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DERIVATIVES FOR PENSION FUNDS

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A survey of available derivatives and a description of how they can be used in pension portfolios will be presented. Participants will see how derivatives can help investment performance and whether derivatives are appropriate for their pension assets. The teaching session will examine the special risks associated with derivatives, how they can be controlled, and why portfolio insurance programs using Standard & Poor's (S&P) futures failed.

MR. WILLIAM H. ALEXANDER: The purpose of this session is not to drag in some whiz kid from New York who will tell you the latest exotic option. The purpose is to tell you what pension funds really are doing, or would be able to do, with the products that are available to them in the marketplace now.

Let me tell you about myself and introduce the other panelists. I run the treasury unit of Confederation Life Insurance Company, which is a market maker in swaps. We have Spencer Kelly with us, from General-Re Financial Products of Canada, which is in the financial products market-making end of the swap business. Spencer has a couple of years of experience at General-Re and previous experience with Confederation Treasury Services Ltd., which explains how he got roped into this session. Spencer will outline from a market-maker's perspective, what products there are in the marketplace at the present time, and what pension funds can do with them or are doing with them.

We then have John, who is an assistant portfolio manager with the Ontario Teacher's Pension Plan Board. Previously he was an asset/liability manager with one of the major life companies in Canada. The Ontario Teacher's Pension Plan Board is the largest pension plan in Canada at \$35 billion. John will describe what it did to get out of a rather restrictive investment position due to previous legislation, into a more fully balanced fund. And I think the Board and probably the taxpayers of Ontario are pleased with the results that were achieved.

Doug Carr is also with us. Doug is the partner in charge of KPMG's treasury risk management practice in Canada. It is growing practice because of the concerns that people have shown for proper controls and proper understanding of derivatives in today's environment. Doug will walk you through the kinds of things that he reviews with various boards of directors and senior management groups, in terms of what to do with controlling the risk exposure.

*Mr. Carr, not a member of the sponsoring organizations, is Partner of KPMG Treasury Risk Management in Canada.

As a bit of a background, I don't know how many of you have seen a recent *Benefits Canada* article that talks about the use of derivatives by pension funds in Canada. It confirms that only 37% of pension funds in Canada currently use derivatives, which is the same as it was the previous year. It hasn't gone up, although the funds say that approximately 28% of those who don't use derivatives intend to use derivatives in the near future. So it's a rather limited exposure in Canada. We have a mixed message on what percentage of funds in the U.S. use derivatives. Probably a higher percentage than Canadian funds, just because U.S. funds tend to be larger and a little more sophisticated on the investment side. But we suspect that people have different perceptions about derivatives and it's probably not because they're "derivatively challenged." We think most pension fund managers and most pension fund actuaries can understand the products. It's probably more because of the public perception of the risk and problems that you're likely to run into with exposures. We've all read about the *Barings* case, Orange County, and that sort of thing. We're here to sort of dispel some of those myths for you. So I will turn things over now to Spencer and he will carry on with the introduction to what pension funds are currently doing.

MR. R. SPENCER KELLY: I will talk about the application of derivatives to pension plans from a market-maker's perspective. I will talk about what is being done in the market and also what is not being done in the market, but could be done. I want to preface my comments with some warnings. I will go over strategies and methods to enhance yields and do all kinds of good things for pension funds. However, none of what I say will make any sense unless you have the proper risk management systems in place. Don't put the cart before the horse. Until a fund is ready to start looking at the risks that it is managing using derivatives, it makes no sense to jump into them. Perhaps that's why the delay in the growth of derivatives' use in pension funds in Canada is occurring.

I will not talk about, as Bill said, the most unusual option strategy that the derivatives market is pumping out. I feel that this is a misrepresentation of the market. That type of transaction is an extremely small percentage of the market. For the most part, the market consists of swaps and very simple options. My goal, to a certain extent, is to "de-rocket science" the whole thing.

I will talk very briefly about the use of derivatives in altering the asset mix in the pension fund. I'll talk about use of derivatives in currency hedging and in accessing other markets. Some markets are difficult to gain exposure to. Derivatives can be very helpful in gaining that exposure. I'll talk about asset swaps. I'll show how you can be a better shopper for investments using asset swaps. We'll talk about altering the risk/return profile of a pension fund using some well-known option strategies, and finally, probably a topic of most relevance to most actuaries, the use of derivatives in asset/liability management in a pension fund.

I'll skim over asset mix fairly quickly. Derivatives are often useful in shifting your equity bond, money market mix in a pension fund, by lowering the transaction costs. Often, instead of directly going to the cash market, derivatives are a cheaper way to go. Derivatives are also useful in a multimanager environment, where a pension fund has hired many specialist managers. You decide to shift the assets around, instead of taking money from one and sending it over to the other. You have an overlay manager who can effectively switch the assets around. You can leave the managers alone and let them do their jobs.

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Currency hedging is actually a fairly common usage. Generally it's used if you have an exposure to a foreign market. Your view is that the market will do well in its own currency terms, but the value of the currency is going to take a dive. Or perhaps, you don't know what the currency is going to do and you're not willing to take that exposure.

You can use foreign exchange futures or forwards to hedge this, or perhaps options if you'd like to retain the upside risk to a currency movement in your favor. The downside of options is that you have to pay for them. For example, suppose you had exposure to the Nikkei (stock index) in Japan. Your view was the Nikkei was going to do very well over the next period of time. The reason for that was the yen is going to go down the tubes. To a certain extent, exports will be stimulated and the stock market will do well. Clearly, you'd love to have exposure to the Nikkei; clearly you won't want to have exposure to the yen.

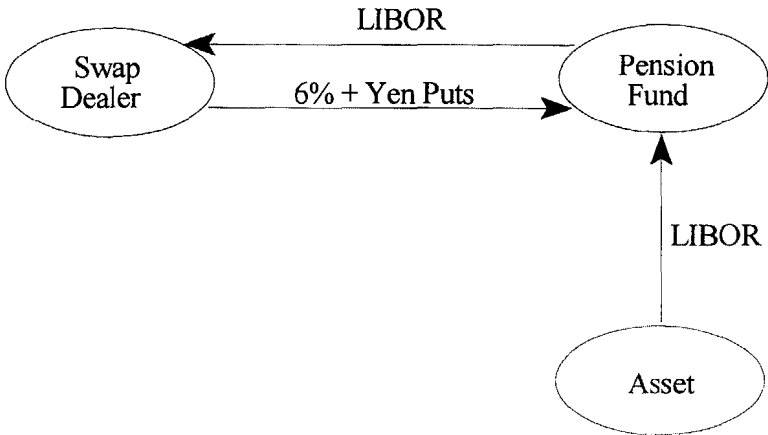
Now you can enter into a foreign exchange forward contract where you will be selling yen forward. Now if your view is right, and the yen starts depreciating, you'll gain a lot on your foreign exchange forward. You'll lose a great deal on the currency aspect of your portfolio. Those two should offset, meanwhile, the stocks go way up and you have a very good return.

