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Embedded Value, Fair Value and the Move to Principles-Based Accounting

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Summary: The International Accounting Standards Board (IASB) is well on its way to adopting fair-value standards for reporting insurance company liabilities. In the United States and elsewhere, accounting standards boards appear committed to moving away from rules-based to principles-based accounting systems. Panelists in this session discuss current embedded-value and fair-value practices, similarities and differences between embedded value and fair value, and whether embedded value and fair value are evolving into a single, principles-based measure of value. At the end of this session, participants understand current embedded-value and fair-value techniques and how they are related to one another.

MS. MARIA TORRES-JORDA: I would like to first give an overview of what the IASB is currently proposing for fair-value reporting. Then I will compare embedded value and IAS and illustrate the different profit emergence with some case studies.

The IASB has defined a two-phase approach for insurance business:

- For Phase I, to be implemented by 2005, certain contracts will be accounted as insurance contracts under existing accounting and others as investment contracts under IAS 39 (standard for financial instruments).
- For Phase II, the IASB is moving toward a fair-value standard for insurance contracts. All the different issues I will be covering are related to Phase II.

Phase II will cover all insurance contracts. The definition of insurance that the board is considering is quite broad. An insurance contract is defined as a contract under which the insurer accepts significant insurance risk by compensating the

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

policyholder or other beneficiary if he is adversely affected by a specified uncertain future event.

In considering whether an insurance risk is significant, no specific guidance is given. Insurance contracts would include term, whole life policies and most property and casualty insurance contracts. The main contracts that would no longer be considered as insurance include, for example, unit-linked or variable contracts without significant death benefit coverage and certain reinsurance contracts such as financial reinsurance, both of which would be classified as investment contracts.

Instead of a deferral and matching model, the model will be asset/liability based. However, it will not be embedded value, since it is explicitly noted in the IASB material that liabilities should be independent of assets, unless policyholder benefits are directly related to asset returns. Additional guidance will be provided on how to deal with performance-linked products.

There is clearly an intent by the IASB that the insurance framework and the accounting for financial instruments, which is defined by IAS 39, are internally consistent. But if insurance contracts are held at fair value and companies choose to classify most invested assets as available for sale and account for most investment contracts at amortized cost, there will be an income statement disconnect between these items. The only way that companies would be able to eliminate this disconnect would be to classify invested assets as trading, with changes in value going through income, and go for the fair-value option on the liabilities.

What are the basic elements of a fair-value framework? Since there is no liquid market for insurance liabilities, I am sure that if I ask each of you for a definition of fair value, I will get as many different responses as there are actuaries in this room. The basic elements of the fair-value framework that the IASB is currently pushing for are the following:

- The fair-value reserve is defined as the expected weighted average of the present value of future liability cash flows.
- Discounting must be at the risk-free rates.
- There must be adjustments in either the cash flows or discount rates for risk and uncertainty. You will hear actuaries use the words "market value margins" for these adjustments. There are a few theoretical approaches on how to set market value margins, but the challenge resides in how to calibrate these margins to market information.
- Credit standing or claims paying ability of the company must be taken into account, generally by reflecting an adjustment to the discount rate. This basically means that if a company is suddenly downgraded, its fair-value reserve will decrease. But allowing a provision for credit standing is consistent with the way invested assets are valued. If taking credit standing was not allowed, many insurance and investment contracts would have a

large loss at issue, which does not make sense in many cases. We will see this illustrated later.

- Assumptions should be constantly updated/unlocked.
- Assumptions for interest rates and equity returns are not chosen by management as their best estimates. Instead, they are solely based on the forward interest rate curve as of the date of valuation. If a stochastic generator is used, the generator must be risk neutral and arbitrage free, basically meaning that it should be tested against the pricing of marketable securities and market value should be validated.
- For non-economic assumptions (such as mortality and lapse), there is generally no market data available. In that case, it would be appropriate to use entity specific data.

Other things that the IASB has been discussing include whether to consider future premiums or not. They have been struggling with how to deal with renewal premiums in the calculations. They are trying to create a definition that works for all types of insurance, and is also consistent with items such as credit card receivables. The latest definition is that future premiums should be included where uncancelable renewal rights constrain the insurer's ability to reprice or rights lapse if the policyholder ceases premiums. Insurers are mostly hoping that the definition ultimately ties more into a best-estimate type of assumption, just like mortality and lapse.

The IASB is not comfortable with a gain at issue, even though this could be obtained by applying the fair-value principles. They are currently proposing that no net gain at issue is permitted (by adding adjustments for risk and uncertainty), although losses may be recognized. This makes it quite difficult to argue that what we are doing is a fair valuation

All options and guarantees should be considered. It's not necessary to bifurcate and value them separately. You can use different techniques to value these options. One of them is the replicating portfolio technique. This means finding a mix of assets that replicates the liability cash flows. Then, the fair value of the liabilities is equal to the market value of these assets. Another alternative is to use closed-form solutions, for example, Black and Scholes. As the third alternative, we can do a stochastic valuation using risk-neutral and arbitrage free scenarios. The first two alternatives are quite difficult to implement in practice due to the complexity of some of the options embedded in insurance products, such as policyholder behavior. Companies tend to value the options by running stochastic models.

What are the main differences from the Draft Statement of Principles (DSOP)? The first is the definition of insurance. The IASB changed the definition of insurance from the one that was originally in the DSOP. The current definition is much looser, effectively making less to do for insurers in Phase I and characterizing more as insurance for Phase II, meaning more items must be fair valued. But, as noted earlier, once Phase II is adopted, it will probably be in most companies' interests to fair value investment contracts as well.

Taking credit standing into account is quite controversial. The DSOP wanted entity specific value with no credit standing taken into account. This thinking has changed into fair value with credit standing taken into consideration.

If one applies the DSOP principles, it is very possible to have a large gain at issue with some products. As I said before, the thinking about allowing this gain at issue has changed.

In the DSOP, the criteria for including renewal premiums was that they must be a valuable option to policyholders, which was defined as causing the liability to increase by including them. This criteria has changed, although the current criteria doesn't seem to be very practical.

After this overview of what the IASB is currently proposing for fair-value reporting, I'm going to compare the IASB proposal and embedded value. To be able to do a meaningful comparison between IAS and embedded value, we need to think about the embedded value calculation differently than the way we are accustomed.
The present value of distributable earnings at the hurdle rate can be thought of as the difference between the book value of assets less the embedded liabilities, where the embedded liabilities are comprised of the following:

- Present value of the best estimate projection of liability cash flows, discounted at the asset rate earned on the investments backing the business, plus,
- A provision for risk and uncertainty, defined as the excess of the hurdle rate over the asset rate times the embedded value. Note that the excess of the hurdle rate over the asset rate is what shareholders demand to assume all the various risks of the business, excluding the asset risk.

Let's illustrate the equivalence between the traditional method of computing embedded value and the method I have just explained, which is usually referred to as the embedded value indirect approach (Table 1 and 2).

This very simple example uses a one-year guaranteed interest certificate (GIC) product. The premium is $1 million. The company is earning six percent on its assets; it's passing the policyholders five percent; reserves are equal to account value. The target surplus is equal to three percent of reserves and the hurdle rate is eight percent.

