Finance

**Moderator:** Max J. Rudolph

**Panelists:** Nancy E. Bennett  
Richard Junker  
Max J. Rudolph

Summary: Embedded value (EV) overcomes many of the shortcomings of statutory and GAAP accounting. Many companies are now using it as their internal financial measure as well as reporting it externally. As this tool becomes more widely used, it is important for actuaries to understand what it means. *The panel discusses the basics of EV, how EV can be used to measure an insurance company's results, and current best practices*

**MR. MAX J. RUDOLPH:** My name is Max Rudolph. I am an FSA and a CFA charter holder. I'm a vice-president and actuary at Mutual of Omaha and the current chair of the Investment Section Council, which is sponsoring this session.

Also speaking today will be Rich Junker. Rich is with GEFA, formerly First Colony. He's an FSA and manager of projections, modeling, business planning, cash flow testing, and economic value. He's going to talk about GEFA's recent implementation of EV, or as they call it, economic value analysis.

Our third speaker will be Nancy Bennett. Nancy is an FSA and a consulting actuary with Milliman USA. Prior to joining Milliman, she was a vice-president and managing actuary with AVON Consulting where she worked on things like asset/liability management, corporate modeling, and a wide range of other projects. Before joining AVON, she was employed by Minnesota Mutual as their appointed actuary.

---

\*Copyright © 2002, Society of Actuaries

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

Let's talk about EV. Why would you add another measurement system? We already have statutory. We already have GAAP. Statutory and GAAP give you somewhat of a comparison to pricing results, but I think EV is much closer because you have included capital considerations.

There's an international standard called fair value. It's not quite there yet, but it's close. In the meantime, European companies, especially in the U.K., have adopted EV. So, if you want to compete against the international big guys, you really need to get involved with it. It's a good measure for incentive compensation, and it can be one piece of a balanced scorecard. For those of you who are not familiar with that, it would involve things other than financial measures, but EV is a good tie-in for the financial measure. It provides management incentives for both in force and new business. If you do something that adds value for in force, you get recognized for it. If you do something that destroys value for in force, you get recognized for it, too. It's the same thing for new business, and it's immediate recognition. With statutory, how many of you are still going to be employed by your current company when you find out if your pricing was right? This is nice in that you get recognized a little bit quicker. For example, if you're able to reduce maintenance expenses, you get the benefit of that.

As we talk about EV today, we'll limit our discussion to single-scenario and best-estimate assumptions, which means no provision for adverse deviations (PADs), for those of you that do GAAP. These projects all leverage off of existing projection models, whether they are cash flow testing, business plans or Financial Accounting Standard (FAS) 97. There are a variety of models that we can use as the base. It really doesn't make any sense to create 30 different models to do 30 different projects, because then you spend all your time trying to show why they're different. If you start off with the same one, however, then they're not different.

EV, as it has been developed, is statutory based. Generating the sources of variation provides a lot of the value in embedded value. It can be developed at the product-line level, combining the different product lines, to get to either your business unit or your company totals.

There's consistency between pricing and projection results. To be complete, let's define free cash flow. It's the same as distributable earnings, where you start with after-tax statutory earnings and subtract any capital infusions and add in the after-tax earnings on that capital, due to investment income.

EV is a subset of appraisal value. By valuing your in-force block and adding the market value of your statutory surplus, that gives you your EV. If you then add to that franchise value—the value of future business—then you come up with appraisal value, an estimate of how much the company could be sold for. There are a number of things you can do with this information besides sell the company. It gives you an idea, with internal management, of how much the firm is worth based on which lines have the value. Sometimes you spend a lot of time on one line, but then you

go through this type of analysis, and you get a different answer. You think, "I'm spending 80 percent of my time on this line that only has 10 percent of the value. Why is that?" It allows you to make better decisions. Maybe that is the right decision, but this tool gives you the data to make that decision.

Chart 1 demonstrates graphically how EV is used in pricing. I can look at the free cash flow stream before any policies are sold or at the in force for a block of business. A couple years out from issue you are past all the acquisition expenses. What's the value at that point in time? If you acquire a block, you don't have to pay the acquisition expenses that are already past. That's what EV is—looking at how you're getting from here to there, and looking at whether it's what you expected. What did I actually get? And why?

When selling new business, value is created if the return on an investment is greater than the hurdle rate. It's destroyed if the return on investment is less than the hurdle rate. The opportunity cost is what matters. That's what you want to be sure of—that the business you're actually writing is better than the alternatives.

In addition, you want to make sure you take credit for any dividends that you've paid out and any additional capital that you've added. What's left is the value added for the period. You can split it out between the value added by new business, the unwinding of the in-force value, and the impact of any variances during the period.

This is not easy. Rich and Nancy will discuss some of the implementation challenges they have run into. I'll touch briefly on timely reporting, models, assumption, and modeling changes.

Right now it's very hard to report EV more than once or twice a year because it takes so long to build the models. The process will improve as more is automated, including data extracts and model assumptions leveraging off of existing projects. It's very difficult when you're actually looking at a value-added statement to split apart the new business and in force. You almost always have to make some form of an estimate, especially on the new business, in terms of saying, "Well, I think what I'm getting is consistent with the way I priced it." This also encourages realistic pricing models, since aggressive pricing will eventually catch up to the product line during incentive compensation.

If you start off with a base business-plan model, it might need to be extended. Say you're looking at a long-term-care block, and you're looking to do embedded value. You're looking for the present value of all the material cash flows. A lot of your business models may only go out five or ten years. For long-term care, you need to go out a lot longer than that to include all of the material cash flows.

Canadian companies are ahead of American companies on EV, and it will be really interesting to watch what they do in 2002, as they report for a second time on EV. I think the first time is a major project, and it's difficult. I don't want to

underestimate that. But the second time through, where you have to say, "Interest rates dropped five percent since the last time I did this. It's a really different world now. How am I going to reflect that? Am I going to run that through incentive compensation or not?"