You can do that hedging yourself or, through the derivatives market, you can get derivatives dealers to do the hedging, as well. For example, they can pay you the Nikkei, payable in U.S. dollars. They take care of the hedging. Obviously, you pay for that, but it can still be much cheaper to pass the risk management onto the most efficient hedger, often a swap dealer. These kinds of swaps where the currency doesn't really match up to the payout, are called quanto swaps.

Regarding access to other markets, often there are barriers to entering other markets. The most common barrier is trying to buy equity in foreign markets. The transaction costs and management costs are or can be very large. Sometimes there are withholding tax problems, government regulations, industry regulations or credit restrictions, all kinds of reasons. It's tricky to get access, particularly to foreign markets and sometimes internal markets, as well. Derivatives can help you get efficient exposure to these markets several ways. I will describe a couple of ways: either directly through swaps, or through customized notes. Both deliver the same end result, but are somewhat different in their methods.

Creating a synthetic asset is using a swap to create a synthetic bond of some sort. Or you can have equity exposure. You can have pretty well anything you want. A pension fund takes assets that it already has and passes the cash flows from those assets on to a swap dealer, in return, receiving some desired cash flow. Suppose you wanted exposure to the yen. As before, you thought the yen was going to depreciate. You could embed some yen puts on top. Instead of coupons, you receive a yen put every six months, something like what is shown in Chart 1.

CHART 1
CREATING A SYNTHETIC ASSET



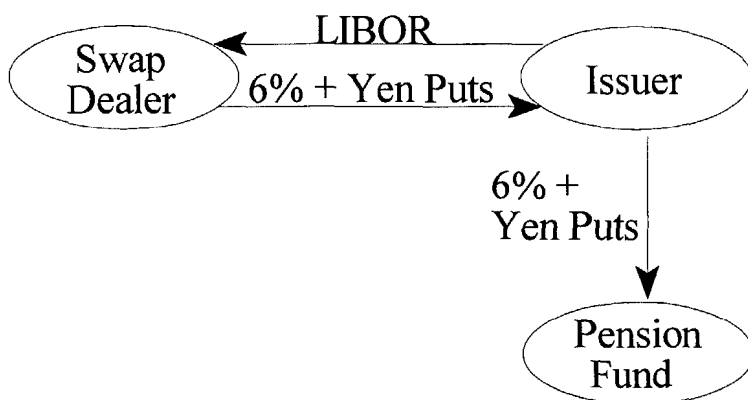
This can be a very effective method of getting exposure to long-dated assets. When a pension fund wants something with a 30-year maturity, it is fairly limited because of the credit intensity of taking on a 30-year asset. Instead, you could do a swap, receive 30-year cash flows, and pay cash flows from assets that you already own to the swap dealer. The assets that you already own would be shorter in term. Therefore, much less credit intensive. So you could end up with a much less credit intensive trade. Now, there is credit risk to the swap counterparty. Pick a high-quality swap counterparty and add in various credit enhancements into your documentation. But that's another topic. Nonetheless, you can use swaps to get long-dated assets in a less credit intensive way. And often, if the market is treating you properly, you can get a very nice yield on that.

In the same manner, you can create exposures to foreign interest rates, or exposures to various spreads between interest rates or what have you. You use an existing asset, take the cash flows, and pay them to the swap dealer. The swap dealer, in return, pays back cash flows as desired by the pension fund. In this case, it's an arbitrary example of paying the coupons plus payoffs from puts on the yen. But generally, the desired cash flows come back. I want to point out the pension fund is laying off the cash flows from the asset, but it is not laying off the credit risk of the asset. If the asset supporting the swap defaults, that's the pension fund's responsibility. The fund still has to pay the promised cash flows along to the swap dealer.

Customized notes end up with the same result as the synthetic asset that I just described. Except, an actual bond is purchased by the fund with the desired features. Chart 2 shows that the pension fund receives the 6% plus yen puts, just like in Chart 1; the net effect is the same. However, the fund is receiving them from an issuer and an issuer does a swap with the swap dealer. This means probably paying the swap dealer London Interbank Offered Rate (LIBOR), or it could be fixed, whatever the issuer wants as funding. The issuer is receiving the more customized cash flows from the swap dealer and then passes them on to the investor.

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CHART 2 CUSTOMIZED NOTES



Now there are several advantages to doing it this way from the pension fund's perspective. One, you don't have to deal with the complexity of swap documentation and that sort of thing, which can be a complicated road. And, if you're not going to be a frequent derivatives user, then perhaps that's not worth the effort. Furthermore, some counterparties will be restricted from getting into the swap market, just for credit reasons. Pension funds are a *strange animal from a credit perspective and some dealers/banks find it is not easy (because it's not normal) to assess them on a credit basis.*

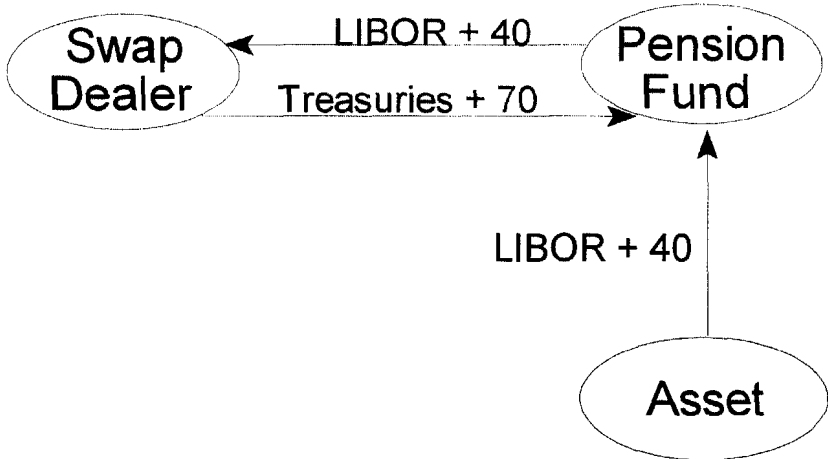
The disadvantage is cost. In the previous example, there was a pension fund and a swap dealer. The swap dealer is taking a bid/offer spread out, so the dealer is making a profit on it. Here, the issuer isn't going to issue unless it gets funding better than the level to which it is normally accustomed. So there's an implicit cost. Furthermore, someone probably sold the pension fund the bond and there would be a fee there. So it costs more, but it's simpler.