Table 1
Simple Example Traditional Embedded Value Calculation

Year	**0**	**1**
Premiums	1,000,000	0
Investment Income	0	61,800
Benefits	0	(1,050,000)
Change in Reserves	(1,000,000)	1,000,000
Pre-Tax Income	0	11,800
Target Surplus	30,000	0
Distributable Earnings	(30,000)	41,800
Embedded Value at 8%	**38,704**	

We can see that at moment zero, the pre-tax income is zero (Table 1). At moment one, we have 11,800. When we do the present value of distributable earnings at eight percent, we get 38,704 using the traditional calculation.

Let's look at the indirect approach (Table 2). We start with the required assets. Assets are equal to reserves plus target surplus. Then we take the liability cash flows—that is, the $1 million (initial premium) plus the five percent interest that we are giving the policyholder. We discount those liability cash flows with the asset rate. As I said before, the asset rate is six percent. Then we calculate a provision for risk and uncertainty, which in this case is equal to eight percent (the hurdle rate), less six percent (the asset rate), times the embedded value, which is 38,704. So when we look at present value of the liability cash flows and the present value of the provision for risk and uncertainty, we get an embedded value liability of 991,296. If you do the required assets less this embedded value liability, you arrive at the embedded value, which is exactly the same value we got before when we did the present value of distributable earnings.

Table 2
Simple Example EV Indirect Approach

Year	**0**	**1**
Required Assets	1,030,000	0
Asset Return (Investment Income/Required Assets)	0.0%	6.0%
Liability Cash Flows	0	1,050,000
Provision for Risk and Uncertainty (Hurdle Rate less Asset Rate times EV)	0	774
EV Liability (PV of Liability Cash Flows plus Provision for Risk and Uncertainty at the Asset Rate)	991,296	0
Embedded Value **(Required Assets less EV Liabilities)**	**38,704**	

Once we understand the indirect method, we can now compare IAS and embedded value. In terms of the invested assets, under IAS we have a mix of market value and amortized cost:

- Assets can be classified as held to maturity, which are valued at amortized cost.
- Assets can be classified as available for sale, valued at fair value with changes in unrealized gains and losses through equity.
- Assets can be classified as trading, valued at fair value, which changes in unrealized gains and losses through income.

Under embedded value, assets are at market/book value. This depends on the country. We can't really determine what the impact is going to be on net worth; it's going to depend on the interest-rate environment.

In terms of the liabilities, we use best estimates for the non-economic cash flow assumptions for both frameworks (IAS and embedded value). As I said before, under IAS we can include future renewals, but we are subject to the ability to re-price that the insurance company has. Under embedded value, we usually use the best estimate assumption, so that we have a negative impact on net worth if, for some products under IAS, we cannot include the future renewals.

Under IAS, the liability discount rate is the risk free rate plus credit risk. Under embedded value, the discount rate is the rate earned on the assets. As companies usually tend to leverage their credit standing, investing in riskier assets, we expect that their discount rate under embedded value is going to be higher than their discount rate under IAS. So that's going to have a negative impact on net worth as well.

Provision for risk and uncertainty: There is no clear guidance under IAS on how to set the provision for risk and uncertainty, though there are several methods that companies are currently testing. Certainly, they will not be equal to the embedded value provision, which takes into consideration the rate earned on assets when valuing the liabilities.

Options and guarantees: The IASB has stated that you should value all options and guarantees using option-pricing techniques. Under embedded value, some companies include the value of the options; some companies ignore it; some companies do a simplified approach based on a reduced number of scenarios.

Profit or loss at issue: As I said before, the IASB has been proposing that if there is a gain at issue, you may have to put additional margins to break even. Under embedded value, there is no break-even requirement. So that is also going to have a negative impact on net worth.

I would like to look at some case studies so we can compare the profit emergence under both frameworks. Chart 1 illustrates an example using a very simple product—10-year-level-premium term insurance. It shows the progression of earnings under IAS and embedded value, assuming experience follows that assumed in pricing.

The first lesson that I would like to illustrate is that, because of the strong basis for regulatory reserve and capital for this type of product under U.S. statutory, there is a high profit at issue under IAS (obviously ignoring the recent artificial limitation that the Board is proposing, which relates to not allowing a profit at issue).

Products tend to be priced using embedded-value frameworks. The gross premium for this product is set to cover benefits and expenses, as well as providing for the cost of holding regulatory reserves and capital. Higher reserve and capital requirements imply a higher gross premium than would be needed without these requirements. A higher gross premium implies a lower fair-value reserve, since the fair-value reserve is equal to the present value of benefits and expenses less the present value of gross premiums. A lower fair-value reserve implies a higher profit at issue on an IAS basis, relative to embedded-value earnings. Going forward, IAS and embedded-value gains are caused by the release of provisions for risk and uncertainty and interest on surplus.

I'm going to illustrate a more complicated product. The next example shows a single-premium deferred annuity (SPDA). It has a single premium of $1 million. The company's rated AA. The account value is just the single premium plus credited interest, and it has a minimum interest-rate guarantee of three percent. There are also surrender charges, which vary by year. They are zero after six years. The lapse rate in year six bumps up to 20 percent (shock lapses when the surrender charges extinguish) and there are interest-sensitive lapses when the product is not competitive. We are going to assume that future interest rates follow the implied forward rates. The company leverages its credit rating by investing in one-, five-, and seven- year A-rated bonds and decides to pass on the book yield on these bonds less 132 basis points to the policyholder.

Chart 2 shows what happens when we calculate the fair value of the liabilities discounting with the risk free rate. That's the first bar in the graph. There we can see that when we are discounting with the risk free rate, we get a significant loss at issue. Why is that? If we go back to the assumptions, we can see that the company is earning on its assets the risk free rate plus 1.44 percent (credit spread for A-rated corporate bonds). If the company is earning on its assets risk free rate plus 1.44 percent, and it's crediting the policyholder the portfolio book yield less 132 basis points, then the company's crediting the policyholder risk free rate plus 0.12 percent. That's what we're using to project the cash flows, but how are we discounting the cash flows? We are discounting them with the risk free rate. That means that at issue we have a loss, which is comprised of the value of the acquisition expenses and the commissions that we paid when the policy was issued, and also the present value of the differential between how we are projecting the cash flows and how we are discounting. This differential is equal to 0.12 percent.

The second bar takes into account credit standing by assuming the company can discount cash flows at the AA-rated corporate bond rate. This AA rate is equal to the risk free rate plus 1.12 percent. As mentioned, the credited rate turns out to be the risk free rate plus 0.12 percent. The loss caused by paying the commission is almost exactly offset by the fact that the discount rate is higher than the credited rate by 1 percent.

Let's see what happens when we compare the IAS framework, discounting with the risk free rate plus credit risk and embedded value (Chart 3). We can see that, as expected, embedded value produces a higher gain at issue. The reason for this is that, first, the company is leveraging its credit standing by investing in A-rated assets and, second, under embedded value, we can capitalized at inception the excess of the interest earned on the assets over the interest credited to the policyholders.

