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Weird Science: Dissection of Derivatives

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Despite negative press and numerous instances of imprudent use of derivatives and the structured products that embody them, the demand for derivatives continues to increase and the suppliers are more than willing to accommodate. However, an ever-growing problem and challenge is how to regulate and account for all these instruments properly in the context of their multiple applications.

Mr. Stephen D. Reddy: We have an excellent panel for this session. Charlene Barnes is an ASA and assistant vice-president with General Re Financial Products. Charlene specializes in derivatives and structured products, with an emphasis on insurance asset liability management and insurance tax issues. Larry Gorski has been a life actuary with the Illinois Department of Insurance for 23 years and chairs the NAIC's Invested Asset Working Group and Risk-Based Capital Working Group. He's a member of the NAIC's Life and Health Actuarial Task Force and has been active in several Academy task forces, including the Equity Index Product Task Force and the Valuation Task Force. Chris Anderson is Merrill Lynch's specialist in investments by insurance companies. He works closely with senior investment officers and chief investment officers (CIOs) and has done a substantial amount of work supporting the industry on regulatory matters.

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Note: The charts referred to in the text can be found at the end of the manuscript.

Ms. Charlene M. Barnes: I was wondering if this should be called "Mad Science and the Dissection of Derivatives," given the kind of general view that a lot of people have about derivatives.

The first question people want to know is, "Why use derivatives?" One big reason not to use them is what we call "*Wall Street Journal* risk." These are very powerful tools, and nobody wants to be the person responsible when they blow up. But there are also a lot of very good reasons to use derivatives. Cutting yourself off because of lack of understanding can be very costly for your company.

Derivatives can help you manage investment risk by decreasing the volatility of cash flow or earnings and reducing the risks of surplus drain. You can also generate tax savings from derivatives. For example, if you have positions in place and want to change their duration but have a lot of embedded capital gains in your existing portfolio of bonds, you can use derivatives to change duration without having to sell the bonds or sell them and generate a capital gain. As long as you are within certain risk parameters of the IRS, that's not a problem.

Derivatives are also used extensively for asset and liability management. You can instantaneously and cheaply shorten or lengthen the assets to match the liabilities better. You also can change the convexity of your asset portfolio. Most of the things we consider natural assets are more sensitive to interest rate changes than are liabilities. Derivatives can help even that out. They also allow you to do asset and liability management without actually disturbing the assets that you own, which you want to avoid for tax reasons. Also, if you have, for example, a money manager who's doing very well in short-term money management but you want a longer duration, you can use derivatives to lengthen the duration of your portfolio without punishing that money manager by taking money away from him or her.

Another big reason to use derivatives is that, like it or not, you're already using them. Most insurance products already have derivatives embedded in them. For example, with minimum nonforfeiture benefits, you're essentially writing a put. With minimum interest rate guarantees, you're writing a floor; no matter what happens to the interest rates, you're going to credit 3%. Equity indexed products are another very obvious example of derivatives that are embedded in insurance products.

The question shouldn't be, "Why use derivatives?" but "How are you going to hedge the derivatives you're short?" If you're not purchasing derivatives, you have to have some plan in place to adjust your asset mix if interest rates change dramatically. Basically, you want to use your entire portfolio and create a dynamic hedging scheme to hedge the derivatives that you're short.

I'm going to go over the current usage of derivatives, actuarial pricing versus arbitrage free pricing, and emerging markets in derivative products. I'm not going to talk about structured products, although it's a very interesting topic. I'm not going to talk about accounting, which is a hot potato right now. I'm not going to talk about taxes, because taxes of derivatives fall into two camps: the extremely simple and extremely complex. And I'm also not going to talk about pricing models such as Black-Scholes and Monte Carlo. Suffice it to say that, in general, with derivatives, there's either a nice, neat formula that will act as a model, or you can use a Monte Carlo simulation. However, you can't use a Monte Carlo simulation if it's not hedgeable, and I'll get into that in a bit.

For current usage estimates, I'm using the 1996 Schedule DB, which is where all true derivatives live in your statements. It's not a great estimate because it's based on notional amounts. The notional amount is an indicator of how much of a derivative you have, but it's not a very good indicator of the actual risk or cost involved in these derivatives. However, we've estimated that about 40% of the usage, or $49 billion notional, is in swaps with insurance companies, and $74 billion, or 60% of the total notional, is in other types of options owned by insurance companies. Chart 1 shows the largest insurance company users of derivatives. It's somewhat complicated, but gives you a lot of information about who's actually using derivatives. The bars show the total notional for the top 10 life insurance companies using derivatives. The dotted line uses the axis on the right to show the percent of the total that each of those companies represent. It is directly proportionate to the bar. The solid line shows the cumulative percentage of the total. The first company uses about 8% of the entire notional derivative. Then it creeps up quickly. The top 10 users of derivatives account for 70% of the derivatives that are being sold.

Chart 2 shows off-balance sheet applications. Note that annuity hedging accounts for 53% of the applications. This covers disintermediation risk, which is often covered in swaps, guaranteed minimum death benefit, the S&P 500 exposure and equity indexed annuities, and negatively convex assets. The shape of the asset and the shape of the liability over different interest rates is very different, and that represents people using derivatives to take care of that problem.

Twenty-four percent use derivatives for GIC hedging, which is primarily duration risk, embedded optionality, and basis risk. The final 23% fall into other categories: structured settlements, which are very elongated liabilities; life insurance applications that are similar to annuity risk, but not quite as emphasized in the product and the profitability of the product; and asset replication—equity-linked notes or creation of different types of exposure using derivatives.

Actuarial pricing is a historical experience. We have an enormous amount of experience for actuarial pricing relative to the amount of experience we have in the capital market, because no matter how many pieces you divide capital market history into, you still have only one capital market. Actuaries are used to working with millions of independent lives.