A picture of an asset swap is almost identical to the picture I showed you for creating a synthetic asset. So the structure is the same, but the thinking is different. Instead of creating a synthetic asset by taking any asset, attaching it to a swap and getting something brand new, you are thinking of trying to find an asset within your general constraints. Say you needed U.S. dollar-denominated bonds with maturities between two and ten years, but instead of restricting yourself to looking at that particular spectrum, you look at the entire spectrum. Perhaps you find a sterling asset yielding floating rates, but at a very good yield. This is very attractive. It's completely inappropriate for your fund, but here you have this great deal. You can buy that asset, swap it into your five-year U.S. dollar asset that you're looking for and end up with what you were looking for in the first place. What you've essentially done is broaden the spectrum from which you can analyze investments. Often you can take advantage of great yields or mispricings that come along, without being so constrained by the requirements of your fund, or more particularly, the requirements of your liabilities. So you can switch into a specific tenor or currency. You can even take a

regular coupon bond, plain vanilla, and turn it into a zero-coupon bond, effectively. And I would wager that doing it that way is probably, in many cases, cheaper than buying strips.

Chart 3 is a picture of an asset swap. It's really the same picture as creating the synthetic asset. Suppose the pension fund has found a great floating rate asset, yielding LIBOR plus 40. Good credit, sounds great, but the fund has absolutely no use for floating rate instruments at this time. Buy it anyway. Pay those cash flows to a swap dealer and swap it into something yielding more than you would expect for that particular credit. In my example, I've put treasuries plus 70. So it allowed the pension fund to broaden the spectrum when shopping for investments. It's nothing fancy—just a good way of enhancing yield for the pension fund.

CHART 3
ASSET SWAPS



You can alter or vary risk/return profile of a fund by buying or writing options. You have well-known strategies, covered calls, protective puts, and all the ones with fancy names: spreads, straddles, strips, and straps. We are seeing people look at derivatives as an asset class, more and more.

Asset/liability management is possibly one of the most useful ways derivatives can be used. Asset/liability management generally requires a fair bit of precision and derivatives can supply that. Let's start with an example of a dedicated portfolio. Suppose you have a fund for a group of retirees with fixed liabilities and you have decided that you are going to cash flow match those. Some people say that cash-flow matching is great in theory, but in practice it's way too expensive. This was true in 1980 and it was probably true in 1985. I don't think it was true in 1990 and definitely not true in 1995. Cash-flow matching, because of the development of the derivatives market in the U.S. and Canada (the well-developed market), is no longer expensive. You don't get charged extra for picking specific dates. Pick your dates, get the cash flow that you want—the transaction costs will

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depend on the market risk taken on by the swap dealer. Cash-flow matching is no longer expensive.

Typically, in a dedicated portfolio, the fund hires someone to do an analysis of the desired cash flows. Someone assumes some reinvestment rates and looks at an entire spectrum of bonds and comes up with something that closely matches, and you buy some fixed-income items. Even if you're buying fairly liquid assets, it can be quite expensive to do it that way. Certainly, an alternative, which I've never seen done, is pension funds could look into using a swap to hedge a dedicated portfolio. You have these projected cash flows for your retirees, so there is some theoretical ideal bond that would cover all those cash flows and life would be grand. You can treat that bond as one leg of a swap. The swap dealer will pay you those cash flows exactly. In return, you have to pay cash flows from your existing assets, instead of buying anything and just churning up transaction costs and keeping your bond broker happy. Now, I'm ignoring many details of this. You have to get into it and do some analysis like dividing up principal and interest. Actuaries are very comfortable with that. It's not a big deal, but just be aware that a swap can be a very useful mechanism for doing exact cash-flow matching. You end up with something that is cash-flow matched to the level of certainty of your mortality scale. There are lower transaction costs, generally, and those assets that you're using to support the swap can be a diversified portfolio of credit. Essentially, all we're doing here is a more complicated asset swap.

Now a dedicated portfolio is on the extreme end of asset/liability management. If you're cash-flow matching, you're completely constrained, and that's all you can do. In an immunization program, the fund manager has some discretion, can take some positions within limits, and can take on spread positions between say the two and ten years. There is a little more that doesn't have to be cash-flow matched. Again, asset swaps are quite useful here. You are constraining a pension fund manager to a very small spectrum of investments. The manager has to go and buy something. He or she might need something with a duration between 2 and 2.5 and that's it. If, at that time, there aren't many attractive assets with durations of 2-2.5, go out and buy something that is undervalued by the market and swap that into the appropriate duration and appropriate cash flows. You can fit your immunization program at the same time, broadening the spectrum of investments you're looking for.

Derivatives can be used to enhance yields and decrease transaction costs. Used wisely, they fit in very well with the objectives of a pension fund.

MR. JOHNNIE K. YUNG: I will share with you some of the experience of the Ontario Teacher's Pension Fund in implementing an asset shift by using derivatives. Let me start by giving you some history about the fund. It was established in 1917, under the teachers and inspectors' superannuation act. This is the beginning of the fund as we all know it today. With the passage of the Teachers' Pension Plan Act, the Ontario Teacher's Pension Plan Board was created, as an independent organization. Prior to the creation of the Board, the investments were restricted to nonmarketable government of Ontario debentures. The investment mandate has been changed since. We have an obligation to diversify.

The plan is sponsored jointly by the Ontario government and its plan members. The two groups share the gains and losses together. The membership, as of the end of 1994,

includes 160,000 active teachers, 43,000 retired teachers, and 88,000 former teachers with some entitlement. Total assets, as of the end of 1994, were \$34 billion. It is the largest invested pension plan in Canada and is the 29th largest one in the world. The situation facing the board when it was first created back in 1990 was that we had 100% of nonmarketable province of Ontario debentures. We could not sell them or trade them. All we had was the cash flows deriving from the debentures. However, we had a duty to invest in a prudent manner. One hundred percent in fixed income is certainly not an appropriate asset mix. And we also had to meet the pension obligations of the defined-benefit plan, fully indexed to inflation of up to 8% with any excess carried over to future years. Without a change of the asset mix, the unfunded liability was bound to increase.

Both external and internal studies were made to determine the optimum asset mix. The board had finally adopted two-thirds in stocks and one-third in bonds. There were two ways to achieve this target asset mix. The first way was to use the cash approach. In other words, buy stocks using the cash flows derived from those illiquid debentures. This shift to stocks would take a long time. Target asset mix was not expected to be achieved before the year 2000 under this approach. The other, more innovative approach, was to use derivatives. In other words, trade the bond payments for stock returns. This could shift to our target asset mix more quickly. The completion date was expected to be 1996 under this approach.

So, what did we do? We finally decided to shift the debenture payments into equity exposures, by using derivatives. The derivatives that we used were swaps. First, we used interest rate swaps to hedge the value of the debentures. And then we used equity swaps to transform the interest rate payments into equity returns.