Finally, let’s see what happens when there is an interest rate shock (Chart 4). We are going to assume that interest rates increase by 300 bps at the end of year three. Under an IAS framework, the market value of the assets declines. On the liability side, policyholder credited rates are still based on the portfolio book yield. But new money type yields are up 3 percent; the product becomes uncompetitive, causing higher lapses. Liabilities decline, but not as much as assets do. This causes a significant loss under IAS.

Under embedded value, if the hurdle rate is unchanged, liabilities tend to increase. Interest sensitive lapses are higher and, since the asset rate is on a book basis, the discount rate will increase, but only gradually in time. The third bar illustrates what happened if the company immediately increases the hurdle rate by 300 bps. Even in that situation, losses will be worst under IAS.

To summarize the discussion: What are the business implications of IAS and embedded value on the comparison between the two frameworks?
As we have been able to see in the various case studies, the IAS framework is disconnected from current pricing techniques. Since embedded value allows you to capitalize at issue future investment spreads, the embedded value of new business will tend to be higher, especially for investment oriented products. In addition, large swings in interest rates and equity markets will cause substantial net income volatility, which will tend to be much more significant under IAS.

Disclosure and external relations will certainly be an issue under IAS type frameworks. A new way of communicating to both the public and analysts will be needed. Companies will need to do a good job in explaining volatility. Due to interest rate changes, the balance sheet may materially change from date of valuation, to date of filing, to date of shareholder or analyst meeting. Companies will need to provide very detailed disclosures for key elements of profits, key assumptions and the quantification of the provisions for risk and uncertainty.

MR. EDWARD L. ROBBINS: What is your opinion on the concept of a liability being connected with someone's credit rating?

MS. TORRES-JORDA: There's been a lot of discussion on that. When the company's downgraded, the liabilities go down; that is something you would not expect. If all the other assets and liabilities in the balance sheet remain the same, your surplus will go up, which is totally counterintuitive. The people that have been developing this IAS framework come from an academic background. They say, "Well, that's right, your surplus will go up because the option that the shareholders have to default on the liabilities increases in value." However, in the market when a company is downgraded, you don't see the share price going up. Some argue that if the company has been downgraded, it's because another part of the balance sheet has also deteriorated, so you will not observed an increase in surplus. Some others put forward the following extreme situation: Imagine that the company is bankrupt. What's the value of the liabilities there? It's zero. They will never pay them. It's a very controversial discussion.

FROM THE FLOOR: Someone indicated to me that it would be a good idea to go to the rating agency and ask them to lower your credit rating.

MS. TORRES-JORDA: Certainly, yes. Now Duncan is going to focus on discount rates that you have to use for both frameworks. I'm sure he will go into much more detail on this credit-standing issue.

MR. DUNCAN BRIGGS: I was asked to do this session a couple of months ago and was given a fairly free rein as far as the specific topics to cover. As some of you probably know, I've done sessions on embedded value at previous Society meetings. I would say without doubt the area that gets the most questioning is the discount rate. How do you set the discount rate? What factors should you take into account? What does the discount rate really mean? I thought I'd take this opportunity to spend a bit more time on that specific issue and delve into both the theory and the practice around setting discount rates.

As you know, embedded value has been around for a long time, at least outside of the United States. It's been used for many years, so I'm going to cover both the theoretical aspects of embedded-value discount-rate determination as well as look at what's done in practice by those companies that report embedded-value results. Fair value, on the other hand, as Maria has alluded, is a fairly new concept, so that part of the presentation is going to focus on the theory behind fair-value discount rates. I'm also going to cover some of the more controversial aspects that are currently being debated, such as the use of the company's own credit standing in the discount rate. Finally, I have a couple of very simple examples that attempt to reconcile an embedded-value calculation with a fair-value calculation.

Before I get into the detailed theory on embedded-value discount rates, I'd like to remind everyone of a very fundamental principle that is critical to the assessing of discount rates—that investors require a higher expected return in return for accepting nondiversifiable risk. Let's take a very simple one-year bullet bond. I've assumed that the bond is risk-free and has a current market yield of five percent. If you discount the expected cash flow of 105 at the risk-free rate of five percent, of course you come back to the market value of 100. In the second part of the example, the bond is now assumed to have some default risk. It has a current market yield of seven percent and a market price of 100. Assuming a default probability of one percent, we can figure out that the expected cash flow to the bond holders is 105.93, and, of course, the rate that takes you back from 105.93 to the market price is 5.93 percent. So the difference between those two discount rates—the 5.93 percent and the five percent—is basically the additional return or expected return that the market demands in order to accept the default risk on the corporate bond. Another way of expressing this principle is that more volatility in cash flow commands a higher risk premium.

Chart 4 illustrates another example of the risk and return tradeoff. This graph is actually based on a scenario generator that's been calibrated using the historic data. On the Y-axis for a range of asset classes, we have the average of compound annual return for each of those asset classes. On the X-axis, we show the standard deviation of those returns. You can see a clear correlation here between the return and the standard deviation with the stock-type asset classes having both the higher expected returns, but also having the higher standard deviation.

The theory as far as embedded-value discount rates is concerned basically says that the discount rate that's used to discount projected distributable earnings should be at the company's weighted-average cost of capital, which is the weighted-average of the company's cost of debt (after-tax) and the company's cost of equity (Chart 6). Those weights should reflect current market prices. The cost of debt can be pretty easily calculated based on the market prices and market yields currently for the company's debt. The cost of equity can be determined using a capital-asset-pricing-model-type approach. We're using the formula I show at the bottom of the slide there. We get the company-specific cost of equities calculated as a risk-free rate plus a company-specific beta multiplied by an equity-market risk premium. The most difficult aspect of applying this theory is coming up with the company-specific beta. For example, even for life companies that are directly traded, you might have some stock-price history that you can use to estimate the historic beta, but that's not necessarily indicative of the volatility of the company's earnings. So you might have to use a different volatility factor.

I'm going to come back in a few minutes to some of the factors that should be considered in determining cost of equity. First I want to illustrate, using a simple example, how leverage on a company's balance sheet should influence the embedded-value discount rate. The example I have is really highly contrived in order to illustrate the points I want to make, but I think you can generalize conclusions to more realistic situations. The company in the example manages money on behalf of investors over a one-year time horizon. It invests that money in the broad equity market. The cost of equity for the broad equity market is 10 percent. The company deducts a management fee of 100 basis points at the end of the year. The company is assumed to incur acquisition costs of one percent, and in the first part of the example I've assumed that those acquisition costs are financed by equity capital in the company. The assumption as far as the expected returns in the broad equity market is 10 percent, and then I've assumed that there are no ongoing costs for the company, so basically the entire management fee that is deducted at the end of the year inures to holders of equity capital.

What do the finances of this company look like? Well obviously that's going to depend on what happens to equity-market returns. I've illustrated five different levels of equity-market return. What does this mean as far as return to the equity investors? Chart 7 shows that basically the return to the equity investors is identical to the return for the overall market. So because we have volatility of equity investors' return, same as the volatility of the overall market return, we know that in this example the company-specific cost of equity is the 10 percent expected return for the market. We can look at this is another way by just taking the expected cash flow to shareholders (11), and then discounting that back at 10 percent gives us the initial equity investment of 10. You can look at it from both sides of the equation and come to the 10 percent as the right discount rate to use.