With actuarial pricing, changes creep in. Mortality rates improve—although they did get worse during the AIDS crisis—but this doesn't happen instantaneously. It moves into the population or moves out of the population over a period of at least a couple of years. And, the lives are all independent. One can argue that they're not completely independent, but it's a very fine point.

Actuarial pricing involves a lot of judgment. In looking at the historical data, you have to decide what's happening. Mortality improvement factors are just quantified judgments. Finally, with actuarial pricing, when you're coming up with a price or product, you need a satisfactory risk/return relationship for the company. Often that's expressed in a very simple return on equity type of analysis. But you recognize that you have some risk and need to get a better return than you'd get by investing in treasuries.

Actuarial pricing differs from arbitrage free pricing, which is used to price most derivatives. Arbitrage free pricing is determined by totaling the current market price of all the components. I like to call it "selling the product for parts." You determine the risks, the cost of those risks in the current market, and then add them all together. Experience is irrelevant because you're basically going to take on some risk and sell off the risk components. The risk/return component is irrelevant because, in true arbitrage pricing, you're not keeping any risk, so you're not going to get any return for it. Lower risk, in general, means lower return for these products. So arbitrage free price product involves very simple derivative, like swaps.

A simple insurance example illustrates the difference between actuarial pricing and arbitrage free pricing. On the actuarial side, you might want to set the premium (P) today for a risky payment (X) in five years. X is a random variable; you don't know what it is, but it will be something in five years. The formula is $P-Xv^5$, or P minus X times the discount factor, which you want to equal zero or some acceptable profitability level. Using historical analysis, current trends, conservatism, and profit you come up with the acceptable expectations for X. Ultimately, P is a function of the risk tolerance and risk/return analysis. You're taking on some risk and getting paid for it, so that's how you determine the P portion of the formula.

Let's take basically the same example with a forward sale paid in advance. You want to find the price today (P) to sell a single share of stock in five years. Once again, there's a certain return on the stock, so it will be worth something else in five years. You could try to determine that number using historical analysis, reasonable expectations, and judgment, but, in this case, those don't make the slightest bit of difference. Instead, you collect Y dollars today, buy one share, and then give it to the counterparty in five years. That's all there is to it. The price is equal to the price of the share plus some profit (P = Y + profit). Because this is essentially a risk-free transaction, that profit will be a relatively small amount.

Arbitrage will always drive prices to the arbitrage free pricing level. Let's say that, instead of the simple insurance example, you were insuring the price of a share in five years. You have two different pricing methods. Because somebody can arbitrage this and take no risk for a very slim profit, the prices are going to have to converge at some point. And the only real difference between the two prices is a risk/return analysis. If the actuarial price is too high, the market won't buy it. You'll have to reduce the return for the amount of risk you're keeping. If it's too low, you could sell this risk in the market and get a lot more money, so what are you doing selling it in an insurance product?

We're working with the efficient market theory, which says that the market's risk/return is the best estimate. Whatever the insurance company thinks the risk/return relationship is doesn't matter. The price of an asset such as a share of stock has the risk/return of the entire market embedded into it. And that's the risk/return relationship that matters. It's not an unbiased estimate, but it's the best.

Finally, certain risks cannot be arbitraged because there is no market. If you can buy that single share of stock in the market, you can get rid of all the risk and use arbitrage free pricing. If you could not buy that share in the market, for example, if there was some other sort of risk, like a life insurance risk, then arbitrage free pricing just doesn't work.

There is a market for your life insurance risk in reinsurance. And that's almost pure arbitrage, but not quite, because it's a one-way market for the most part. You can sell your life insurance risk to a reinsurer, but usually can't buy it. Within the reinsurance and retrocessionnaire market, there is some transfer back and forth. But for a direct writer's purposes, it's a one-way market.

There's some risk sharing with reinsurance. Very often the insurance company doesn't want to lay off the entire risk to the reinsurer. If, for example, the company is developing a new product, it would want some risk sharing to ensure that everyone is doing due diligence and giving their best effort.

But if you sold all your risk to the reinsurer, it would be a spread business. You'd bring it in for a certain price, arbitrage it, sell it for parts for a lower price, and keep a bit of money. That's basically how arbitrage works. The problem is, you reduce the risk *and* the return, so is it worth it? You're selling the risk for a lower price than you bought it for, but the reinsurers make the profit because they have a risk/return relationship. The risk market being one-way poses the problem. In a two-way market, supply and demand would drive returns to the level that the whole market finds acceptable.

Arbitrage free pricing principles allow you to value investments and investment strategies. In addition to valuing option transactions, the principles help you to gain an understanding of market value and the sensitivity of the structured products. Also, they are good for valuing unusual risks embedded in a security. As long as you can arbitrage the risk on a share of stock or the bankruptcy risk on a company, it can allow you to determine some value for it.

Also, arbitrage free pricing principles are very helpful in appropriate liability pricing because they allow you to price embedded options consistent with market prices. For example, with minimum interest rates in different types of annuities, you have an embedded option in your product that you have to value. You can come up with some sort of satisfactory risk/return relationship for your insurance company based on history, but if the market is selling it for a whole lot more, you have to look at all the different pieces of your product to make sure that you're not selling it too cheap. Perhaps you could make more money by selling the risk directly, so it doesn't eat up the entire profitability of the rest of the product. And even if you don't explicitly hedge, keeping arbitrage free pricing methods in mind allows you to get the risk/return relationship that's appropriate for the entire market.

Another issue is asset/liability management. Keep arbitrage free principles in mind when you want to change your asset mix. It will get you to a different point on the risk/return relationship of the efficient frontier or move your entire company to a different point. But you have to ask yourself, "Is this just pure arbitrage? Am I moving to a better point or merely a different point?" If you're moving to a point that you could achieve simply by getting into a couple of option transactions, you might not be making any big improvements.