Before we did the first swap, there was a great deal of background work that had to be done. First, we had to get federal government approval for foreign content. We also had to get board approval. We also had to research the counterparties for each market and deal with documentation. Then, foreign exchange considerations, whether to use hedged or unhedged benchmarks and credit exposures had to be carefully evaluated. We also had to set up systems for front, middle, and back offices. Finally, we also had to implement internal controls and valuation procedures, and design our compliance reports.

The first phase of the asset class shift is to use interest rate swaps. The objective here is to hedge the debenture value, to reduce the interest rate risk and, finally, shift the fixed-rate debentures into floating-rate instruments. Chart 4 shows you the parties involved. Basically, we receive the fixed coupon payments from those debentures. We then enter into an interest rate swap by paying those fixed payments to the counterparty. In return, we receive floating payments. Effectively, we are transforming the fixed-rate debentures into a floating-rate instrument. In this case, the floating-rate instrument is three-month bankers' acceptance floating-rate notes.

Chart 5 shows the maturity profile of the debentures in our core investment portfolio. We had \$9 billion of nonmarketable debentures with a modified duration of about seven years. In other words, for each percentage change in interest rate, this portfolio would change by \$630 million. And if rates in Canada increased by 2%, in the long run, this portfolio would lose roughly \$1.2 billion overnight. The interest rate risk was substantial.

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CHART 4
SWITCHING FROM BOND PAYMENTS TO FLOATING PAYMENTS

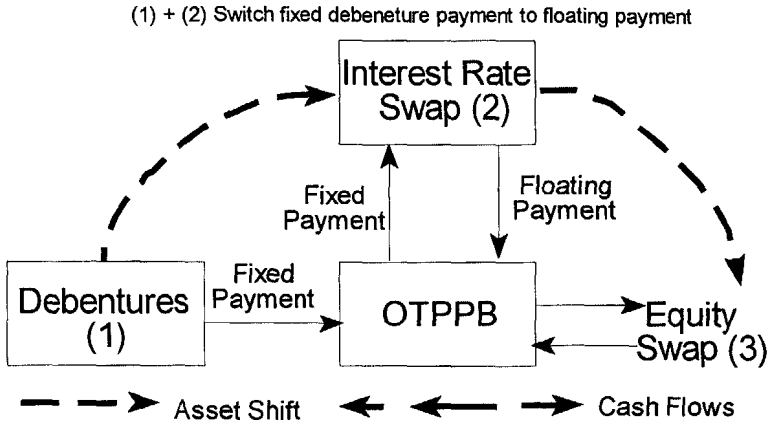


CHART 5
MATURITY PROFILE
CORE DEBENTURES

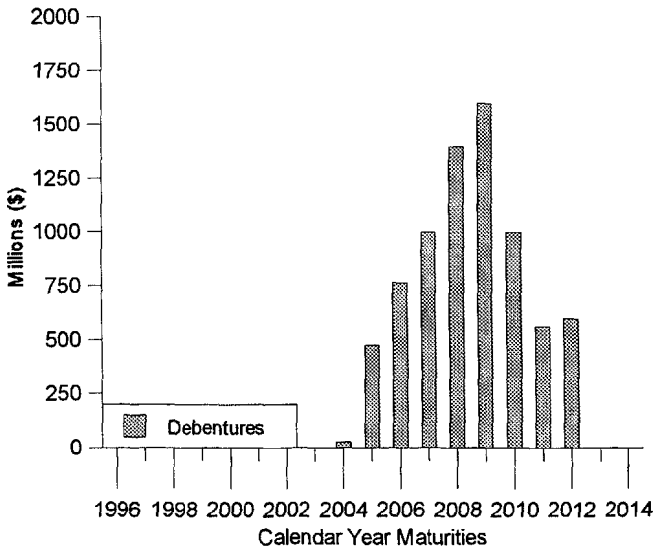


Chart 6 is an ideal world of no residual interest rate risk. The top portions of the graph are debenture maturities and the bottom portion are interest rate swap maturities. In order to construct this portfolio, we would have to enter into interest rate swaps with maturity

exactly mirroring those of the debentures. This is indeed an immunized portfolio. This is as if the debentures were sold and cash were raised.

CHART 6
IMMUNIZED PORTFOLIO (THEORETICAL)
CORE DEBENTURES AND INTEREST RATE SWAPS

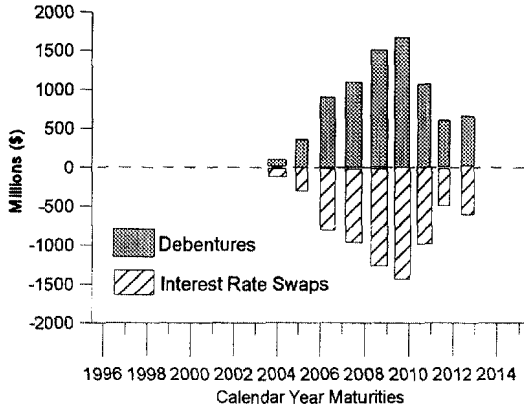
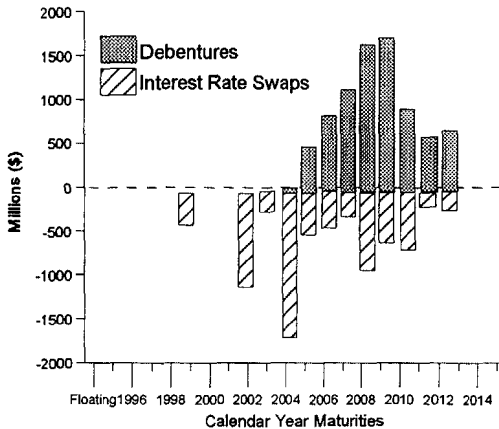


Chart 7 is a maturity profile of our core debentures as of the end of 1994. Again, the top portions are debentures and bottom portions are the interest rate swaps. You will notice that the maturities of the interest rate swaps do not mirror those of the debentures. This is because, in the past, no counterparty in Canada would do swaps beyond ten years. But, fortunately, longer-term interest rate swaps do exist in the market today. And this historical position can be adjusted over time, when opportunity permits.