I'm now going to complicate the example by introducing leverage, and I'm going to assume that the capital structure is now changed to 75 percent equity/25 percent debt. There are actually two approaches in doing embedded-value calculations that can be used to deal with a leveraged balance sheet. The first approach, which is the one that's most commonly used in practice, is to take the embedded value as the present value of expected pre-debt cash flows, and then subtract off the current market value of the company's debt. The alternative approach, which is not as commonly used, is to directly discount the post-debt cash flows. On Chart 8, I'm going to figure out what discount rate we need to use with both of these approaches. To do that, I'm going to start from the assumption that when we do the discounting we want to get a number that equals the initial investment of the equity investors. In other words, if the equity investors put in $1, then immediately after they put in $1, it needs to be worth $1.

The finances of the company now show the initial debt capital of 2.5 and a debt repayment of 2.65, which is simply the initial debt plus interest at an assumed rate of five percent. If you look at the right-hand column (the return to the equity investors), you can see a couple of things. First, the expected return has now increased. Rather than the 10 percent we had previously, it's now 11.7 percent. Secondly, the volatility is also greater, so in the down scenarios the equity investors lose more than the market as a whole. In the up scenarios, they do better. If we apply the embedded-value Approach 1, where we're present valuing the pre-debt cash flows and subtracting off the market value of the debt, we're basically taking present value of 11, minus 2.5. If we solve for the discount rate, it gives us 7.5, which is the initial equity investment, then we get a discount rate of 10 percent. If, on the other hand, we use embedded-value Approach 2, which is to directly take the post-debt cash flows, we're then discounting 8.375. We solve for the discount rate, and we find that it's 11.7 percent.

So what does this example tell us? First, it illustrates the principle that leverage does create more volatility in the return to the equity investors. As we saw from the earlier slides, more volatility and cash flow demand a higher risk premium. We see that by the fact that expected return in the example is now 11.7 percent versus 10 percent in the unlevered situation. If we use embedded-value Approach 2, which is the one that's not commonly used, then the correct discount rate to use is actually the company's cost of equity, not the weighted average cost of capital. We see that as you increase the leverage, you increase the cost of equity. So if you also use this approach in the embedded-value calculation, the discount rate should be increased if the leverage on the balance sheet is increased. If, on the other hand, you use the more common Approach 1 to do the embedded value, then the discount rate is the company's weighted average cost of capital. We can calculate that from first principles and get back to the 10 percent that we illustrated in the example. So really what we're saying is the weighted average cost of capital doesn't change with the addition of leverage, which is a fundamental principle of financial economics. I've simplified things slightly by ignoring taxation, and obviously debt payments are tax-deductible, so there is some advantage to putting debt on the balance sheet. On the other hand, I've also ignored financial distress, which basically says that debt holders rank above equity investors in the company, and that offsets the tax effect a bit. I think the net of those two items tends to be somewhat second order in the basic principle that weighted average cost of capital is really invariant to changes in the leverage structure of the company.

As I mentioned earlier, coming up with the company-specific cost of equity is really the big challenge in assessing an embedded-value discount rate.We're trying to look at the volatility of the cash flows to the equity investors in the company. There are obviously a lot of different factors that can influence that. We talked already about leverage in the context of the example. I think it's important to think of leverage in a fairly broad sense. For example, a lot of financial reinsurance agreements are really very similar and characteristic to debts. If you have financial reinsurance agreements that are like that, that really dictates that for embedded-value purposes you should treat them like debts in setting the discount rate.

Target-surplus level is an important consideration. Some companies do embedded value using realistic levels that pertain to surplus or target surplus in the company, for example, based on rating agency formulas; whereas other companies do the calculations using regulatory minimum levels, which are typically a lot lower. I think depending on which approach you take, there is, in theory, a discount-rate implication. If you hold more retained surplus in the company, that is going to have to dampen the volatility of the cash flows to the equity investors. So more target surplus should really imply a lower risk premium and, hence, a lower discount rate.

Related to this point is the level of conservatism in statutory reserves. If you have a lot of redundant reserves, that's going to have to reduce the volatility and, in theory, reduce the discount rate. The underlying product cash flows need to be considered. Certainly some product types are going to be riskier from the shareholders' perspective than others. I think you could argue that, for a block of variable annuity business, the volatility is maybe even more than the equity market, because your revenue is basically proportional to equity market returns but you have some fixed costs. You have leverage there that might imply a higher risk premium for that type of business.

You have some control over profitability and you can manage credited rates to hopefully maintain a reasonably stable level of profit volatility on those types of products. This should be less and, hence, the risk premium should be less.

When we're looking at embedded value, we're really looking at it for the company aggregated, so you can do all these calculations for the specific products. But at the end of this we're aggregating everything up and looking at the riskiness of the overall company cash flows. When you do that, it's important to think about the benefits you get from having a diverse mix of business as well as natural hedges in products, to the extent that both of these factors act to reduce overall volatility that would act to reduce the overall risk premium in the discount rate.

Corporate-level risk management programs—again, things like reinsurance, securitization, anything that's being put in place at the corporate level to dampen volatility to equity investor—should in theory have a discount-rate implication. Finally, it's important, when you're considering the discount rate, to think of it in conjunction with how things like option and guaranteed costs are considered. If, for example, you have guaranteed minimum death benefit (GMDB) risk on variable annuities, a lot of times that's allowed for in embedded value by including an explicit cost in the projected cash flows to reflect the expected cost of that benefit. If that's the case, then what you don't want to do is add in something additional to the discount rate to allow for that risk. You need to be careful not to double count for the same risk.

That covers the theory of embedded-value discount rates. I think what companies tend to do in practice is somewhat more simplified than the full theoretical approach I've just outlined. I would say the typical approach that has developed over the years by those companies that publish embedded value is to set the discount rate equal to a risk-free spot rate plus a spread. Most of the companies that do embedded value have operations in a number of different countries, and they'll typically vary the discount rates in each country to reflect differences in both risk-free and in the perceived volatility of cash flows from that country. In the United States, the 10-year Treasury has generally been used as the risk-free rate, and I think in theory you should really be looking at the duration of shareholder cash flows in choosing an appropriate term. Ten-year has been used by most companies, but if there are certain types of business that are much shorter-term or longer-term, then maybe a different rate is appropriate there. Typically the rate has been taken as a spot rate on the valuation date. In a couple of cases, I've seen companies average over a short period if, for example, the spot rate on the valuation date had popped down or popped up, they've averaged over a bit just to smooth out some of that volatility.

The spread that's used is then implicitly capturing the leverage and all of the other factors that I mentioned previously, and the spread in most cases typically is not varied from year to year. Sometimes it may be changed. If, for example, there have been significant changes in a company's operations or in market conditions, this spread may be changed in those situations, but typically it's kept reasonably constant from year to year (Table 3).