Nancy is going to discuss future developments in detail. This is a very quick list. It's a step toward fair value—very much so. If you think about it, most of the improvements over the last 15 years have been an iteration toward fair value. We could debate fair value for a long time, but eventually we're going to get to something that we're going to agree on that focuses on the distribution of results as opposed to a point estimate. If you think back to when cash flow testing and risk-based capital (RBC) came out, you also had FAS 97 in there. Now you've got the RBC C-3 interest rate requirements, duration calculations, and economic surplus. These are all iteratively moving in the same direction, and I'm really looking forward to seeing where we end up five or 10 years from now.

I think eventually we'll end up with something that's more GAAP-based, just because more companies are managing themselves based on GAAP than statutory. I think we'll move toward doing more stochastic analysis, starting with interest rates, which is behind the option-adjusted value of distributable earnings, and then adding mortality, morbidity, defaults—any assumption that moves. I see some software developers in here. This is my plug to you. Prepare for the future. This is where we're going to go.

Variance analysis by line describes the sources of earnings during the period. Showing how you got there, relative to what you expected, helps you manage your business. When you get into using probability distributions, as opposed to just point estimates, it will add value and make it worth the heavy investment that this project can be.

Luke Girard gave a talk at the second fair value seminars and followed up with an NAAJ article (Volume 4, Number 1) in January 2000. There was a lot of discussion as to whether or not you should calculate fair value based on cash flow. Should you do it based on distributable earnings? I know when I heard Luke's talk I wondered, "Well, doesn't the law of one price say that it shouldn't matter?" That is essentially what he spent a lot of time and a lot of work proving. So it's kind of nice that what you were taught back in freshman economics class actually holds.

I think it's important to compare the discounted distributable earnings against option-adjusted cash flows at least for some sample product lines. We are trying to look at that and are getting numbers that are very much in line with each other. It's interesting, because we've been doing the option-adjusted cash flow work for several years, but we struggle to get others to understand what we did. So now we're trying to do EV, because that seems to be more of an industry-driven thing. But I think that I already have the answer, so I'm struggling with that a little bit.

We're trying to educate people and get the industry on board with these tools, so that a company isn't isolated.

**MR. RICHARD JUNKER:** Over the past couple years at GE, we have been working on the economic value concept, starting with a group of asset-liability management actuaries and defining the objective. Corporate actuarial staff assembled a guidebook to ensure consistent standards across the organization. It was no small piece of work! But we had a tremendous commitment to the task. We had a group that met regularly, and we each made presentations of our lines. It proved a tremendous best practices experience. Each product line would present its results, and we all learned from each other. We'd go through one cycle, and then we'd apply our learnings from one another. At each cycle, a new standard for common content evolved by the feedback.

Many of you have read Napoleon Hill's book, "Think and Grow Rich." It offers six principles for living life well, though I'm not going to enumerate them all. One is the mastermind principle, which is associating with a group of people to attain your intellectual or spiritual objectives. In the business context, I found our best practices team to be the premier example that I've experienced. We have a lot of outstanding people, we put our minds together through conferencing and communicating, and we have developed an economic value product that is outstanding. Working on this team has been a tremendous experience.

My goal, along with Max's and Nancy's, will be to demonstrate that economic value analysis is a better analytical tool that applies business concepts on an economic basis. To make it happen is a lot of work. Economic value analysis is where we're all moving as a business and industry.

There are many aspects of economic value analysis. I propose to take on just three of them today—"the big three".

The first aspect is the assumption, revision, and approval process. The goal is to have stability of assumptions from the beginning of the period to the end—that is the real essence of it. They need to be credible.

The second aspect is the stochastic approach. The stochastic approach has made our work product very rich. Rather than just a point estimate, we have several scenarios. With the technology available in the past, it was more difficult, but now we can run much faster.

The third aspect of the analysis that we took on was variance analysis. This goes beyond developing a point estimate, which is quite common, especially among the companies in European countries. It's like a balance sheet for the company's income statements.

Looking at assumptions, the key is approval and control. With many different lines and many different people involved in models, you can have a lot of numbers floating around. The only way you can do variance analysis is to keep assumptions stable across the beginning and end of the period. They are allowed to change based on management actions that occur during the year. These are reflected through actual results. We found that our assumption-setting process wasn't as well documented when we began, but we ultimately put a strong amount of rigor around it. We thought we had good assumption processes going in; creating assumptions is what actuaries do well. We've been operating models for a long time. But on close review the first time through, we found numerous reasons to change and polish assumptions. Fortunately, after a few cycles, any further assumption changes that we identified became much diminished. We found differences in point-of-view on assumptions. The product development staff might have a point-of-view on the assumption, and the finance area might have another, such as target surplus, in particular.

The benefit of having the assumptions set for variance analysis is that you don't have as many questions about the results. What if a product manager looks at the results and the economic value didn't perform as well as expected, and nobody believes it? If you have an anchored set of assumptions, a rigorous dialogue becomes much easier, and having a foundation of credible assumptions makes for consistent interpretations from one year to the next.

The Control Cycle of assumption setting has four steps. Our focus is on definition and approval of assumptions. The other steps are calculation of economic value, variance analysis, and updating assumptions in the model. We run through the entire iterative cycle doing the economic value exercise. Updating the assumptions occurs primarily in the off-season, although we're always striving to make our models more precise. The key to the assumption setting is product leadership, actuarial leadership, the product managers, the risk managers—everybody becoming involved. It's a whole company effort, as much as we can make it. The next facet I wish to share with you is the stochastic approach. Many have said in the past, that doing economic value analysis beyond one point is just not practical because of the runtime. We've made huge strides in hardware and ability to process jobs faster. The software is faster, and we have seen that benefit. Typically, we run 25 randomly generated scenarios, plus a level scenario. The starting point is setting a discount rate to apply to the economic value or distributable earnings, quarter by quarter. After adjusting net earnings for the change in required surplus, you just discount at the hurdle rate—whatever definition you choose to use. We have used a constant hurdle rate for all lines. To reflect the riskiness of each line, we consider the target surplus settings.