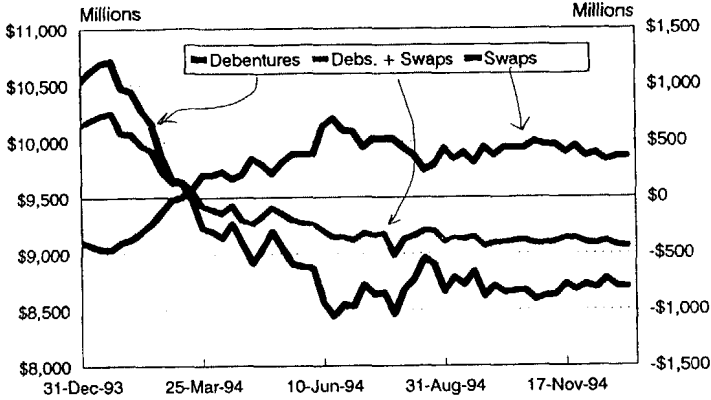
CHART 7
FIXED INCOME MATURITY PROFILE:
MARKET VALUES FOR DECEMBER 31, 1994



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Chart 8 shows our ability to preserve the value of the debentures. The line running from top to bottom represents the market value of the debentures over 1994. In 1994, interest rates increased and we lost \$1.5 billion on the debentures. The line running from bottom to top is the market values of our interest rate swaps. We gained \$850 million on them in 1994. The middle line shows you the net position. We incurred a net loss of \$650 million and this loss is mainly due to debentures not yet swapped into equity exposures.

**CHART 8
CORE FIXED-INCOME PORTFOLIO: VALUE PRESERVATION**



For the second phase of the asset class shift, we used equity swaps. The objective here is to exchange floating rate payments into equity returns. Chart 9 shows you the process. As you recall, we received the floating side from the interest rate swap dealer. We then entered into another swap called an equity swap. By paying the dealer the floating payments, in return we received the unhedged equity index return. Effectively, we have transformed the floating-rate instrument into an equity exposure.

**CHART 9
SWITCHING FROM FLOATING PAYMENTS TO EQUITY (STOCK) PAYMENTS**

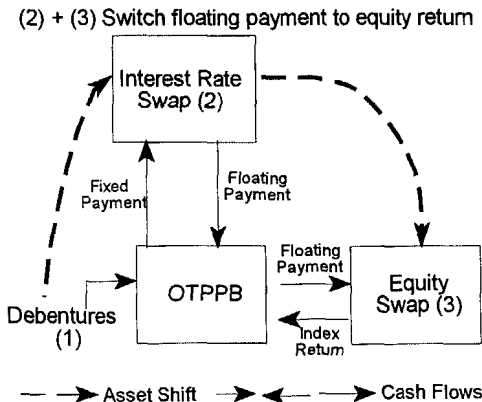
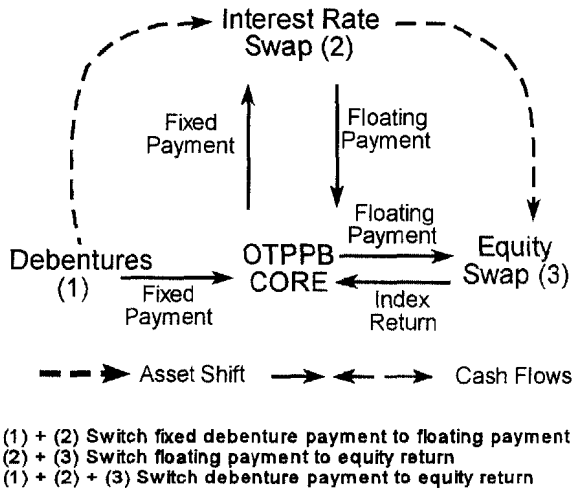


Chart 10 shows you the complete process. We received the fixed-coupon payments. We entered into interest rate swaps by paying the fixed payments and receiving the floating-rate payments. We then entered into another swap, called an equity swap, by paying the floating payments and receiving equity returns. The net result is that we have transformed the debenture payments into equity returns.

CHART 10
ASSET SHIFT FROM DEBENTURES TO EQUITIES



We use equity swaps mainly in the international markets. We have two international equity portfolios. One is the U.S. portfolio, where the benchmark is the S&P 500 total return index. The other portfolio is the Europe, Australia, and the Far East (EAFE) portfolio, which consists of 20 countries in those areas. The benchmark is the Morgan Stanley Capital International (MSCI) EAFE total return index. We use the equity swaps mainly in countries where large futures markets exist, such as the U.S., U.K., Netherlands, Germany, Switzerland, Italy, and France. For countries with small futures markets, we use the cash approach and we buy stock.

Chart 11 shows you the breakdown of our EAFE equity portfolio. We started our first equity swap back in 1991. By March 1993, we used equity swaps in only two countries, Germany and the U.K. And the rest of the portfolio, more than 75% of it, was in cash stock markets, managed by an external fund manager.

By the end of 1994, we expanded the derivatives into seven countries, the Netherlands, Germany, the U.K., Switzerland, France, Italy, and Japan. The cash stock portfolio now consists of only 16.7% making up the rest of the 13 countries in the EAFE portfolio. The size of this portfolio increased 167%, or more than \$2 billion in less than two years.

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CHART 11
EAFE—DERIVATIVES USE

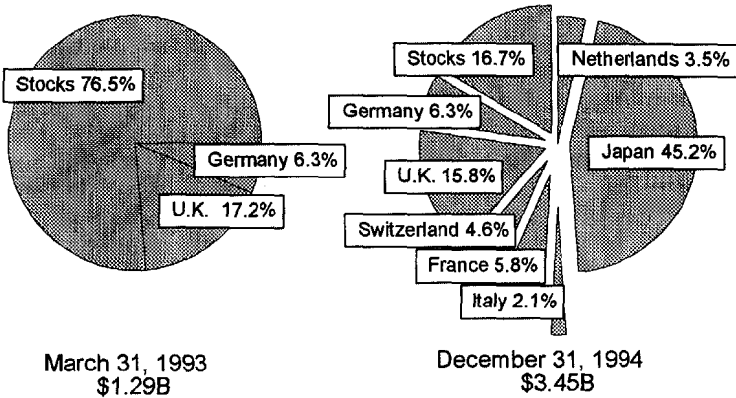
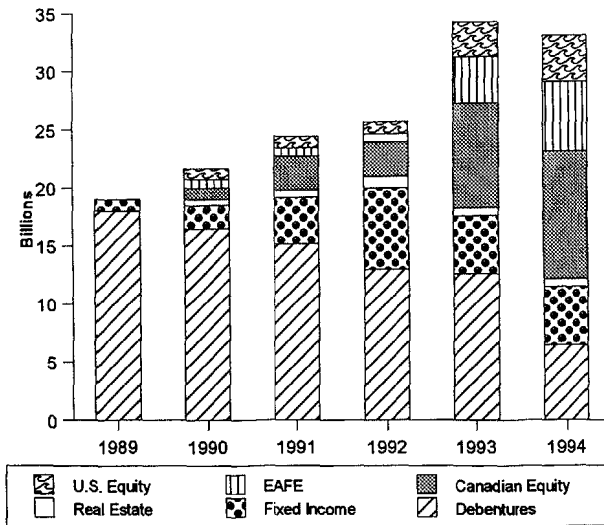


Chart 12 shows our asset mix over the past six years. Moving from 1989 to 1994, our fixed-income portfolio decreased to one-third of the portfolio, our target asset mix. Return for this diversified portfolio exceeded both of our benchmarks and the inflation-adjusted liabilities. As a matter of fact, the unfunded liability of this fund has decreased from 14% of the total 1990 assets to just 7% today.