Table 3

Year-end 2002 Discount Rates for U.S. Operations of Companies Publishing Embedded Value Results

Company	**Discount Rate**	**Spread over 10-yr T**
Legal & General	6.40%	2.53%
Swiss Re	7.00%	3.13%
Prudential (Jackson National)	7.00%	3.13%
Munich Re	7.00%	3.13%
Canada Life	7.50%	3.63%
Sun Life	7.50%*	3.63%
AXA	7.50%	3.63%
Fortis	7.70%	3.83%
Manulife	8.00%	4.13%
Aegon	8.00%	4.13%
Old Mutual	8.00%	4.13%
Zurich	8.00%	4.13%
Allianz	8.15%	4.28%
ING	8.30%	4.43%
*8.5% used for separate account business		

This table shows the discount rates that were used by companies with U.S. operations that published discount rates at the end of 2002. The 10-year Treasury year-end 2002 was 387, so what we could see is based on that risk-free rate. The implied spreads over risk-free range from a low of 2.5 percent to a high of nearly 4.5 percent, and if you take out the two outliers there, the range of spreads is actually close to 100 basis points.

I'll move on to discount rates in a fair-value context. I think as good as embedded value is, there are some shortcomings to the system. A couple of these are things that the fair-value-type techniques do attempt to address. In particular, we've talked already about coming up with a single discount rate for a company's entire cash flows. That is an extremely challenging exercise, and there's a lot of judgment that's necessary in order to come up with that single rate. Embedded value tries to make some allowance for options and guarantees, but not really in a market-consistent way. This is an area that fair value attempts to address. The fair-value framework really specifies a hierarchy of methods for coming up with fair value of liability. If a market value is available, use that; if a market value of a similar instrument is available, then use that market value with appropriate adjustments. What is typically going to be the case for most insurance-type liabilities, however, is that there's no market value or pseudo-market available. In that case, the hierarchy says to use some sort of present value of projected cash flows for the liability.

Assuming we're using the present-value method, then what is the right discount rate to use? The framework says that if there's no risk associated with the liability, then we should use a risk-free discount rate. Now, even with something as simple as that, there's still a lot of debate. If you think about the typical liability, that's going to be cash flows of multiple periods of time in the future. In theory you should use a discount rate for each one of those cash flows, which reflects the duration of that cash flow, so already we've introduced a lot of complexity. Treasury yields have been used historically as a proxy for risk-free, but some people are arguing that swap rates might be a better measure, so there's debate around what is the right risk-free measure to use.

If the cash flows do include an element of risk, then a risk adjustment should be included, and that risk needs to reflect the market price of the risk that's being taken on. A few different approaches have been put forward to come up with the appropriate risk adjustment. One is simply to adjust the discount rate to reflect the risk. The second is to use option-pricing techniques where we would basically project the cash flows over a large number of scenarios, and then apply risk-neutral probabilities to average the discounted amounts to come up with the liability value. A third is to use so-called market-value margins where we basically project out cash flows that include some sort of loading or risk margins. For example, on mortality risks, we might load up death benefits to reflect the uncertainty associated with mortality rates. Whichever of these approaches is used, the important thing is to calibrate the risk adjustment to the market price for that risk, and I think therein lies one of the key difficulties with fair value. I mean, for most insurance liabilities, there's no active marketplace, so how do we come up with the market price for these insurance-type liabilities? Some people have put forward the reinsurance market as providing some indication at least of pricing for mortality- and morbidity-type risks, so reinsurance can be used maybe as a guide to setting mortality-type margins.

I think an interesting consequence to the theory is that the risk adjustment could be positive or negative. For example, on a term-insurance-type product where the company is taking on mortality risk, the liability needs to be increased to reflect the mortality risk that the company is retaining, so there's a positive risk adjustment in that situation. On the other hand, in a lot of contracts, investment risk is passed through to the policyholders. If you think about things from the policyholders' perspectives, their asset, which is future income from the insurance company, is going to be reduced in value because of the investment risk they're taking on. So given that the asset on the policyholders' balance sheet is being reduced, the liability on the insurance company's balance sheet should also be reduced, and so in that situation you get a negative adjustment for risk.

I think that certain types of risks are more easily allowed for using one of these approaches versus the other. Market-value margins, I think, are good for mortality- and morbidity-type risks. Options and guarantees are probably more suited to option-pricing-type approaches. If you're using one or both of these approaches to account for risk, then the actual discounting should then be at the risk-free rate, because you've already allowed for the risk by the market-value margins or the option-pricing methods.

Everything I've said so far, however, ignores the key point that Maria alluded to. How should the company's credit standing be reflected in coming up with the discount rate? The pure fair-value theory says that basically the issue here is that the company has a liability to policyholders, but if the company goes insolvent, it could default on those liability payments. So really we should be reducing the liability on the insurance company's balance sheet to reflect the probability that those payments won't be made due to insolvency. That implies using a discount rate that is the risk-free rate plus the credit spread based on the company's own credit standing. As Maria said, this may be the most hotly debated issue around fair-value calculations at the moment as to whether this really makes sense or whether we should just stick with the risk-free rate. I think I've covered the first argument. The other two arguments for doing this are really based on an analogy with the treatment of debt. If you think about debt on the company's balance sheet, if you look at the market value of that debt, it does reflect the company's own credit standing. If that's how debt is treated, why should other liabilities be treated any differently?

I think there are, however, several very strong arguments against using the company's own credit standing in the discount rate. First, it leads to this counterintuitive result that earnings can actually go up when the company's credit standing goes down. In my mind, if I'm an analyst or if I'm an investor in the company, that just doesn't make any sense to me. Is that really a result that I would find useful? At the end of the day, fair value is being put forward as providing good information to investors, and I question whether that is really the type of result investors are going to understand.

A lot of the arguments for adding the credit spread to the discount rate are based on analogies with the treatment of assets. However, a fundamental difference is that while assets are actively traded, insurance liabilities are not. Therefore, why should asset-valuation models be applicable to insurance liabilities? The final argument against is that policyholders are actually given a lot of protection by way of guarantee funds and other forms of protection. I think these protections act to reduce the relevance of credit standing because policyholders rank pretty highly in the event that there is an insolvency.

For the final part of my presentation, I have a very simple example that attempts to reconcile fair-value discount rates with embedded-value discount rates. I need to attribute the foundation for this example to Luc Girard, who, as you probably know, has written a number of papers on fair-value-type issues. Those of you who have read those papers will see quite a bit of similarity in this example to some of the stuff that Luc did. The example is based on a four-year GIC with the following specifications:

DESIGN SPECIFICATIONS

- Insurer's credit rating: AA
- Initial deposit: $1,000
- Term to maturity: four years
- Invest in A-rated corporate bonds
- Target surplus = 5.88% of statutory reserves
- Acquisition expenses = 0
- Credited rate = 5.5%

MARKET DATA

- Risk-free rate = 5%
- Corporate bond risk premium:
  - AA = 50 bps
  - A = 75 bps
- Tax rate = zero

In particular, note that the insurer's credit rating is AA and the underlying assets are invested in A bonds. I'm going to assume a risk-free rate of five percent; a credited rate on the GIC of 5.5 percent; and then we have risk premium for AA bonds at 50 basis points and A bonds at 75 basis points. For the simplicity of this example, I've also ignored the effect of tax.