We have adopted two definitions of economic value. One is a pure, constant hurdle rate. Another is a path-dependent rate, wherein we look at the current environment and connect the fixed-hurdle rate by formula to the moving and randomly generated interest rate scenarios.

For this method, focus on the initial 90-day rate to define the relationship, taking the difference between the fixed-hurdle rate and the 90-day rate along the level interest scenario. Then you make that difference the constant you add to the 90-day rates across all the other scenarios and across time. With that consolidated discount matrix so defined, discount all future distributable earnings period-by-period.

The stochastic presentation beats the defect of a single scenario. It's an expectation. You may currently be in the money, or you may lose money, but at least you will see the range. The mean and the level scenario can be vastly different, depending on which line you're looking at. The optionality of the assets and the liabilities are displayed through the variability.

This is not a stable process. There's a fair amount of difference between results generated by the level scenario and the mean. Chart 2 shows results ordered by the path-dependent rate and by the fixed-hurdle rate. Below the graph is the mean of the path-dependent rates and the standard deviation. You can see how much variability it has. Some of the variability of the two sets of results is driven by the two discount functions, using one discount function that moves along the dynamic interest paths and another that's fixed.

We now have a strong, stochastic, long-term point-of-view in place. With it, we are able to do a tremendous amount of what-if analysis. It can be variations of interest-crediting strategy, asset segmentation approaches or assumptions. We once sought to learn what we were missing by running a limited number of scenarios. We ran a 98-scenario alternative to the standard set of 26. We were aiming for an even 100, but fell somewhat short. There was some variation in the standard deviation of economic value, but our focus was on the variance analysis overall. We concluded that the mean values changed only slightly, remaining quite stable. Little was gained by running more scenarios. The additional runtime was proportionate, running about the same for each additional scenario. When you have a whole enterprise to model, you must make some compromises, even with today's computing power.

Chart 3 shows the results of specific sensitivities.

Chart 4 is a waterfall chart detailing our variance analysis. We're looking at the progression through one operating period. The mean initial economic value is displayed, *Prior End of Period Value Reported* in the chart, followed by the mean effect of assumption changes. I spoke earlier of reviewing the assumption set at the beginning of each analysis period. If you run through one year, then refresh your assumptions for the next cycle as of let's say January 1, the economic value can change some. If your assumptions are stable from one year to the next, the updated economic value carried forward will be fairly similar.

After we have revised assumptions, we present the revised economic value, shown as *Value Beginning of Period* in the chart. Next appears the expected return on the initial economic value, *Planned Return* in the chart. That's at whatever the hurdle rate is, and if it's a partial year, adjusted accordingly. Then we move into the various changes—variances A through F in the chart, for the key assumptions. They can be large or small, positive or negative. We trace each of them to the end of the year. Keep in mind that we are analyzing experience variances for in force only.

At this point, you have the economic value of in force prior to distributable earnings on in force. Next, economic value is diminished by distributable earnings on in force to corporate, producing *EOP Value Inforce* in the chart.

Now we move to the impacts of newly issued business. We add incoming capital transfers required to support newly issued business of the current year, *Value of New Business* in the chart. The internal rate of return is seen to be less than the hurdle rate in this example. This is so because the future distributable earnings reduce the economic value. The final increment is *Distributable Earnings on Newly Issue Business*, representing the total surplus strain and required surplus arising from the current year's writings. This is the large increase that takes us to the ending value, *End of Period Post Distribution Value*.

Going into the next analysis period, the target surplus of newly issued business becomes an element of the total target surplus of the line. Next year's beginning economic value will retain that element of economic value—the investment of the target surplus for newly issued business. This has sometimes been a sticking point for some people. They ask, "What happens to that investment? After you have all this surplus strain, how does it stay in the economic value?" This investment is central to the proposition that the corporation sends the money to you to invest and to equal or exceed the 12 percent hurdle rate that they require of you, both on past and recent writings. In contrast, when you have good operating results, your economic value declines, because you return the unneeded excess surplus to the corporate arm of the company.

The variance analysis should lead to management action. In the ideal, we can drill down into anything that gives us a problem. It can stem from reinsurance. It can stem from direct, it can stem from this line, it can stem from that sub-product. It may be a different legal entity for a given product, if that's the way you report—or it may stem from a channel.

I have now covered three fundamental aspects of economic value analysis—the assumption-setting process, the stochastic presentation of results, and the variance analysis. Recall that the assumption-setting process ensures stability of the economic value progression from one period to the next. The stochastic presentation gives a long-term perspective that GAAP doesn't give. The method is teamed with statutory, so that measurement of operating results is integrated over time, reflecting both current and future expectation of results. The variance

analysis incorporated into the VBA process has helped our product-development people, our finance people, and our actuarial staff to work together to improve our effectiveness at collaboration.

Where does economic value analysis go from here? Nancy will give you her thoughts shortly. Here's my take in brief. Going forward, advancing the economic value process is occurring on a global perspective, through fair value processes. At our company we have achieved a first version of economic value that covers the major product line liabilities. We seek next to build a full enterprise model. We also want to drive the process into the non-actuarial areas, led by the product managers. We find that our experience studies process is benefited by observing the conclusions from the variance analysis on mortality and persistency in our economic value models. Experience studies, financial management reports—the internal consistency of numerous processes is improving as a result of using the economic value tool.