CHART 12
TOTAL FUND ASSET MIX



Without the use of derivatives, we would not have been able to achieve our target asset mix by today. If we had to use the cash flows from those illiquid debentures, it would take another six or seven years to achieve this target.

MR. G. DOUGLAS CARR: I'd like to provide some background in terms of risks. I thought we might have fun with some of the recent horror stories and disasters that you read about. I'll then talk about how control environments have been evolving, and the various work that's been done over the last couple of years in defining what types of control environments are appropriate to control derivatives risk. In a similar vein, I'll discuss some of the evolution that's gone on in management and the reporting of derivatives exposure. I'll conclude with a discussion about the role of the board of trustees of a pension fund in all this, which, of course, is where the ultimate responsibility falls.

Derivatives, of course, have gotten a horrible reputation lately. The "D" word has become something that people don't want to talk about. A tremendous amount of risk is associated with it. If you really wanted to frighten your board of trustees, you could show something like Table 1, listing all the quite narrow definitions of the types of risks to which you can be exposed.

TABLE 1
RISKS

Technology	Regulatory	Market
Basis	Tax	Interest Rate
Political	Accounting	Prepayment
Suitability	Legal	Reinvestment
Optional	Daylight	Volatility
Concentration	Capital	Netting
Contract	Liquidity	Currency
Systems	Bankruptcy	Commodity
Limit	Collateral	Equity
Rollover	Modelling	Call
Hedging	Cross Market	Yield Curve
Interpolation	Systemic	Curve Construction
Extrapolation	Time Lag	Raw Data
Credit		

What I do want to do is just focus on the four main areas. Most of those other risks can be grouped into the risks that you know of as market risk, counterparty credit risk, the legal and regulatory risk, and whether you're conforming with regulatory requirements and, of course, the operational risks of how you're controlling your trading activities and your back room activities.

The most definitive piece of work on this is the G30 report that was undertaken by the Group of 30 two years ago. It produced a report called *Derivatives: Practice and Principles*. The summary document contains about 20 key recommendations that govern the practices of anybody participating in derivative instruments. In addition to the summary report, there are about three appendices. This is a very good summary of what derivatives are, how they're traded, and the types of controls that should be incorporated over their use. In the wake of that report, we've had a whole raft of regulatory examinations of this issue and reports recommending policies that should apply within their jurisdictions.

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We've had reports come from the Bank of England, the Ball Committee, the Bank for International Settlements (BIS) Committee of the International Bank Regulators. We had the General Accounting Office (GAO) report and a number of things in Canada with the Canada Deposit Insurance Corporation (CDIC), and the Office of the Superintendent of Financial Institutions (OSFI) derivatives. The OSFI is the best practice paper, but all these reports really have the same recommendations that were embodied in that original G30 report.

These are the common themes that each one stresses: the need for active oversight by the board of trustees, well-conceived risk management measurement reporting, comprehensive internal controls (with segregation of duties), and limits on risk taking. I will just quickly go over each of those four.

In terms of oversight by the board, the strong recommendation is that the board understand what it is that it is trying to do, what its mission is and then, within that, how it's going to use derivatives to meet that objective.

You should have an independent risk management function that is independent of the trading activity, and prior product approvals on the types of instruments or products that you're going to use. In some cases, the board may well decide that it would use forward-based or future contracts, but it doesn't want to use options at all. Or alternatively, the board might say, "We're happy to use options, provided we're buying the options, but we don't want to be in a position of taking unlimited exposure by writing options." So the Board may prohibit writing options.

Risk measurement reporting should be comprehensive. It should take into account things that are on the balance sheet, as well as the things that are off it. Measure the risks in a consistent fashion. Make sure the information you're using to value them is from consistent sources. I recommend marked-to-market reporting and then some kind of reporting to the board that is relatively simple and easy to understand, rather than a whole myriad of reports that look at the risks on a category-by-category basis.

In terms of the segregation of duty, we just talked about the requirement to have a risk management function that is independent of the position taking. In the evolution of some of these entities, the people who are putting positions on are the ones that understand the transactions. They are then the ones to whom people look to value the transactions. So, you then have no independent satisfaction that the trader is not valuing things inappropriately. Let's discuss back-office controls. John referred to midoffice and back office and it's very important to distinguish them. In some cases, it may be together if the back office has sufficient expertise to understand the risks that are created. If it doesn't, you wind up with the creation of a midoffice.

The internal audit function is obviously, very important as are appropriate compensation policies. For example, is your treasury activity a profit center? If so, why? Make sure that you don't have compensation practices that would induce people to take on inappropriate levels of risk and risk that's not consistent with the objectives of the organization.

Typically, you'll have a definition of limits on the amount of market risk that you want to be exposed to, or are prepared to live with. The same thing applies to counterparty credit

risk. You also may want to develop other limits to deal with concerns about liquidity requirements, and therefore, how the portfolio may be structured in terms of liquidity. You might establish settlement risk limits by counterparty that would be much lower than your counterparty credit limits, for fear of the amount that you would have to settle on any given day. There's also the question of who has the ability to bind the fund? And what are the limits of this authority?

Now, moving into the management and reporting environment, I'll talk briefly about each of these two main categories of risk: market risk and counterparty credit risk. I'll describe some of the things that have been developed in terms of measuring and reporting these. You'll again see that there is a theme to all of this: the need to have all positions marked-to-market, so that you don't get into a distinction between the on-balance sheet and off-balance sheet items. If you have off-balance sheet exposure, let's bring them all together into one place where you can see the entire picture. You want to measure the risks consistently, ensure that you're getting information for your marked-to-market valuations from consistent sources, at the same time of day, and that you're consolidating the information on market price risk and counterparty credit risk. You're going to aggregate counterparty credit exposure, for example, by all the types of instruments that you may be exposed to, with that counterparty.