I'm going to take the fair-value purist approach to setting the discount rate and assume that the company's own credit standing is included. This tells us that the liability-discount rate is equal to the risk-free rate of five, plus the AA risk premium of 50 basis points, so I get a discount rate of 5.5 percent, which happens to be exactly equal to the credited rate on the GIC. The fair-value liability is simply equal to the initial deposit of $1,000 when you calculate it at the end of each and every year. Similarly, the statutory reserves are also equal to $1,000 at the end of each and every year. The market value of assets is then equal to the initial deposit of $1,000, which is basically the amount of statutory reserves at any point in time, plus the value of the target surplus assets. We used 5.88 percent of statutory reserves as our target-surplus level, so that means at the end of every year, the market value of assets is 1058.8. What that tells us then is in this simple example, fair-value equity equals target surplus, and is equal to 58.8 at the end of every year.

Chart 9 shows that statutory and fair-value balance sheets are then actually the same in this case because the asset and liability values are the same. In order to calculate embedded value, we need to calculate our distributable earnings and distributable earnings equal statutory earnings, plus the change in target surplus. Statutory earnings in each year are basically a 25-basis-point spread on the assets supporting the reserves. Don't forget the insurer is earning 5.75 on the A asset; it's crediting 5.50, so a 25-basis-point spread, plus the investment return that's earned on the target-surplus assets. That gives us 5.9 as the statutory earnings in each year. The target surplus is established at time zero. It's held constant throughout the four-year period and then is released at the end of the fourth year, so we get the pattern of distributable earnings that we showed in the chart. If we discount the future stream at the end of any year, we find that if we use a rate of 10 percent, then the present value of distributable earnings at 10 percent equals the target surplus at all times.

The conclusion of the example is that basically using an embedded-value discount rate of 10 percent equates embedded-value equity to fair-value equity. We can also think about the 10 percent discount rate in a fair-value context, and to do that we use a concept referred to as leverage-adjusted cost of capital. I would refer you to Luc Girard's papers for a detailed discussion of that. Basically the leverage-adjusted cost of capital includes a definition of leverage that is equal to the market value of assets, divided by the fair value of equity. We plug in the parameters from the example, and we come up with a leverage equal to 18 in this example. Then the remaining parts of the formula for leverage-adjusted cost of capital involve the underlying asset-risk premium, the insurer's risk premium, the leverage and then the asset earned rate. If we plug the parameters from the example into this formula, we come up to the 10 percent discount rate that we've derived previously.

Now, in the very last bit of this example, I'm going to see what happens if the asset portfolio gets riskier. Chart 10 shows that the company is going to switch to a BBB investment strategy, and we're going to assume 6.5 percent return, so the asset-risk premium is now doubled to 150 basis points. This change actually has no impact whatsoever on the fair-value balance sheet. The fair-value discount rate is just risk-free plus the company's own credit standing. That hasn't changed, so the fair-value liabilities are the same. The market value of the assets also hasn't changed, so fair-value equity is exactly the same as in the prior example, and it's equal to the target surplus. However, if we try to calculate embedded value using this same discount rate of 10 percent, we find that the embedded value has increased, because our distributable earnings have increased due to the additional asset spread that is being earned.

In the bottom part of the chart, I've taken the revised stream of distributable earnings and solved for the new discount rate that allows us to equate embedded-value equity to fair-value equity. I find the discount rate needed to do that is 23.5 percent, and we can also get that directly using the formula for leverage-adjusted cost of capital. I was actually somewhat surprised when I saw that number come out of this example, and I figured I must have done something wrong. But then I thought about it and looked at the underlying riskiness of the cash flows to shareholders, and basically profit is reliant on earning additional spread over and above the credited rate that is given to the bond holders. With fluctuations in default rates like we've seen recently, it can quite conceivably be the case that profit is totally wiped out on this type of product. So once I thought through that logic, I realized that, yes, this increase from 10 percent to 23.5 percent is real, and it reflects the far greater risk that is taken on when you take on the risky asset strategy.

I have a couple of conclusions. You can demonstrate consistency between fair value and embedded value by using the right discount rate, and the leverage-adjusted-cost-of-capital concept helps us to get to that directly. When a riskier investment strategy is employed, the fair-value balance sheet is unchanged, so the additional expected yield under the fair-value reporting system is left to emerge as it is earned over the four-year period. As we see in the example, if we don't adjust the discount rate to reflect the riskier strategy, we're basically capitalizing all of the expected future asset earnings into the current-year embedded-value earnings. I think the conclusion from that is that, using an embedded-value methodology, we really need to think very carefully about the discount rate implications of making changes to investment strategy.