At GE Financial, we have focused stochastic analysis on the interest-rate element of earnings. Certain modeling software vendors are making strong progress in applying stochastic approaches to other elements of the income statement. We have not gone there yet, but it will happen. I recommend that you take action to get involved and look for opportunities within your company. It's the natural progression from the cash-flow testing regulation that evolved during the early 1980s, to ultimately give companies the analysis tools to manage themselves on an economic basis. As a profession, we have been doing cash flow testing, we have made a mark in business planning, and we have supported asset-risk analysis using the duration and convexity tools. The next level up is dynamic financial condition analysis and its cousin, economic value analysis.

The actuary's primary purpose is to help the president and the board of directors to manage the operation. We've come a long way in these 15 years, and I have been proud to be part of the progress of our profession. I think we all enjoy that part of our business. Data and technology are wedded so well in our work.

I don't know about you, but when I'm working with our models, assessing these results, and talking with people in the company about where we're going, I often feel like Calvin, the young rebel of the "Calvin and Hobbes" comic strip. Young Calvin has limited power in the world to influence events. Just the same, in his own mind he has evolved all manner of special powers. With economic value analysis, we actuaries have our own special powers, and it can be quite exhilarating. It's a great experience to ask what is really happening, dig into it, and fix operating problems.

The information explosion of the last five years has been phenomenal. We are privileged to be so advanced, long past the encumbrances of 150 years ago. Can you imagine being Elizur Wright, first Commissioner of Insurance for the State of Massachusetts, enlisting his daughter to help him crank out reserve factors? Our

models, with all their actuarial intelligence, give us the ability to be artists in our own right. We all look to be ready for the revolution. It's going so fast, it's going to bowl us over if we are not ready. I close with a quotation from Peter Drucker, from 1999:

"Are you ready for the revolution? We will have to learn to define and organize outside information. That is the information revolution ahead of us. Economic value added has shown that we can manage, we can produce, and we can make effective, real information about the reality of economic activity. There will be as radical a change in our economy and society in the coming 20 years as any in our history. When I say change, I mean change like that between 1880 and 1914, the second industrial revolution."

**MS. NANCY E. BENNETT:** The focus of my presentation today is to follow through on the theoretical aspects that Max touched on and the implementation steps that Rich talked about. I'm going to briefly touch on some of the factors that have influenced the growing use and interest in EV over the last few years. The majority of my talk will focus on the uses of EV in practice, with particular emphasis on the future of EV. I will also provide some balance and point out some of the limitations of the EV approach, using the limitations as a framework for discussing the future for EV.

As the size of this audience indicates, there is a lot of interest in the concept of EV. Company managements are frequently looking for new and improved ways to evaluate performance. Also, as actuaries, we tend to get a little bit bored with number-crunching exercises, and we always want to go beyond and have a deeper understanding of what really is going on underneath all the numbers. We all have had many years of experience with statutory and GAAP accounting, and we're losing interest due to the limitations and the resulting manipulations that take place in both statutory and GAAP reporting. Some of us have started turning our attention away from the financial services industry to see if other industries do something else. Clearly, we find different reporting approaches in the manufacturing and non-financial sectors.

We've seen a lot of success in EV. Notably, you have some very large companies such as Coca-Cola, the United States Postal Service, Eli Lilly, and Monsanto that have seen a significant improvement in their financial results, which many of the companies attribute to their implementation of EV.

These success stories spill back into the financial services industry, and we hope to enjoy similar success with EV. Certainly, within the insurance industry, we're seeing widespread use of EV in Europe, the U.K., and Canada, which leaves the U.S. insurance industry behind the rest of the global insurance industry. Clearly, there is an increased interest among U.S. companies in evaluating financial results based on the underlying economic fundamentals. In terms of management compensation, we

want to ensure that management incentive compensation is tied to shareholder value.

We're not seeing all U.S. insurance companies embrace EV because EV principles make so much sense. Within the U.S., there is a fair amount of resistance to EV, other than those companies with an affiliation to the countries that have embraced EV. EV is based more on appraisal methodology rather than U.S. GAAP. As we all know, U.S. GAAP results are the primary focus of most U.S. companies. As such, measuring and evaluating financial results based on long-term models is fairly unusual in the United States.

But all that aside, we are seeing EV used in more and more companies. There are four primary uses of EV:

1. First and foremost, the primary use of EV is to report actual financial results and evaluate performance—what happened during the last reporting period or over an extended period of time.
2. Once companies have EV in place, some use it in their mergers and acquisition activities—either to analyze the entire company or a particular block of business, either for disposition or for acquisition.
3. Some companies use EV to analyze and quantify the impact of certain strategic alternatives. The EV framework allows companies to ask, if we do these things, how will shareholder value be impacted?
4. Finally, more companies are using EV in their management compensation. This is probably one of the most recent changes in the area of EV. A few years ago, most companies were using EV for management information. Based on a Milliman survey, about half of the companies using EV are starting to use it in at least one aspect of management compensation.

Let's dive into some of these uses a little bit more. As I said, the foremost use of EV has been financial reporting. The catalyst for using EV is an acceptance that current financial reporting standards are not sufficient for understanding the underlying economic drivers of the business. So EV has come out of the ashes, so to speak, as a more rational measurement system for evaluating the contributions of management's activities to shareholder value.

You might also be wondering about the exhausting part of implementing EV since the U.S. still has statutory and US GAAP requirements that make EV a third reporting system. In addition, we are aware of the developments with the unified valuation system and the international accounting standards. All these different reporting systems make us sit back and ask—these are different scorecards, but which are better?

One of the questions I have addressed in implementing EV is how EV-based performance metrics compare to statutory or GAAP-based performance metrics. Far and away, GAAP return on equity is the most popular performance measurement—along with the associated return on asset or earnings per share—to judge the financial performance of a company. These particular measures are derived from accounting profits; as such, these measures reflect the anomalies of statutory and GAAP accounting and any "unique" company adjustments made to manage earnings.