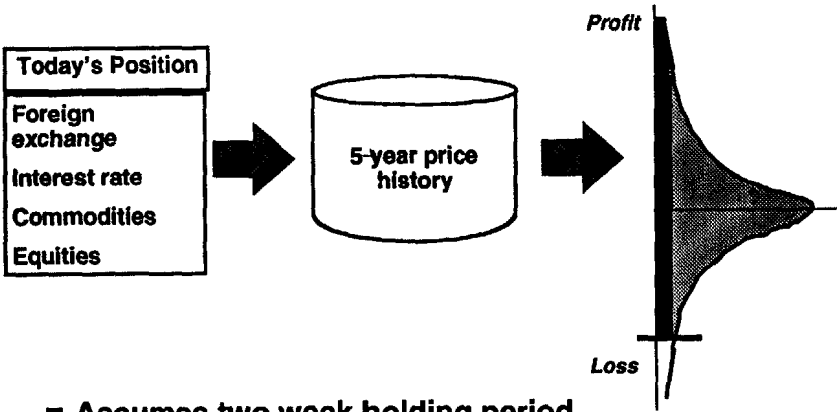
To show the evolution of this, it used to be that often this kind of analysis simply took place at the product level. You would aggregate the risk exposure and the counterparty credit exposure, for example, for the foreign exchange positions, or for the swap positions and so forth. Then, that was brought together into a consolidated reporting of what your exposure would be on a replacement cost basis. On the next level is scenario modeling to determine what your risk could become, both on a market price risk and on a counterparty credit risk basis.

That's this concept of "value at risk" that you've probably heard a fair amount about. Looking at Chart 13, basically, the idea is to take the position that you have today, your entire portfolio (which probably has a combination of things relating to foreign exchange or interest rates, commodities, and equities), and simulate what would have happened had you held that position for every, say, two-week period during the last five years. If you then graph the results, you wind up with a distribution that's pretty nominal, as shown in Chart 13. The idea is that you want 95% confidence that the loss that you would have incurred by holding that position, would not have been more than a desired limit. So you attempt to structure the portfolio such that all the acceptable outcomes (in the grey area) have a 95% confidence level above the stated limit.

Chart 14 illustrates a way that you can produce a report to senior management or the board of trustees that would chart this. The two lines (upper and lower) are mirror images. This is effectively the value at risk range. You calculate this based on your portfolio and you have 95% confidence that the gain or the loss wouldn't fall outside the range. The position changes every day, of course, and you calculate what your value at risk is, and then you can plot the actual daily profit and loss and if everything is holding true you'd expect the daily profit and loss line would exceed these boundaries about one in 20 days. If you want to do it on a higher level of confidence, say, if you don't want to lose that kind of position more than once a month, the limit is expressed and the confidence interval altered accordingly.

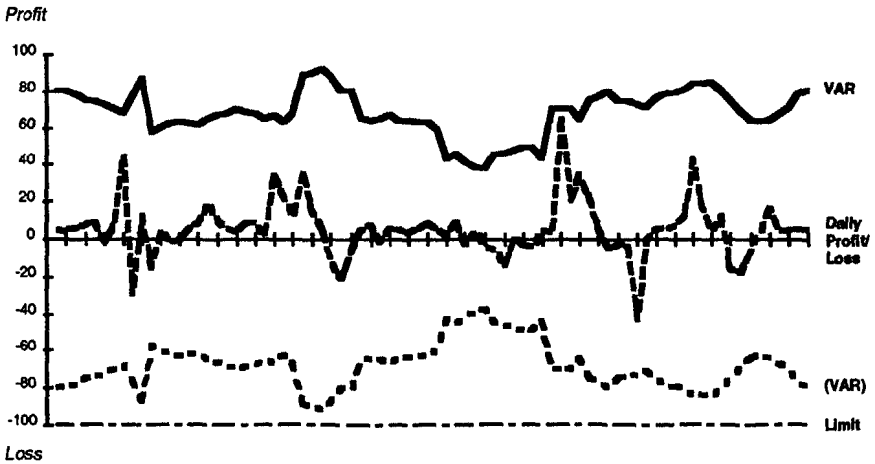
DERIVATIVES FOR PENSION FUNDS

CHART 13
VALUE AT RISK



- Assumes two week holding period
- Level of confidence = 95% quartile

CHART 14
SAMPLE REPORT: POTENTIAL VERSUS ACTUAL CHANGES IN VALUE

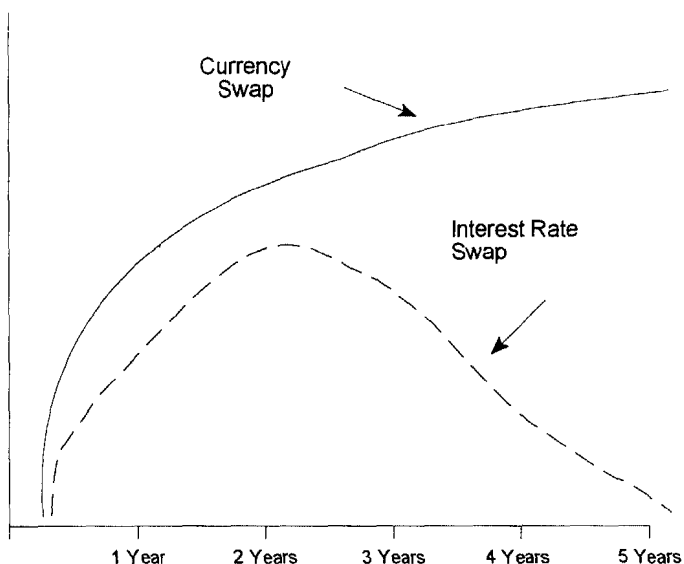


Counterparty credit risk results from a combination of the probability of counterparty default, (which is obviously fairly nominal, but still a factor and clearly less with exchange-traded products, than it is with over-the-counter instruments), and a credit exposure that you'd incur in the event of default. There you're concerned with the presettlement risk, with increasing exposure before you come to the end, which is the case with swaps. And the settlement risk that you have with an foreign exchange transaction, because it has the potential to keep on growing. Obviously, your objective here is to limit the growth in exposure.

Just as a reminder, the measurement of the credit exposure will cover all of the products, so if you have investments with a counterparty, and you also have a swap transaction with that counterparty, then let's consider them together and what the effect would be of a failure of that counterparty. You need to consider not just the current replacement cost, or current marked-to-market of the position, but the fact that the exposure can continue to escalate totally beyond your control. So typically, you use models to calculate what the worst case position would be if exposures continued to increase before you could do anything to mitigate your exposure.

Chart 15 is an example of how the exposure can continue to rise. In the case of an interest rate swap, it will go up initially, of course, but ultimately you get to the point where there are fewer cash flows remaining to come in and so the exposure will reduce, going back to zero, at the end of a five-year swap. But with a currency swap, you have no assurance that the exchange rates might not continue to diverge so that the exposure could continue to escalate as you move further out the life of the currency swap.