Chart 1

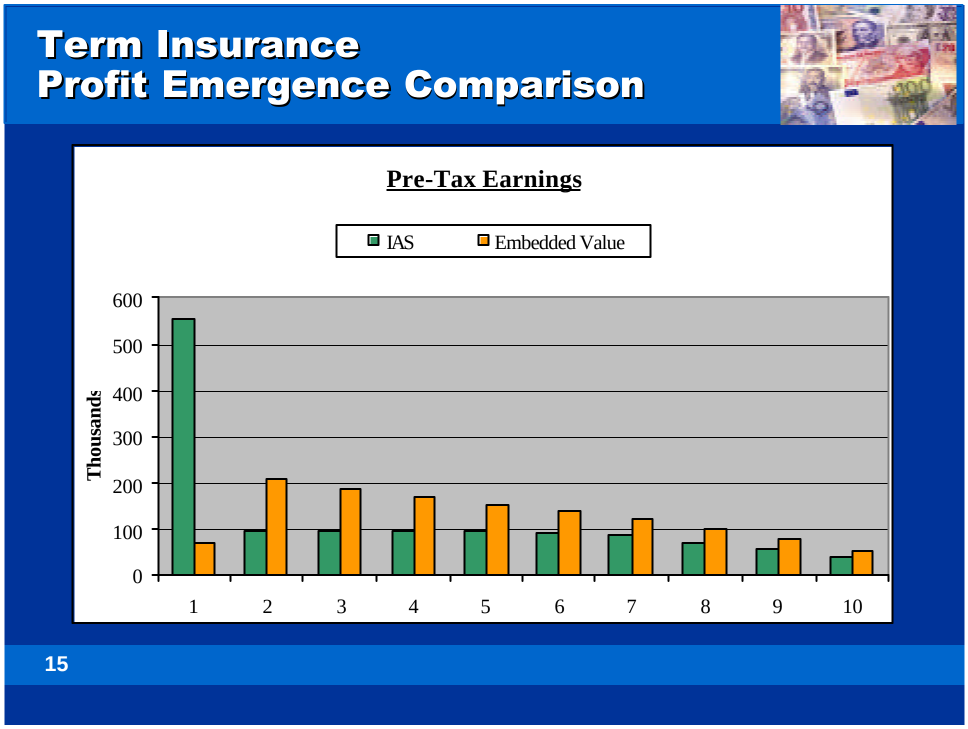

Chart 2

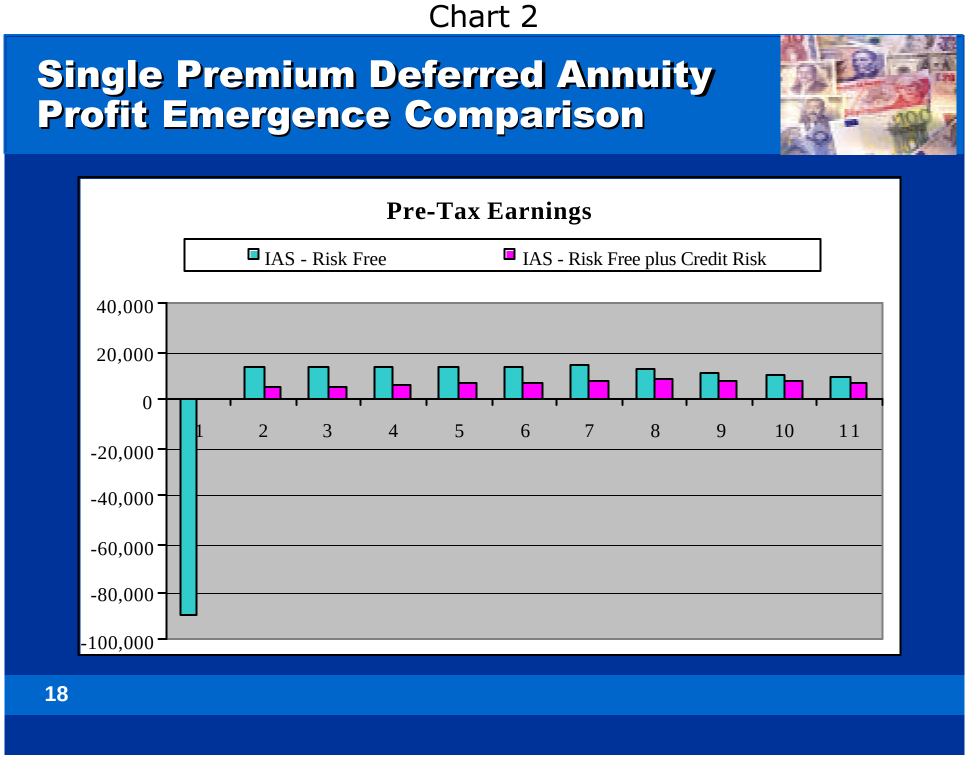

Chart 3

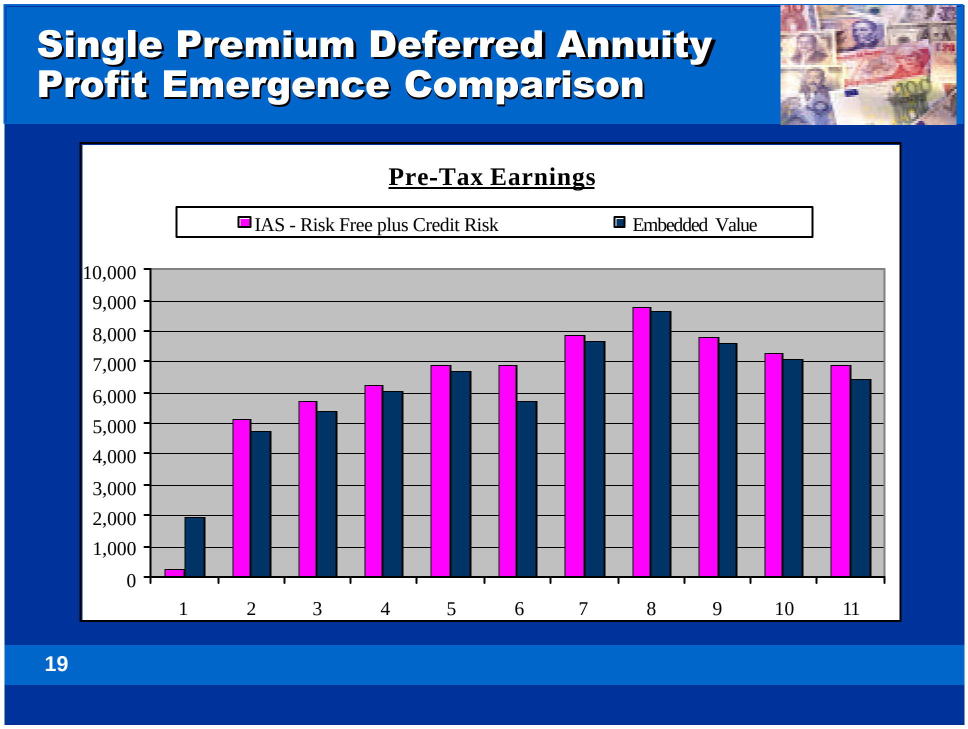

Chart 4

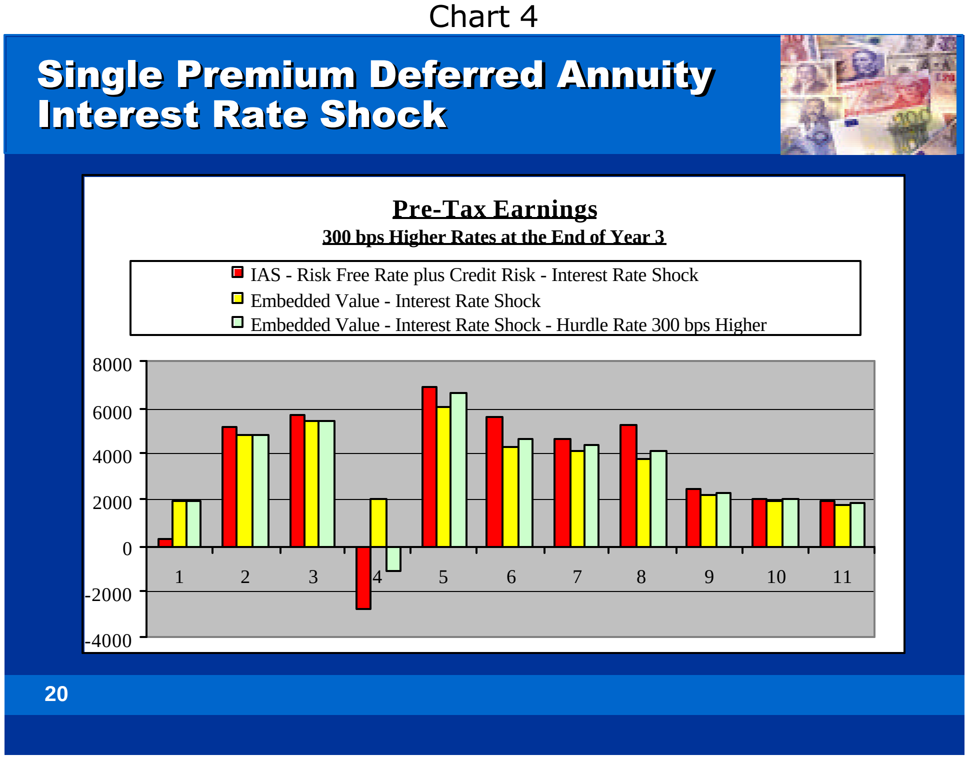

Chart 5

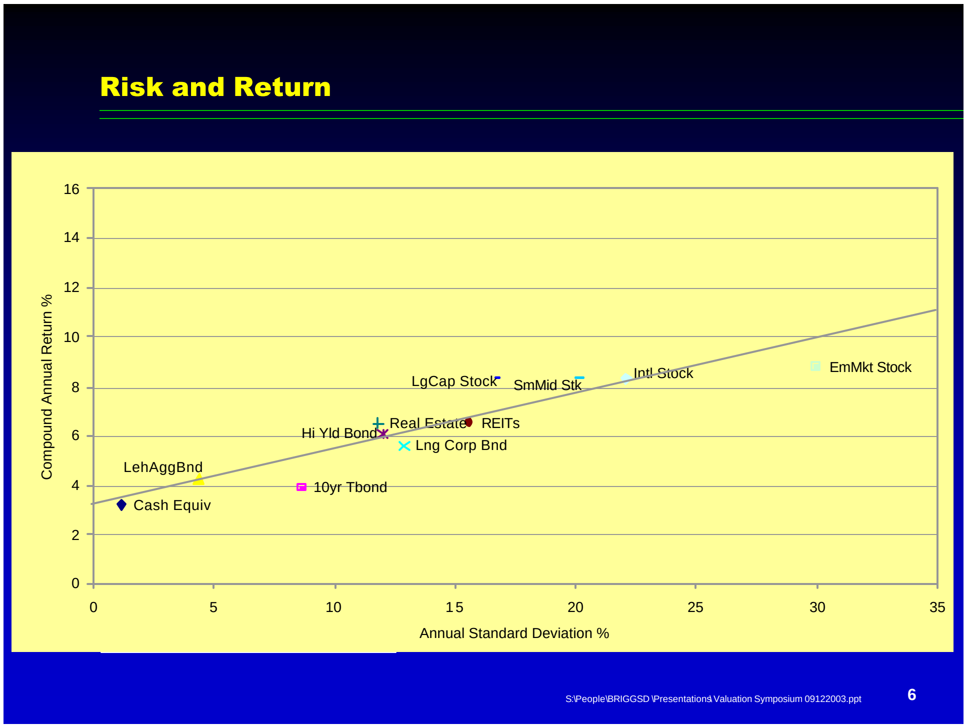

Chart 6

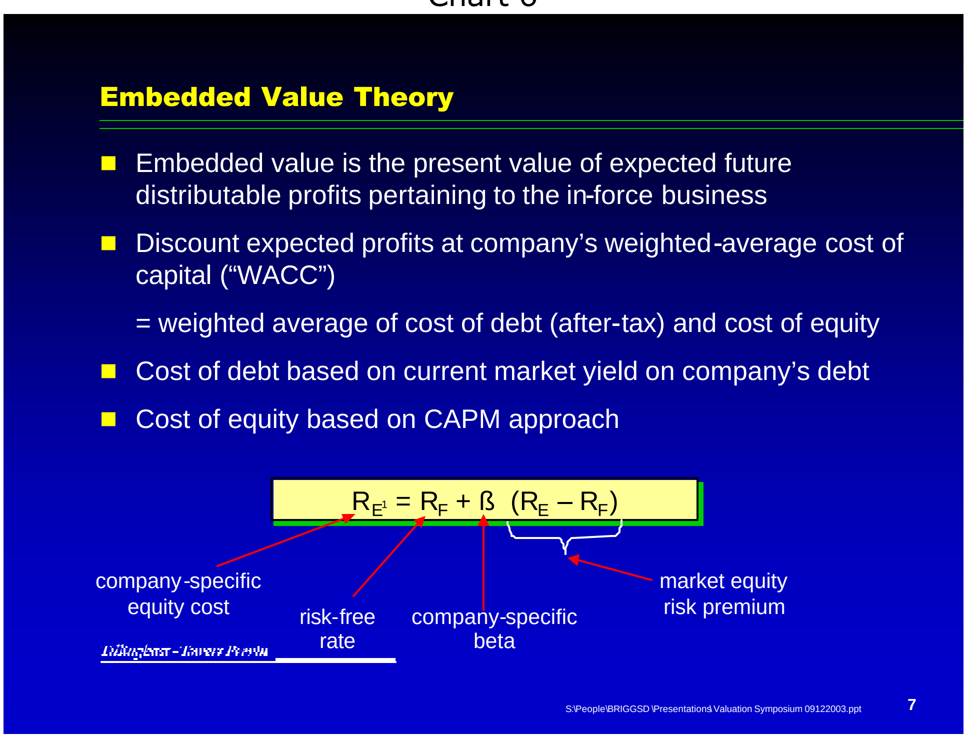

Chart 7

Impact of Leverage on Embedded Value Discount Rates – Example (*cont'd*)

Equity Market Return	Money Under Management boy	Money Under Management eoy	Initial Equity Capital	Management Fee	Return to Equity Investors
-10%	1,000	900	10	9	-10%
Zero	1,000	1,000	10	10	Zero
+10%	1,000	1,100	10	11	+10%
+20%	1,000	1,200	10	12	+20%
+30%	1,000	1,300	10	13	+30%

- Cash flows to equity investors have same volatility as broad equity market
  → company-specific cost of equity = 10%
- Discounting expected cash flow (11) at 10% gives 10, which equals the initial investment

more . . .

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Chart 8

Impact of Leverage on Embedded Value Discount Rates – Example (*cont'd*)

Equity Market Return	Money Under Management boy	Money Under Management eoy	Initial Capital Equity	Initial Capital Debt	Management Fee (pre-debt cash flow)	Debt Payment	Post-Debt Cash Flow	Return to Equity Investors
-10%	1,000	900	7.5	2.5	9	2.625	6.375	-15.0%
Zero	1,000	1,000	7.5	2.5	10	2.625	7.375	-1.7%
+10%	1,000	1,100	7.5	2.5	11	2.625	8.375	+11.7%