Since companies have been using GAAP ROE for so long, most companies believe that they understand GAAP ROE. While a company may be comfortable with GAAP-based measures, are we certain that achieving a particular ROE or ROA target is consistent with increasing shareholder value? In certain instances, GAAP ROE can be increasing, but shareholder value is declining at the same time. Some companies have moved to market value or market value-added as a performance measurement, since those measurements have some features that ROE doesn't have. But market value adjusted (MVA) alone is not sufficient to simply look at the contributions to shareholder value on a period-by-period basis.

Other companies have taken the ROE concept to a higher, more sophisticated level by calculating risk-adjusted return on capital (RAROC) or return on risk-adjusted capital (RORAC). Again, these are still accounting-based derivations, with some more complicated adjustments to the accounting basis to reflect business risks or financial leverage. Every company becomes accustomed to evaluating its performance using certain measures, recognizing the limitations of the different measures. The EV proponents believe that it is a more straightforward approach to evaluate performance. EV is more straightforward than a complicated RAROC calculation with several adjustments. EV focuses companies on the one thing that matters most of all—increasing shareholder value.

The second use of EV is to support the appraisal process. In theory, EV is very close to fair value or the theoretical market value. Of course it's not the observed market value, but EV is a subset of the appraisal value. The notable exception is that EV excludes the value of future business or the value of the distribution franchise.

Let's move into what I would consider to be the future of EV. Once the EV tool is in place, it provides a quantitative basis for evaluating strategic alternatives. EV is a tool where a company could quantify how certain actions would affect shareholder value. I'm sure we've all been in meetings where people throw out ideas about how a certain program or product is going to have such strategic value to the company. But oftentimes, companies think an idea makes sense, but they're not sure how much capital will be required for a particular venture. They hope that the new venture will improve shareholder value, but they don't really have a tool for quantifying the impact on shareholder value. With the EV tool, a company could quantify the impact of certain actions. Also, with EV, a company is able to isolate

how the value of the company has changed, due to what management has actually done, rather than just secular trends that are observed in the industry.

If we take a step back to basic finance principles, we recognize that we have four alternatives to increase the value of a company. All of the strategic alternatives under consideration are going to fall into one of these four areas.

1. We can operate more efficiently to increase the return on the capital that we've already invested.
2. We can start investing in projects that have a more favorable return than the cost of capital.
3. We could divest or stop activities in projects that aren't generating a satisfactory return on capital.
4. We could restructure capital to reduce the cost of capital.

As we get beyond the basics, what does that really mean we can do inside an insurance company? On new business, there are a number of actions we could take. For example, we could try to improve our mortality experience by implementing stricter underwriting standards. We could go into some alternative investments that might increase our spreads, and hopefully not increase risk too much. We can manage our expenses more effectively, or we could launch into an aggressive growth strategy.

For our in-force business, we have similar but slightly different actions available to us to improve our shareholder value. We can improve persistency. We can restructure our crediting and dividend practices to increase margins, relating to mortality, interest and possibly expenses. We could rebalance the entire asset portfolio—again, if the results make sense. Aggressive expense management will also improve shareholder value on the in-force business.

Arguably, I think we could say that most, if not all, insurance companies have objectives related to efficiency in underwriting and expenses and their investment process. So you might ask yourself—what insights will EV provide? I think EV can help a company prioritize those activities that will have the greatest impact on shareholder value to help direct resources to get the greatest bang for the buck.

To help illustrate the use of EV in prioritizing resources, I put together a case study to show how EV can change under different circumstances. It is a very simple case study, so you're going to have to just accept some of these numbers. I started out with a pricing model for universal life policies. I could have used the cash-flow testing model, or the model that was used for planning purposes. You might think that the same model should be used for all of these different activities. But I think that if we're all honest, we know that many companies use different models.

I calculated the EV on the new business using an 8.5 percent hurdle rate. This is a single discount-rate calculation. The pricing model produced a 7.81 percent internal rate-of-return and negative embedded value of \$460,000. What that really means, of course, is that the company is issuing new business that is destroying shareholder value. As you can imagine, this is not the best news to report to management. I could have changed the numbers and changed some of the assumptions to come up with an example that was a little bit easier to accept right out of the chute. But I intentionally decided to leave this example in here, because it also illustrates another very important point about EV. Depending on the extent to which your financial management activities have been integrated within your company, you can get some pretty surprising results. Every pricing person, of course, will say that they're issuing profitable products, and the financial area is trying to explain it. But oftentimes there's a disconnect between the different areas in the company, and the EV process can highlight the inconsistent analyses between the pricing and financial areas.

This illustration can show how management could improve this particular result. I looked at the certain alternatives. The first alternative is to decrease administrative expenses by 10 percent. EV improved by \$320,000, but still comes up \$140,000 short with an 8.28 percent internal rate of return (IRR). The expense management for this particular case study had a large improvement of embedded value. If we were to launch an underwriting program where mortality improved one percent annually for the first 10 years, we see that EV would improve by about \$310,000 and earn 8.29 percent. This action also provides a significant pickup in EV.

Let's move over to balance sheet items. If we change our investment strategy for new business, with no impact on any existing assets allocated to support this block, to yield 50 basis points more than currently assumed, you would see a pickup in embedded value of only about \$50,000 to a 7.9 percent IRR. In this particular example, you don't see a large pickup in EV.

Finally, let's consider an aggressive growth strategy. I increased policy count by 15 percent. To some extent, this is sort of a check. Fortunately, the IRR stayed the same at 7.81 percent, so our model was solid. By following this strategy we have destroyed even more shareholder value than before. In other words, the old adage that a company can grow its way out of any problem and make it up in volume is not always true.

If you accept the numbers in this illustration at face value, what conclusions can be drawn about this particular company? I think the illustration suggests that the activity with the greatest potential for improving shareholder value is, in fact, expense management.