Among emerging products, credit derivatives are very hot right now. Let me give you a simple example. An insurance company wants to purchase a private placement from corporation XYZ, but exposure to XYZ is already too high. And let's just say that XYZ has publicly traded debt, which means there's a market for their exposure and a potential to for arbitrage. With the credit derivatives, we have a reference credit. XYZ has a public bond issue and floating rates with a maturity

similar to the private placement. We'll use that as a reference credit when we're creating a product. We'll also determine what credit event will trigger the payoff. Usually it's a default of the reference credit.

So you select a bond and say, "If that bond defaults, something is going to happen." The insurance company then pays an annual premium to its counterparty, and, if the credit event occurs, the derivative writer or the counterparty pays the difference between the notional and the market value of the reference credit. Now you have the private placement exposure to XYZ, and this derivative asset as well. If XYZ's publicly traded debt falls through the floor, you're still going to get some money. Hedging your exposure allows you to buy more of the private placement. And the level of protection depends on the terms of the private placement. Often private placements will be more or less secure than the public debt. There's some basis risk, but most of it is reduced by this type of transaction.

This example is hedgeable because of the public debt. The counterparty can short the bond in the market, which means that, if the value of the bond goes down, the counterparty will make money off the short and can pay that out. In this example, the market value of the reference bond is insensitive to interest rate changes, so that won't be a factor. Also, the counterparty's risk and profit are relatively low. This is very specific risk based on a reference credit that's actually available. The counterparty is not taking any unusual risks, for example, the risk specifically related to this private placement. Because it's arbitrage, the counterparty has laid off almost all of its risk.

The more complex the product is, the less hedgeable it becomes. For example, the public debt is of shorter term than the desired protection. You have a 20-year private placement, and the longest term public debt is 10 years. That will make it less hedgeable. Also, you can design it so the payoff is sensitive to interest rate changes, which has nothing to do with credit risk. But it will still affect the value because being less hedgeable means more risk for the counterparty. And more risk means risk/return enters into the equation so it's more expensive from a purely economic point of view.

To summarize, derivatives are an integral part of our business. Even if you don't currently own any, they are embedded in your product, so you are hedging them in one way or another. With arbitrage free pricing, the pricing for a hedgeable risk differs from the pricing for a risk position. In arbitrage free pricing, you sell off all the risk and don't need any return. Actuarial pricing assumes you're keeping the risk and need extra return for that risk. Most derivatives are priced without risk/return analysis. When they become incredibly exotic, the counterparty does maintain some risk, but also gets paid for that. If there's no market for the risk,

arbitrage free pricing does not apply. Finally, new products based on different risks are constantly being developed.

Mr. Stephen D. Reddy: You showed that the top 10 companies are accounting for about 70% of total derivatives usage in the industry. Why do you think it's as heaped as it is? And what is the breadth of use beyond that 70%? Are a lot of insurance companies not doing anything at all?

Ms. Barnes: There are a vast number.

Mr. Reddy: Why?

Ms. Barnes: It's centered around a few companies right now because of the general size of the company, the level of expertise, and when they made the commitments to using derivatives. Obviously, derivatives come on and off the books, but some are fairly long-term and there are 50-year swaps out there. The longer a company has been using derivatives, the more they'll have. The other issue involves the company's general level of expertise and the amount of risk they have. For example, pure variable annuity writers don't have the same kind of risks as companies that are writing fixed annuities. I find that more insurance companies are developing expertise and interest in derivatives, though, so the proportion is definitely increasing.

From the Floor: You list asset/liability modeling as one of your arbitrage free pricing principles and ask, "Is another asset mix better?" Will you expand on that? The way I've understood arbitrage free pricing is that, at any point in time, an asset is fairly priced.

Ms. Barnes: That is correct. A simple example is if you have a particular asset liability mix and you're planning to move to another asset liability mix. You might think the risk/return of that new and improved mix is better than the current risk/return combination. Arbitrage free pricing might indicate that it's not a better mix. The difference in the risk/return relationship might have nothing to do with asset/liability mix and merely be a point on the efficient frontier that our stakeholders could have achieved themselves by shorting, fixing, buying equities, or whatever. If this is the case, you haven't accomplished anything so it's really not a better mix. But if you move to a different point on the efficient frontier by changing the asset mix alone, then you have definitely made an improvement.

Mr. Christopher T. Anderson: In dealing with insurers, we've found a real reluctance to get out front on this issue. Considering the efforts underway in the

regulatory community in the last five or six years, it's been hard to find somebody that's willing to take the lead and move forward.

What's so weird about this derivatives to begin with? What's so weird about earnings pressures on companies? If you look at the insurance industry in the U.S. compared to western Europe, earnings are not as good. Performance pressure continues in the investment department. CIOs care a lot about their performance and what they can do about it.

What's so weird about seeking investment alternatives? That's been going on forever, partially as a result of other factors. What's so weird about competitive pressures for consumer resources? This is not the only industry that's vying for funds. Rating agencies tell me that executive managers in this industry need to understand that they are financial services providers on the life side and competing for funds in the financial services area, too.

What's so weird about global competition? It's not just your company in your city anymore, and the pressures are significant. All of these pressures emphasize the need for innovation. And when we talk about the weird science of derivatives, that's what we mean.

Charlene went through some of the uses of derivatives. I'd like to make some distinctions between structured products and derivatives. By a structured product, I mean something that alters principal payment priorities. They see altered principal payment streams, and periodic payment streams can and may be altered. The classic example of a structured product and one of the early ones was the collateralized mortgage obligation (CMO).

In the insurance realm, a derivative product is one you first expect to see on Schedule DB or in separate account. That's where to look. Derivatives include swaps, options, futures, puts, calls, caps, and floors.