CHART 15
 EXAMPLE: TYPICAL WORST CASE CREDIT EXPOSURE
 OVER THE LIFE OF A FIVE-YEAR SWAP



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Organizations are becoming more sophisticated in their approach to measuring counterparty credit risk. For example, exposure is considered to be the credit equivalent of a derivative exposure, or the replacement cost of the current marked-to-market. The next step is to take into account the potential additional exposure that can arise. Then you must consider portfolio modeling where you can take account of the portfolio effects which will tend to mitigate your exposure. The potential exposure add-ons, if you're looking at the instruments on a product-by-product basis, could wind up with a very large number. However, when you look at your overall portfolio though, you'll have some things with a counterparty going one direction, offset by another instrument with opposite exposure to the same counterparty. So you have a netting effect. You can also have a timing effect like an interest rate swap, where the exposure will decline over time. Therefore, the maximum exposure that you're going to be exposed to from that counterparty may not be the sum of the maximum exposures at any point in time. If you're looking at it over a five-year period, the exposure for one instrument may peak at year two and the exposure for another instrument might peak at year five.

Spencer made reference to the ability to reduce credit exposure through some of the things that you can incorporate into your International Swap Dealers Association (ISDA) documentation. For example, early termination provisions in the event of material change or credit downgrade. Or, the requirement to post collateral at trigger points in the marked-to-market valuation so that you reduce your exposure. Alternatively, you could simply provide that when you reach those marked-to-market trigger points that you have a requirement to pay out or receive the amount that's in the money and reset the rates accordingly to current market rates.

Consider then the role of the board of trustees in this control of the risks. For many years now, we've had people who were looking after the trading and, the people supervising them really had no idea what they were doing. It doesn't work that way anymore.

Chart 16 illustrates the typical way that we talk with clients about the process of setting policies. This includes the establishment of policies and limits, the development of the systems and procedures that will control transactions, the issues that surround the valuation of the positions, accounting/disclosure, management information to the senior management and the board, reports on performance measurement (how outcomes compare to benchmarks that have been established), how the process of internal control and internal audit work, and finally, an evaluation of how well this whole process has worked. The evaluation should then feed back into a review of the policies and modification of the policies as appropriate. So, from the board point of view, the board should be heavily involved in the policy area. It should probably be exercising some kind of oversight over the limits that are being established. Then the board will want to see evidence that the rest of this process is taking place appropriately. The board should also be involved again at the end point, the evaluation of the effectiveness of the process. You'll see, I think, a move towards people doing this on, hopefully, an annual basis (certainly not too much longer than that) to ensure they have appropriate processes.

CHART 16
POLICY SETTING

The Day Committee Report was commissioned by the Toronto Stock Exchange (TSE) and was released a few months ago. It was a report on appropriate corporate governance procedures. There are a number of points which I think are of general application to any kind of an organization.

In terms of the mandate of the board, the Day Committee Report, in fact, requires that all TSE companies put in a statement about their approach to corporate governance, identification of risks and how they are managing them.

The report also suggests that board composition should be reviewed, to make sure you have enough resources and sufficient diversity of views and relevant experience. Make sure that you have some people who will participate actively in the deliberations of the board. Given all the responsibilities of the board, it may be more effective for the board to operate through committees. So you want the committees to contain a number of people who are independent of the entity or the fund, in terms of reference and, of course, the expertise to understand what the risks are and how they're being managed. The report also suggests the education of trustees of pension boards, for example, orientation sessions for new trustees and ongoing relevant training. There are many ways of educating people about the risks and exposures we have been talking about. The report suggests that when board members get out of their area of expertise, they should get external counsel. It recommends finding other people that can help members review the process and, in conjunction with management, understand the role the board is looking to outside counsel to play and to support them.

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All these control procedures we have talked about are not new. All the things we've talked about in relation to derivative instruments are equally applicable to cash market instruments. All that we have here is simply a heightened concern when you're dealing with derivatives because of the greater complexity of the risks, and the leverage that is possible through using derivatives. We also have the failure because of the lack of understanding to recognize the risk and to put in place appropriate controls and reporting.

So the challenge for managers of funds, I think, is to go through this process, assist the trustees in an understanding of the risks, go through the points shown in Chart 16, and have an agreed approach as to how they will manage risk and how the systems will be put in place in order to do that. Often, this can be most effectively achieved by establishing a committee of the board to take responsibility for the direction of this process, on behalf of the board, and to facilitate the ongoing education and training of the trustees, so that they're adequately equipped to perform those tasks.

MR. ALEXANDER: As I said at the beginning, the whole point of this session was to show you a number of alternatives and the possibilities that exist. I think Spencer ran through a wide variety of possibilities. We also showed you how John and the Ontario Teacher's Pension Plan achieved quite a meaningful shift in their overall portfolio mix. It gives you an idea of the scope of impact you can have. But as Doug has outlined quite dramatically, it takes a great deal of effort to use derivatives. One of the questions that I've often asked Doug is, "Is it worth all this effort?" I think Doug pointed this out, and I'd like to reemphasize what he said; it's something that people should be worrying about when they're just dealing in the cash market. There are risks inherent in the cash market that don't get publicized because they probably don't offer quite as much leverage as the derivatives market. But, nonetheless, there are risks that should be controlled and should be managed within a fund whether it's using derivatives or not.

FROM THE FLOOR: How do derivatives lead to the lowering of transaction costs? I heard that a couple of times and it's not really clear to me.

MR. KELLY: It depends on the market you're talking about. Let's say you wanted to buy an option, as opposed to doing sort of a Black-Scholes approach to synthetically create an option yourself. For you to replicate the option, you would have to be doing transactions in the market all the time in response to market changes. In a perfect world where there are no transaction costs, it wouldn't matter. The advantage in a derivatives house is it has a two-way market. It will buy or sell an option to you and buy an option from somewhere else. For the most part, the derivatives house can almost sit on that position without incurring any further transaction costs. The inherent transaction costs to you are eliminated by the derivatives house. In an equity transaction, they may be paying on the S&P to you, and receiving on the S&P from someone else. Again, no real transaction buying or selling of stocks was done to support this. I have oversimplified by implying that exact offsetting transactions are done (that's how they were done in the old days). It's done today on a portfolio basis, but the same idea holds. I try to get somebody to pay me what I'm paying you, and I get them to pay a little more than I'm paying you, and that's how I make my profits. But by having static hedges, I can reduce transaction costs significantly. My advantage is I'm a more efficient hedger than you could be. Sort of a cash flow central. That's the general idea.

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MR. ALEXANDER: If I could just supplement that. I've seen a number of pension funds that believe in actively managing asset mix and Spencer alluded to this earlier. The transaction costs in shifting in the derivatives market are considerably less than the commissions you would pay both in and out of a stock market, for example. You could make that kind of an asset mix shift, but there are hidden things too. I think Spencer eluded to the fact that if you have, say, a small cap fund or a fund that's involved in a market where transactions are harder to execute, just because of the liquidity in the market, you get hidden transaction costs because you move the price of the stock. You can achieve the asset mix shift without incurring those costs, and you don't mess up the manager who is running that small cap fund for you.