Management compensation is one of the newer uses for embedded value. A lot of companies that have implemented embedded value are still not using EV in their incentive-based compensation. If you read some of the Stern-Stewart material on

EV, they say that if a company is not willing to use EV in management compensation, implementing embedded value is not even worth the effort—EV will just be another reporting system. By using EV in management compensation, you turn your managers into owners, and reward them for sustained increases in shareholder value. The value of the incentive is due to fundamental human nature. There is some debate about the effectiveness of EV-based incentives, but I'll leave that debate to the human resources people.

Let's think about how EV might be used in a management compensation formula. For comparison, a traditional plan includes a salary plus a bonus. The bonus is negotiated annually, with a target bonus set every year. The actual bonus that the executive earns at the end of the year might be somewhere between 80 to 120 percent of that particular target. This bonus formula produces a capped bonus. If you have a really bang-up year, you don't see it all in your bonus. Conversely, if you have a really bad year, that gets lost in a traditional approach too.

In addition to the bonus structure, you also can have a stock option plan. Oftentimes stock options are granted to executives, but most traditional bonus plans grant the options at a fixed-exercise price. Within an economic value added (EVA) compensation plan, you'll see a bonus based on the percentage of EVA for the year.

Perhaps you set a target bonus using an EVA that is at least equal to the prior year's EVA. But the actual bonus in the current year is based on the percent of economic value added that has been contributed. In that regard, the bonus isn't capped. If performance improves well beyond the target, the bonus is not capped.

In the stock option plans, the exercise price is changed each year, according to the cost of equity capital. As executives exercise some of the options, there's a direct link to the cost of capital being invested. Of course, there are several variations of management compensation plans based on EV. This illustration is not designed to represent any one particular company. The basic idea of an EV-based compensation system is that the executives profit only if the shareholders also profit.

By this time, I hope that we have convinced you that EV has some merit—especially if you ignore the work involved with implementation. While we're very interested in continuing this dialogue on EV, there are some limitations to EV that are slowing down some companies.

In terms of EV, the thing to remember is that the primary, if not the sole, focus is on increasing shareholder value and not stakeholder value. There are many companies that have vision statements or objectives where they are trying to do things that also benefit the other stakeholders in the company—the employees, the community, or their customers. EV proponents argue that if shareholder value increases, then the stakeholders also benefit. But there is no explicit recognition of stakeholders in EV.

Where is EV going? I think that the interest in EV will continue to increase. I am not convinced that EV is the Holy Grail of reporting systems. Regardless, I think we will see increased use of EV, particularly in the U.S. insurance industry. Part of the increased use is due to the influence of non-U.S. parents. Also, some stock analysts have started to use EV in evaluating their stock picks. As EV is implemented in the U.S., we will see further developments in EV theory. Max touched on these but we will see developments in stochastic analysis and the projection of EV.

Do I think EV is a fad or a worthwhile activity? As all of us have said here, we believe that EV is a better reporting system than either statutory or U.S. GAAP. EV has limitations, but EV is a better system since it is based on underlying economics. It can be an effective management tool. If a company embraces embedded value—much like GE has done—and institutionalizes the whole EV process, it can be very effective for managing the financial performance and the shareholder value of a company.

**MR. RUDOLPH:** As you're looking at an incentive compensation plan, trying to look at which manager is responsible for which result, one of the things that I spend a lot of time thinking about is how to split out the investment results—from return, yield, defaults—all those types of things. Has anybody figured that out yet, or is that something that a research project yet to come?

**MS. BENNETT:** That's an excellent question. I don't know of anybody that's done that. While I think EV is a better reporting system, EV does not isolate functional responsibilities within a company. Moreover, EV doesn't tell a company what financial performance *should* be. EV tells us if performance is increasing shareholder value relative to the prior period, but EV does not directly address what financial performance should be.

**MR. JUNKER:** We've given a great deal of thought to that as well, working with the investment department. On the default side, we have impairment reports. So we have an actual result, and we have our model's deterministic set of default rates. We can isolate it, but that's just one dimension of the return. Another piece is how you define your asset segments. If you're a GAAP-based company, you may say that the GAAP liability is how you define your liabilities. But this is a statutory-based exercise, and you need to have the reserves covered and the target surplus. If there's any variability in your assets—because surplus is a big piece of the whole of the assets you need—then yield rates from one period to the next can vary a great deal, because the mix of assets backing surplus assets is often quite variable. That makes it hard to see what's really going on. It leads to working with the investment people to see what the assets have done—the ins, the outs, the resulting asset yield roll-forwards. When you have a tremendous number of portfolios, you have a tremendous number of lines and people moving assets around. With some complex assets in the portfolios, it can be extremely challenging.

**MR. JAMES F. REISKYTL:** It seems inherent in all of these systems that utilize stochastic analysis, that there is some understanding of policy owner behavior. How do you, under the various scenarios, introduce different levels of policy owner behavior? More importantly, what kind of feedback loop do you have to make sure that these assumptions are accurate, or are at least in the ballpark? Because it seems to me that the ultimate test of any system is to provide some demonstration that, in fact, the system works.

**MR. JUNKER:** The lines that we focus on are dynamic stochastically for the interest earnings variable. As a result, there is potential for dynamism on the liability side as well. For a traditional life line, there is not much optionality on the liability side to work with. For fixed immediate annuities, there's not much liability-side optionality either. A lot of the action is on the asset side. When you turn to interest-sensitive products such as deferred annuities and universal life, it becomes a more difficult proposition. There are many moving parts in such models. The standard for a well-validated model is much higher under economic value analysis. If your company has a tremendous amount of this business, you need to do a great amount of testing of what your policyholder behavior assumption is doing versus reality. We have done some good work on our policyholder behavior assumption, but only on a certain piece of it, because several legal entities have universal life. Aggregating it all and persuading yourself that it's all credible is not an easy proposition.

**MR. REISKYTL:** Do you have a feedback loop where you actually measure this and report on it?

**MR. JUNKER:** We haven't established one yet. Universal life was not the first product, obviously, and immediate annuities were much easier to model the first time. We got it in only during the latest iteration.