What happens in CMOs is that the principal repayment priorities are altered based on the class of securities that an investor owns. They are allocated according to prepayment characteristics spelled out before the transaction takes place. Also, it's possible and likely that coupons will be reconfigured in a CMO. This is what we mean by structuring in terms of altering the fixed and floating coupons and having higher or lower coupons for various classes of security. You see structure not just in CMOs but in collateralized bond obligations (CBOs), multiclass asset backed securities (ABS), or basically anything that's multiclass and has been structured.

What is important in your companies is not necessarily just risk-based capital (RBC) numbers. My personal view is NAIC's risk-based capital formula is only of interest to a very, very small number of companies. What is interesting, though, is the classification of the security between debt, equity, and preferred. I currently have an issue before the Security Valuation Office (SVO), which is making a determination about whether it's a preferred or a common equity.

What makes a structured product bond-like? The SVO uses standards to determine whether something is a bond or not, and the test is a predominance of these factors:

- Do creditor rights exist or not?
- Do you have a scheduled repayment of principal and interest? This is mandatory. You have to pay or default. Lack of payment is an act of default.
- Are you a creditor in the event of liquidation or not?
- Are payments to holders deductible for tax purposes under U.S. law?
- Is the principal protected?

These standards were adopted a year-and-a-half ago, and I think it has helped all of us distinguish debt from equity. If a product meets all the conditions, the NAIC can rate it as a bond, and under RBC of course, it's a bond. But, more important, the rating agencies will view it as a bond.

If the product is rated and monitored by a rating agency, we like that. We have different standards for nonmonitored deals; for example, a security can be rated once but currently not monitored. And you can have a product that was never rated at all. We suggest getting products rated because it's much easier to get them to the SVO.

A bond focuses on credit in the insurance realm. A rated credit instrument has a specific meaning under the defined-limit model investment law. The law is essentially the same as the one adopted in Illinois. It means that there is no risk of loss of principal due to factors other than credit. And that's a bond.

When you have a bond, we assume that no optionality exists, other than the standard right of the borrower to prepay beginning at a certain time and at a certain price. But there may be other optionality introduced by structure. I have to rely on the actuarial profession to identify, evaluate, and measure those elements through cash flow testing. The profession has done a terrific job of tackling CMOs. And the regulatory community identified CMOs and gave regulators and others tools to deal with them. We have to assume that the cash flow testing works, because with

bonds, we're dealing with purely credit risk and other risk elements are not identified.

Let's talk about a revised view of insurer use of derivatives. This is a legalistic distinction, and I'm relying on the defined-limit version of the insurer investment law. Uses for derivatives include: income generation and hedging. By income generation, we mean writing covered calls. That's a very narrow, precise definition.

Hedging is a lot more complicated. In this context, hedging means risk reduction. You can hedge against a change in value, yield, price, quantity, or cash flow. You can hedge changes on either side of the balance sheet, asset or liability, and they can be either present or anticipated.

Now I'm going to forecast the past, because in GAAP accounting, the definition of derivatives is something that fluctuates in price in accordance with other instruments. The latest statement is just out, so I'm predicting the past. If you want a good prediction of the past, download an Ernst & Young (E&Y) paper called "Derivatives and Hedging" from the Web site *www.ey.com*. Go to index, accounting, and look under downloadable papers.

The concepts that E&Y expected to appear in the latest GAAP release include discussion of derivatives as assets and liabilities and the directive that they should be reported in the financial statements. But the key point is that fair value is the most relevant measure for financial instruments and the only relevant measure for derivatives.

Since codification of statutory accounting is unitary, it embeds what is rated as a bond. Given the distinctions we've talked about earlier, a bond is rated based on how it appears on the statement. Larry will be talking about that in terms of replication and creation of synthetic assets, we see a major divergence for what we expect between GAAP and STAT in this regard.

For GAAP accounting, only items that are assets and liabilities should be reported. And finally, special accounting applies for items designated as being hedged. One aspect of qualification should be an assessment of the effectiveness of the hedge (i.e., offsetting changes in fair value or cash flows). This takes us to the next point, which is how synthetic assets can be created using cash and derivative products.

Mr. Larry M. Gorski: My presentation today will be on the NAIC Replication Project. Charlene explained that the current uses of derivative instruments were annuity hedging, GIC hedging, and "other." Embedded in that other section was something called "replication." Also, for the current uses of derivative instruments,

she showed that the top 10 companies account for about 75% of total derivatives in the insurance industry. I think it's an accurate assessment. From my standpoint, I see about 65-70 companies using derivatives, but the vast majority of them are used by nine or ten companies. And, if it wasn't for the introduction of equity indexed annuities, there probably would be only about 45 companies using derivative instruments. It's still not a widely used instrument for asset liability management purposes or risk management purposes in general. This is surprising, considering the input we had from the industry and the trade associations when we were developing the model investment law and the NAIC Replication Project. I would have thought that there would be many more users, but there's still a great degree of hesitancy in stepping forward as a significant user of the products.

Insurers would like the flexibility to manufacture risk return profiles in a cost-effective manner. That's the rationale for companies to use derivatives for replication purposes. But regulators have some concerns. The first one is that the current RBC formula assumes that derivatives are only being used for hedging purposes. The only RBC factor associated with derivatives is for the counterparty exposure. Because of that there are directives to move ahead with derivatives used for replication purposes.

Second, the structure of reporting is very deficient when it comes to explaining the use of derivative instruments. Schedule DB will identify derivatives by class options, futures, forwards, etc., and there is some description there. But you get no real sense of how the instruments are being used by the current reporting.

Third, regulators are concerned about any embedded bonds in a derivative instrument. It took six or seven years to develop the model investment law and, during that period of time, there was one disaster after another. First we had junk bonds. Then we had mortgage loans and the real estate crisis. And then we had all the problems with stand-alone derivative instruments, such as the Orange County situation and others. There was a great reluctance by regulators to move ahead with recognition of derivatives by insurance companies. Chris did a good job of explaining the three different uses from a regulatory standpoint: hedging, income generation, and now replication.