+20%	1,000	1,200	7.5	2.5	12	2.625	9.375	+25.0%
+30%	1,000	1,300	7.5	2.5	13	2.625	10.375	+38.3%

- Approach 1
  EV = PV (expected pre-debt cash flow) – market value of debt = PV (11) – 2.5
  Discount rate of 10% yields EV of 7.5
- Approach 2
  EV = PV (expected post-debt cash flow) = PV (8.375)
  Discount rate of 11.7% yields EV of 7.5

more . . .

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Chart 9

GIC Example: The Financials

Statutory and Fair Value Balance Sheet
(Same in This Case)

	Time After Issue 0	1	2	3	4
Assets	1,059	1,059	1,059	1,059	0
Liabilities	1,000	1,000	1,000	1,000	0
Equity	59	59	59	59	0

Statutory earnings each year = 25 bps x 1,000 +5.75% x 59 = 5.9

Year	0*	1	2	3	4
Distributable Earnings	(58.8)	5.9	5.9	5.9	64.7

*At issue

IRR = 10% and PVDE @10% = target surplus, at all times > 0

Chart 10

GIC Example with Riskier Assets

- Invest in BBB bonds earning 6.5%
- F.V. liabilities **DO NOT** change and total MV assets = initial deposit + target surplus
- F.V. equity is same as previous example = target surplus
- ***But*** E.V. @ 10% increases because distributable earnings increase!

	Time After Issue 0	1	2	3	4
Distributable Earnings	(58.8)	13.8	13.8	13.8	72.6
EV @ 10%	84.0	78.6	72.6	66.0	0.0
Fair Value (= target surplus) = PVDE @ 23.5%	58.8	58.8	58.8	58.8	0.0

NOTE: LACC = 100 bps x 17 + 6.5% = 23.5%
= Discount rate that reconciles E.V. to F.V.