**MS. BENNETT:** I think your point is well made—predicting policyholder behavior is very important. I'm not sure if it's any more or less important within an EV application. It's a difficult exercise to predict policyholder behavior. One of the things that I found, in coming up with assumptions for EV, is that experience studies are really not very well designed to support what I would call long-term projections. Regulatory cash-flow testing generally should have better policyholder behavior assumptions. I don't know that the problem is any more extreme with EV. This is an opportunity for actuaries, but I think we need to have better experience studies.

**MR. RUDOLPH:** In terms of dynamic assumptions—especially on lapses, we have actually done quite a bit of work on that within our own block. When interest rates spiked last year, it really came in pretty much as we had expected it to, which was a nice validation, and we were able to get that feedback loop. What I'd like to see more of is work that leverages off of the asset models, like prepayments on home mortgages. It seems like that model should be very similar to what we would see

on the lapse side, in terms of what mathematical function you use. It's just a matter of using it on the liability side. On the other hand, you've got this whole other risk of additional premium coming in, and I don't know of anybody who's really done much work on that. In today's low-interest-rate environment, you're hitting up against guarantees that encourage somebody to dump in a \$100 million deposit. You can't support that. There are still companies out there with five and six percent guarantees. I'm more concerned about how sensitive that is.

**Mr. REISKYTL:** Certainly the concern, when you gave your example, is to risk-adjust the results. It's easy enough to make different changes, but obviously, where actuaries can add value is to try to risk-adjust the results. If you just change the assumptions, it's easy enough to see what the results are. More importantly, have you increased or decreased risk?

**MR. PETER D. TILLEY:** What kind of time horizons would you be doing these calculations over? And if those time horizons go beyond the usual corporate planning cycle, perhaps 5 years, how do you deal with multiple lines of business? In a company that sells many different kinds of products, individual annuities or individual life insurance lend themselves well to this. They probably have inputs directly from some software packages that we all use to do our ALM modeling. Those lines don't seem too complicated for this kind of a process—at least to feed the data in. But lines like group life or group health—if you're in a company that's doing all those sorts of things as well, and you're dealing with a line of business that's used to thinking in terms of, at most a 5-year model. Does it make sense to be doing 20-year present value (PV) discounting on the individual products, and three- or five-year PV discounting on the group side? Or do you have to try to get the group guys onto that same time horizon?

**MR. RUDOLPH:** That's an issue that comes up a lot at our company, because we do have all the lines that you referred to. You're exactly right, Peter, that on the group lines, generally they don't go out nearly as far, even on group disability insurance (DI) or group long-term care, as you'd like to see. It's a different mindset. We're trying to use EV to encourage them to extend those models, so all of the material cash flows are included. For individual health that's going to be a lot shorter than long-term care, whether it be group or individual. Certainly, the group long-term care product could extend for 50 years or more. It's a structured settlement-type tail. But I think you raise a good point. It's one of those iterative issues that you try to get on the table. I think there are some side benefits to the product lines as you start to extend the models. One of the things that we've actually threatened to do is to say, "We'd really prefer to have you, as the product manager, extend these models out. But if you don't, I'm going to extend them, and we're going to present it to senior management. It's going to come back, and they're going to ask you why we did such a poor job."

So far that hasn't worked. They've essentially let us go ahead and extend them. Now we've gone back and said, "Well, here's what we did. Does it make sense?"

Now that we have something to show them, we've been able to come back, and they've been very interested in our analysis. All the models that we have extended are available as a result of our duration work, because you have the exact same issues when you're trying to calculate a duration for these blocks.

**MR. JUNKER:** Each line is different. Thinking of the nature of the benefits, how predictable are their cash flows? Immediate annuity obligations are pretty well fixed, and there isn't too much to do about that. You need to extend the models a long way. For term insurance, you have the mortality deterioration assumption, and that compounds over time. When people hit the end of the level period, you can expect mortality to sharply rise for those who persist, reflecting the steeply increasing premiums. What do you really believe is going to happen after the 20<sup>th</sup> year? You can run your model 30 years, and observe distributable earnings of the first 10 years, 15 years, first 20 years. You may conclude that incremental economic value of each added projection year is still contributing quite a bit. Years 21 and later may be worth a fair amount. On the other hand, do you really want to take credit for it? You may come to a different answer for each line in this regard.

One point I would make, of course, is that if cash flow testing is your model, maybe you've already settled on 20 years. But if you're doing an economic value analysis, you may observe results and conclude: "I invested all this statutory surplus, and I don't get an adequate return unless I reflect 30 years." In GAAP pricing projections, 30 years is common. So, if you're going to do all your architecture for EVA, think about going out 30 years before you set up for 20 years, because it's much harder to extend the models after the start-up phase.