What I'll be doing today is giving a brief overview of a report that has been provided to the regulators by the interested persons, i.e., the industry. If you're interested in the whole report, I suggest calling Bill Shriner at the ACLI. The report is still in draft form and changes will be made as time moves on. There's only one element of the comprehensive project that is near completion, the reporting aspect of it.

A replication (or synthetic asset) transaction involves a cash market instrument and a derivative instrument to replicate the performance of an otherwise permissible investment. You might have a bond, a stock, futures, or a swap transaction. When you use them as a single entity, they replicate or reproduce the performance of an otherwise permissible investment. This is not to be confused with a structured note, where both of the pieces are combined in a single instrument.

The key concept is reproducing the performance of an otherwise permissible investment. That obviously implies some type of effectiveness measurement, but developing that measurement has been the major stumbling block in the process of recognizing derivatives used for replication transactions.

Lets consider a case where we're trying to replicate a lower-rated bond. We're holding a U.S. government bond, and entering into a default swap on a specific bond or issuer. From a cash flow standpoint, the bond is producing either fixed or floating rate coupons. The insurer is receiving a semi-annual payment, but in the event of default by the underlying bond or issuer, the insurer will be responsible for the amount of that default. That's where the transformation of the government bond into a lower-rated bond takes place.

Obviously there are variations to the structure. Rather than the swap being based on a single bond or single issuer, it could be based on a basket or index and you can have forward settlement. From the industry standpoint, the replication is welcome because the item being replicated may not be available at the desired maturity. If you use a basket or index, you're bringing diversification as a transaction. It may be a more economical or more efficient transaction, so it will have better value. And, because you're using government bonds as a component of the transaction, they're obviously very liquid. The only illiquid piece is the swap proportion of the transaction.

Here's another example. Let's say you want to replicate the performance of the S&P 500. You can buy treasuries and futures, combine them in the proper way, and replicate the performance of a stock index. That's another example of a replication transaction.

How are regulators going to account for these kinds of transaction? For the first example—transforming a highly rated corporate or high-grade government bond into a lower rated bond—the replicated unit would be valued on an amortized cost basis because it's a bond. The cash instrument, the treasuries, are also valued on an amortized cost basis for statutory reporting. And the derivative component would also be valued on an amortized cost basis in this case.

In the other example—replicating the performance of an equity index—such as the S&P 500, replicating would be on a market value basis. The cash instrument, in this case, treasuries, would be valued on an amortized cost basis. And the derivative would be valued on a market value basis. This gives you a feeling for how the rules are developing right now for valuing the derivative component of a replication transaction.

The next major item of the emerging regulatory framework is reporting. It's likely that a version of these reporting rules will be adopted at the upcoming NAIC meeting for incorporation into the 1999 annual statement. If that takes place, it's possible that the other elements will fall into place and derivatives for replication purposes will be recognized some time in 1999 or 2000.

The reason that's so important is that states are adopting the NAIC model investment law with a proviso that the derivatives used for replication purposes will be permitted as soon as the NAIC adopts a comprehensive framework dealing with accounting, reporting, and RBC issues.

This report will be incorporated in Schedule DB, Part F. The key is that each of the three pieces are identified. Then we have a description of the replicated or synthetic asset. If we were trying to replicate a lower-rated corporate bond, here's the description of the replicating unit. The NAIC designation assigned to the replicating unit would be a class 2, an SVO2 Bond with a value of $1,000. Then Schedule DB starts taking apart the transaction into its various pieces. The derivative instrument component is a default risk swap. The cash instrument is a U.S. Treasury note. Finally, in designating the underlying cash instrument, as a government bond, it is exempt.

One of the changes that might take place will be to incorporate within the various components, not only descriptions, but also fair values. We would have a fair value of the Treasury note, the swap, and the synthetic or replicated unit. The reason we're moving in that direction goes back to the fact that the effectiveness measurement is a key element to this whole project. As regulators, we want to know that what you say you're replicating is what you are replicating and that the risk characteristics are what they are claimed to be. The initial effectiveness measurement tool was that, at time of inception, the fair value of the two components—the cash market component and a derivative component—were equal to the fair value of the replicated or synthetic asset. That idea has been pushed along to require that as an effectiveness test throughout the life of the replication transaction. To enable monitoring, we're moving towards incorporating fair values within the two components and the replicating unit also.

Another element of the complete package is asset valuation reserve (AVR) and RBC. We've done some work on the AVR component (see Table 1), but the RBC format has not been discussed yet.

TABLE 1
DRAFT—MAY 5, 1998
ASSET VALUATION RESERVE (CONTINUED)
BASIC CONTRIBUTIONS, RESERVE OBJECTIVE AND MAXIMUM RESERVE CALCULATIONS
REPLICATIONS (SYNTHETIC ASSETS)