Chart 1

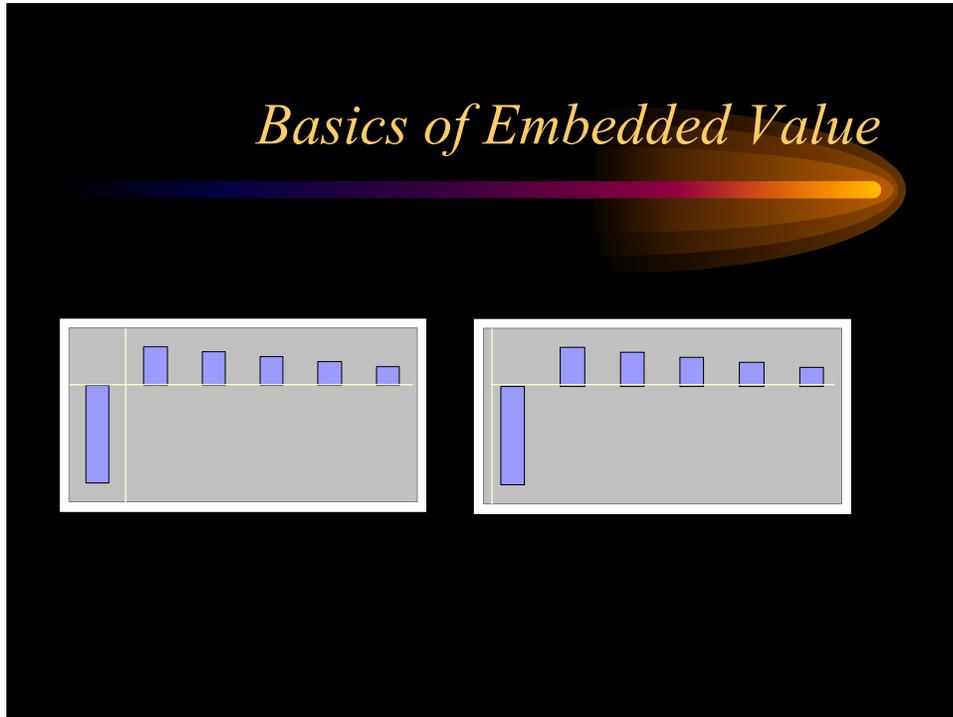


Chart 2

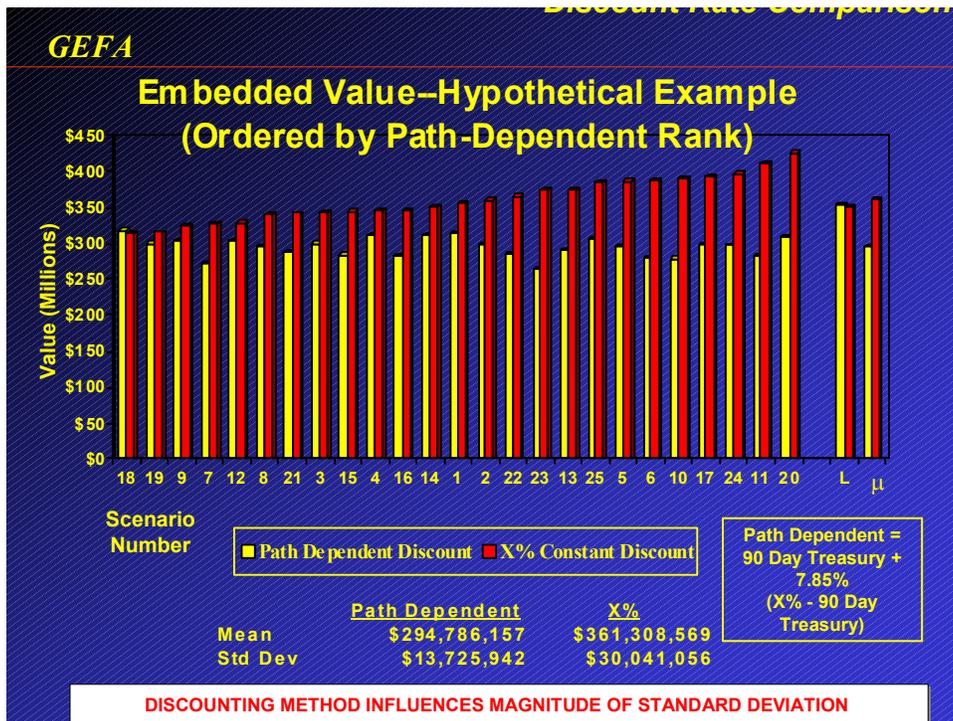


Chart 3

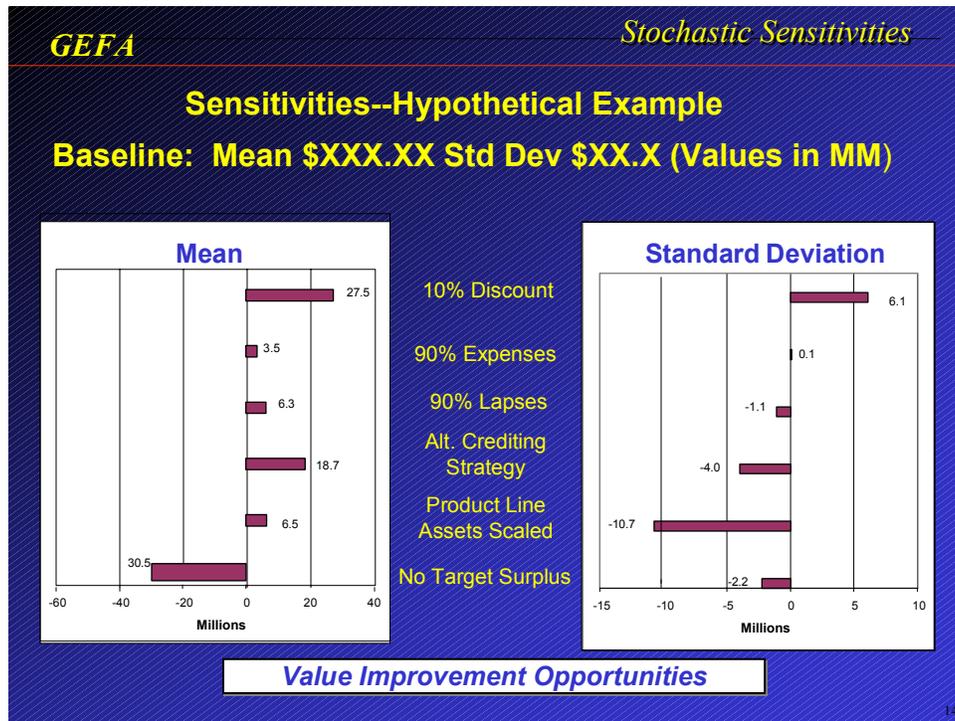


Chart 4