(1) Position Number	(2) Type (R/C)	(3) CUSIP	(4) Description of Asset(s)	(5) NAIC Designation or Other Description of Asset	(6) Value of Asset	(7) AVR Basic Contribution	(8) AVR Reserve Objective	(9) AVR Maximum Reserve
1	R		Fixed Rate Bond	Class 2	$1,000,000	2,000	6,000	10,000
	CW		ABC Bond	Class 2				
2	R		Common Stock Portfolio	Unaffiliated Public C/S	927,000	0	185,400	185,400
	R		Five Year Treasury Coupon Strip	1 (Exempt)	80,000	0	0	0
	CW		U.S. Treasury Bond	1 (Exempt)	1,000,000	0	0	0
3A	R		ABC Corporate Bond	Class 2	1,000,000	2,000	6,000	10,000
	CW		U.S. Treasury Note	1 (Exempt)	1,000,000	0	0	0
4	R		XYZ 8% Bond Portfolio	Class 1	1,000,000	500	1,500	3,000
	CW		ABC Bond Portfolio	1 (Exempt)	1,000,000	-500	-1,500	-3,000
5	R		Variable Rate Note	Class 2	1,000,000	2,000	6,000	10,000
	CW		ABC Bond	Class 2	1,000,000	-2.000	-6,000	-10,000
6	R		Dollar Denominated Bond	Class 1	1,000,000	500	1,500	3,000
	CW		Foreign Denominated Bond	Class 1	1,000,000	-500	-1,500	-3,000
7	R		Emerging Market Bonds	Class 3	1,000,000	10,500	28,000	40,000
	CW		U.S. Corporate Bonds	Class 1	1,000,000	-500	-1,500	-3,000
8	R		XYZ Convertible Bond	Class 3	1,080,000	11,664	30,240	43,200
	CW		XYZ Bond	Class 3	1,000,000	-10,800	-28,000	-40,000
9	R		Convertible Bond (ii)	Class 1	1,100,000	550	1,650	3,300
	CW		Corporate Bond	Class 1	1,000,000	-500	-1,500	3,000
10	R		Floating Rate Bond	Class 1	920,000	460	1,380	2,760
	CW		Convertible Bond	Class 1	1,000,000	-500	-1,500	-3,000
11	R		Index Amortizing Security	Class 1	1,000,000	500	1,500	3,000
	CW		Floating Rate Non-Callable Bond	Class 1	1,000,000	-500	-1,500	-3,000
12	R		Callable Bond	Class 1	1,010,000	505	1,515	3,030
	CW		Fixed Rate Bond	Class 1	1,000,000	-500	-1,500	-3,000
13	R		Fixed Rate Bond	Class 1	1,010,000	505	1,515	3,030
	CW		Floating Rate Bond with an 8% Cap	Class 1	1,000,000	-500	-1,500	-3,000
14	R		ABC Commercial Mortgage Loan	Other Commercial, In Good Standing	1,000,000	6,300	14,000	22,500
	CW		U.S. Treasury Note	1 (Exempt)	1,000,000	0	0	0
Line 0199999 Subtotal Default Component – Other Than Mortgage Loans						12,284	34,800	56,320
Line 0299999 Subtotal Defulat Component – Mortgage Loans						6,300	14,000	22,500
Line 0399999 Subtotal Equity Component – Common Stock						0	185,400	185,400
Line 0499999 Subtotal Equity Component – Real Estate and Other Invested Areas						0	0	0
Total						19,184	234,200	264,220
General Account – 53a and Separate Account – 31a								

In dealing with the transaction involving the replication of a lower-rated corporate bond, look at example 3A. This report will be part of the annual statement that provides information on the calculation of the AVR. You will be reporting both components of the transaction. "R" stands for replicated unit, and "CW" stands for the cash component of the transaction, with "W" indicating that there is no residual

asset risk retained by the insurer in this transaction. In fact, the swab transaction would swap out any default residual risk if there was any. Because we're dealing with a Treasury note, you don't have that. But if this was a SVO1 being swapped into an SVO5, that would be a consideration when you're dealing with the cash component.

Then you would identify both the cash component and the replicated component, and provide the other information needed to do the calculations in this worksheet. The basic idea of this worksheet is to calculate the additional AVR and eventually the additional RBC of the replicating unit relative to the cash market instrument. The worksheet shows several examples. In some cases, what's called the AVR reserve objective for the replicating unit will be a positive number, whereas the AVR reserve objective for the cash market will be reported as a negative number. And the subtotals are the sum of the positive and negative numbers. Otherwise, only the increased AVR or RBC would be coming out on the worksheet. And the objective is to provide the additional AVR or RBC of a replicating unit relative to a cash market instrument.

Another element to consider is the pure and simple financial analysis. How are regulators going to view replicated transactions relative to their components? Basically, we're going to be viewing the replicated or synthetic asset as a single entity. Even though it's built up or manufactured by the insurer, we'll be viewing that as the entity in a financial analysis.

What does that mean? In the first place, because, in many cases, we're talking about transforming an exempt or a high-rated security into a lower-rated security, who's going to determine the credit quality of that lower-rated replicated transaction? That's where the SVO comes into play. These transactions will be filed with the SVO, which will be asked to assess the replicated unit and assign an NAIC designation to it.

One of the stumbling blocks in trying to apply that principle is dealing with transactions that involve a basket or index. With a replication of a single issue, the SVO can use its normal analytical tools to evaluate it. But, if you're dealing with baskets or indices in the replication transaction, it becomes more difficult and complex, so right now the SVO is reluctant to take on that task.

The first draft of the final version of this whole project will only deal with single securities, not replications, baskets, or indices. However, those are the types of transactions the industry is most interested in. It does allow for diversification in any specific market. And the industry is working very hard to suggest rules that the SVO could apply in a realistic and efficient manner.

From an asset adequacy analysis standpoint, regulators will be looking at the replicated unit as being the asset supporting a block of business. If you're replicating a lower-grade corporate bond with treasuries and a swap transaction, we would expect to see the bond being modeled for asset adequacy analysis purposes, as opposed to modeling the treasuries, and possibly disregarding the swap transaction. This seems to be the case with many companies that do hold derivative instruments. So we would be looking at the replicating unit, not the components, for asset adequacy analysis purposes.

Another element of the complete package is that we would be viewing the replicated unit as a unit and applying it against any of the applicable limits. So if you are trying to replicate the S&P 500, you're replicating common stock. That replicated unit would be counted against your equity limits in your state's respective investment law.

Finally, looking at it from a unit standpoint, if you have any financial ratios that your state of domicile happens to use, presumably the states will be looking at the replicated unit in their financial analyses. If they have a liquidity test, or any test that's uses a high-grade government bond as an element of that test, the state probably would not use the government bonds in the way they normally would. They'd be using it as the replicating unit. If you're replicating the S&P 500, they'd be looking at the replicating unit or financial ratios. They would not be using the underlying government bonds in any type of liquidity test or high-grade bond test.

Mr. Reddy: You mentioned that replication isn't officially permitted right now, but it's coming. To what extent do you feel that it's already going on, perhaps being disguised as hedging? Second, with regard to credit derivatives, I know there's a lot of activity going on now. What is the current regulatory status of that? Is it technically permitted to do a credit swap, for example, and how should it go on the books?

Mr. Gorski: Let's deal with the credit derivative transaction first, because similar questions come up all the time. If you purchased a structured note that has a credit derivative embedded in it, that's perfectly legal. There's no problem with that because that structured note is being filed with the SVO, which does a credit analysis taking into account the credit derivative component of that structure note.

The problem emerges with stand-alone credit derivatives. And there are two paths to take here. If you're holding or engaged in a credit derivative transaction for hedging purposes—hedging some credit risk that you may already have by entering into and offsetting the credit derivative transaction—that poses no problem, because derivatives are permitted for hedging purposes. It's when you're taking on

additional credit risk through a credit derivative transaction on a standalone basis that problems occur.

The legal status of that type of transaction depends on your state of domicile. For example, in Illinois, we adopted the new version of the model investment law, so the transaction would be clearly prohibited. It could not qualify via a basket either, because the model investment law clearly says that you can't recognize derivatives through a basket provision. In other states, the answer may be ambiguous. Because of the age of the law and the way it was written, the status may not be recognized. But we realize that companies may be entering into a credit derivative transaction for purposes other then hedging, so we're moving ahead as rapidly as we can with the reporting end of this project.

Your other question was about companies entering into replication transactions before the gun has sounded, so to speak. There are replication transactions and there are replication transactions. If you are replicating a floating-rate bond by holding a high-grade corporate or a Treasury and entering into a swap transaction, and there's no additional credit element to the swap transaction other than the credit of the counterparty, you're not doing anything to change the credit risk of that transaction. I don't think anyone would have much of a problem with that. We would probably even recognize that as a hedging transaction in some fashion. It's where you are transforming the credit or asset risk of an instrument from an RBC standpoint that regulators start to get concerned. I have no idea how many companies are doing that. Reports in the trade press and by trade associations indicate that some companies are, but their state law might permit it.

Mr. Reddy: I have a follow-up question for Charlene. We talked earlier about what a bond is, how you can embed various elements into a bond structure, and that bonds are rated by the SVO. It's the synthetic asset creation idea that Larry talked about. When you put something in a bond, it's clear that it can and should be treated in a certain way. When we talk about credit derivatives, however, the question is, are those credit elements being embedded in bonds today or are insurers themselves using the stand-alone elements discretely to manage that risk? We know that depository institutions, to a substantial degree, have been using credit derivatives on a stand-alone and discrete basis. In my insurance industry support work, some groups have polled the industry, asking brokers, dealers, and others about this practice. At this time, we haven't found more then a handful of transactions being done by insurers on a stand-alone basis. We know there's a lot of interest in it, though. Do you have any sense that has changed?

Ms. Barnes: No, because credit risk is the stock and trade of insurance companies. And they are very comfortable taking it through most of the fixed income

instruments that they normally deal with. They're not looking to separate it from the rest of the risks associated with the bonds. Also, companies have expressed some interest in private placement risk, even on a nonstand-alone basis, on their existing assets. Some insurance companies see a private placement as having more value than the publicly traded debt and want protection from the credit exposure. They look at it as an arbitrage opportunity, and we're seeing a lot more of that.

Things come across my desk saying, for example, "We're willing to sell six months worth of AT&T for two basis points" or something similar. The company is taking a very short-term position and wants to get rid of something immediately. I've never seen any interest from any insurance company in that type of transaction.

Mr. Gorski: About a year-and-a-half ago, some publication had a report on derivative strategy that seemed to imply about 25 life insurance companies were active players in the derivatives market. The article didn't clarify whether the companies were using stand-alone derivatives or structured notes, or whether they were taking on risk or hedging it away. However, it raised questions and, after much discussion, the response came back consistent with what Charlene said. However, it's still a nagging question, because at least once a week I get a phone call from someone, that, reading between the lines, give me the feeling that companies are doing something different from what Charlene is advocating. So I still have a regulatory skepticism.

Mr. Steven P. Miller: Your definition of a hedge implies that it is something that reduces risk. The FAS133 has a much narrower definition of a hedge, which seems to exclude most of what insurance companies call hedges, including caps and swaps for their single premium deferred annuity portfolios. Does anyone have any comment about how that will affect the insurance industry's use of derivatives for fixed annuities and GICs?

Ms. Barnes: It's not good. There are so many accounting issues, I could go on about them for quite a while. And some of them seem very complicated to me. The FAS doesn't have the resources to get into the absolute nitty-gritty of every issue specific to insurance companies, and this does pose a problem.

Mr. Gorski: That's an interesting take on that question. As we were developing the model investment law and the rules for recognition of derivatives for hedges, regulators were being told that our rules were more limiting than rules in other arenas. And now I'm hearing that maybe it's the other way around.

Mr. Anderson: This underscores the different paths that are being taken by GAAP and statutory accounting. It is truly remarkable. The unitary version we described

in terms of the statutory approach serves the purpose of going along with legal investment limits and so on. But we can't underestimate the impact of GAAP accounting on companies. And certainly that has to influence behavior.

Mr. Erin Dandridge Cole: I am curious about these replicating transactions. It seems as though Schedule DB is trying to move the derivative piece, if it's a stand-alone, into bond treatment. Is that so?

Mr. Gorski: The replicated unit is going to be treated as a bond or stock or what have you. The individual pieces will be reported as they normally would be. The cash component of the transaction would be reported in Schedule D and the derivative portion would be reported in Schedule DB as an option or a future. But, there will be a new exhibit "F" in Schedule DB that brings the pieces together so the regulator can understand how the derivative is being used in conjunction with the cash market instrument.

The AVR or the RBC piece will look at the replicated unit relative to the cash market instrument and come up with the additional RBC. It's walking a fine line between viewing the replicated unit as a single entity versus viewing its pieces. It's a bit of both. But, if a company is viewing it as a replication transaction, we think our regulatory framework should look at it the same way.

Mr. Cole: Is this happening because they're trying to get the NAIC to approve putting on such derivatives? It seems that companies stand to lose at least as much by having the replicated unit treated as a package deal. If a highly liquid bond that provides some piece of the value of the total transaction is paired with a U.S. Treasury bond, they're going to move the whole transaction down, which has some obvious negative implications. Instead, you could carry on your regular investment process by throwing on the derivatives, and perhaps hold a lower-quality bond for a longer duration, as you suggested. Why do they need to lump them together?

Mr. Gorski: If it was just a lower duration bond that would be for hedging purposes, these rules wouldn't apply. They only apply when the combination transaction changes the characteristics of a bond from a RBC standpoint. Let me respond to your initial question about whether the industry's desire to get this additional use of derivatives recognized by regulators is causing everyone to follow this path. When the industry suggested derivatives for replication purposes six or seven years ago, we immediately objected to the things that we already talked about. And this is the path that was agreed upon to remove those objections.

Mr. Cole: So you're saying that's why they're going through this big effort to be able to use a credit swap, for instance, because the NAIC won't allow companies to do that unless they say it's trying to replicate something else?

Mr. Gorski: Right.

Mr. Cole: It seems unduly rigid.

Mr. Gorski: That's the nature of regulation.

Mr. Sean Patrick Casey: I'm starting to deal with some asset/liability management issues in our overseas operations. Is there much of a market overseas for interest rate derivatives? In particular, I'm looking at Japan, Korea and Taiwan. Also, if these countries aren't that advanced, are they very efficient at this point?

Ms. Barnes: Do you mean within the country or dollar to yen?

Mr. Casey: Within the country.

Ms. Barnes: It depends on the country. There are certainly some well-developed markets. Swap markets are very well developed in Japan. The smaller the economy, the less developed it's going to be. But, generally, it's doable. The important considerations are how big the economy is, how much public debt there is, and how long the yield curves go out. For example, Thailand's yield curve only goes out five years, so you're not going to buy into very liquid 10-year swap market. But they're certainly there.

Mr. Reddy: Larry, I have a question consistent with a replication project and putting into place appropriate RBC treatment for these synthetic assets. Wouldn't it also be appropriate to give a credit in cases when hedging is done for RBC purposes? I see it as replication in reverse because you're laying off risk. Wouldn't it make sense to provide some kind of credit for RBC where hedging is done?

Mr. Gorski: That's an excellent question. About three years ago, we actually had that project on the agenda of the Invested Asset Working Group. At the same time, the industry was pushing for the replication project. We asked the industry which project do you want us to take on first, recognition of risk reductions through hedging transactions or replication transactions? The industry wanted us to tackle replication first, so we're giving it the first priority. We'll be going back to the other project as soon as this is wrapped up.

CHART 1
LARGEST INSURANCE COMPANY USERS OF DERIVATIVES

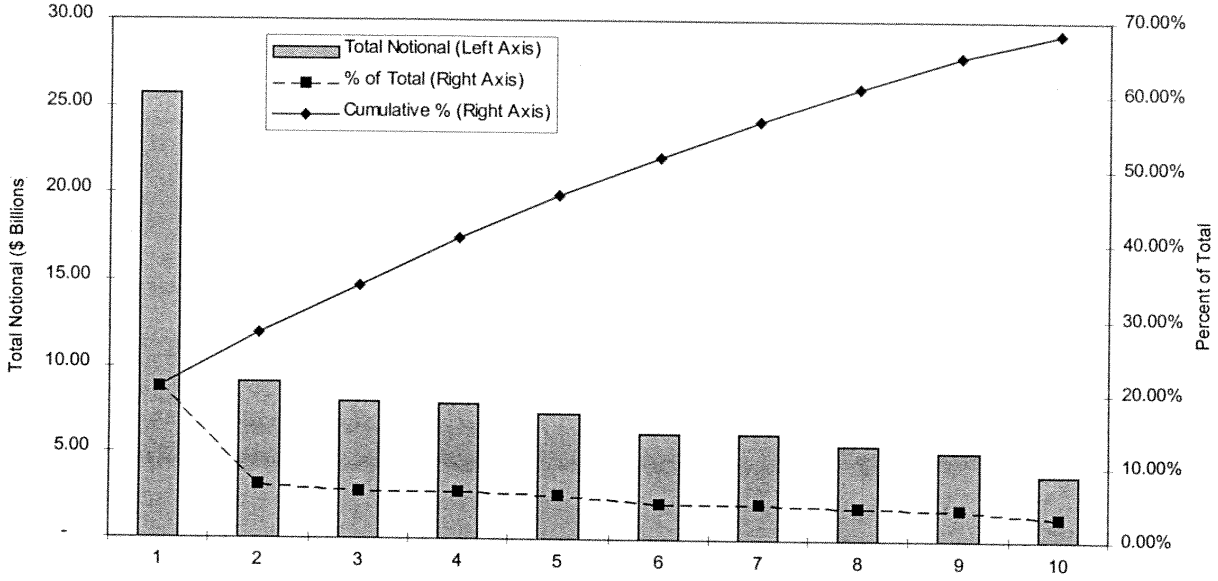

CHART 2
OFF BALANCE SHEET APPLICATIONS