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Course F-585 “Lite” Financial Risk Management in Banking

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Summary: This teaching session will introduce “seasoned” actuaries to the new material on the Finance Track of the Education and Examination syllabus. This session will focus on the latest text added to course F-585. This text, Financial Risk Management in Banking: The Theory and Application of Asset/Liability Management (ALM), by Dennis Uyemura and Donald VanDeventer, takes a practical look at the techniques banks use for ALM.

Mr. Joseph Koltisko: Our first speaker is Dennis Uyemura. Dennis has been a senior executive at a number of banking institutions, including First Interstate and the Federal Home Loan Bank in San Francisco, which is probably the second largest issuer of fixed-income securities and derivatives after the U.S. Treasury. He has also been the chief financial officer of Silicon Valley Bank, so his perspective on how banks manage risk is particularly valuable. He's currently a consultant with Stern Stewart.

With Donald VanDeventer, he is the coauthor of one of the books on the current syllabus, *Financial Risk Management in Banking*.

I'm the corporate actuary for Fortis Inc. in New York. One Fortis company, American Security Group, is a leader in providing collateral protection for banks. Our finance subsidiary, Auto Lenders Acceptance Corp., counts leading banks as its clients. Other Fortis companies provide group long-term disability coverage, asset

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accumulation products, health insurance, and long-term care. I'll discuss some of the corporate finance aspects of the exam.

Mr. Dennis Uyemura: I assume that those of you who are in the room have a general interest in how bankers deal with the topic of financial risk management. What I'm going to do is take some of the topics that are addressed in the book *Financial Risk Management in Banking*, by Uyemura and Deventer, Irwin 1993 and try to give you a little more background about why those topics are particularly relevant from a banker's perspective.

The issue for bankers (as it is, I believe, for any corporation) is value. Economic value added (EVA) is the thrust of the book. What we were trying to do with the book was to show senior executives in banking organizations that you really can apply the basic principles you learned in your first finance course to the world of making decisions in banking and managing a bank. That linkage is amazingly weak in many corporations, not just banks.

I head up the financial institutions division for my company now, and I work with insurance companies, finance companies, investment banks, and also with the finance subsidiaries of large conglomerates. Everything I will talk about is geared toward maximizing shareholder value; that is, providing the linkage between risk management and value creation. The principle here is not new to anyone. It's a question of maximizing the net present value (NPV) of the firm. How do you make decisions and set up a management framework so that every decision that's made will maximize the NPV of the firm? That's why I state here the fundamental goal of ALM is to maximize the risk-adjusted returns to shareholders over the long run. It's my belief that if you do that, you automatically maximize the NPV of the firm.

The problem you have in implementing this is that this is a valuation concept that requires a forecast of earnings and cash flows. It means cutting through many accounting distortions. NPV is not a practical tool in my opinion to use in real decision making. Somehow we have to take this concept and make it operational it so that we're not dealing with forecasts and valuation models.

Line managers are not going to use it. That's the whole thrust of the EVA framework—we are talking about risk management in all dimensions. The EVA framework has to be generic, high-level, and understandable, but it has to have integrity from a theoretical perspective as well. That's really the problem.

What I describe in the book is "shareholder value-added." EVA is a trademark term for this concept. I'm now a part of the company that owns the trademark, but you'll see it referred to as shareholder value-added or economic value-added. It's a simple

concept. EVA is simply a cleaned up measure of operating profits on an after-tax basis minus a charge for the amount of capital that's being allocated to the activity times the cost of capital. The difference is EVA.

NPV is a valuation concept. EVA is a measure of current operations. In my opinion you should not use NPV for decision making in incentive compensation and performance evaluation in risk management because it's not practical. You can use EVA; that's the whole thrust of it. We've taken the NPV equation and we've sliced it up into one-year increments. EVA is the current year slice of the NPV equation; therefore, the NPV of any firm is the present value of current and forecasted EVA. If you maximize every year's EVA, you will maximize the NPV of the firm. That's the thesis. It's as simple as that.

From the Floor: How does that concept relate to risk-adjusted return on capital (RAROC) or value at risk (VAR)?

Mr. Uyemura: That's one of the critical topics that I have to cover—how does EVA differ from VAR and RAROC and all the other buzzwords? There's a fundamental difference.

The concept is identical, but I'm going to make the claim that EVA is broader, and more comprehensive. I need to prove that to you, because that's my fundamental belief. One thing I never have an argument about is that EVA is about a thousand times simpler to implement. Those techniques (VAR and RAROC) are very difficult to implement in the real world. When I say a successful implementation, I mean buy-in from the chief executive officer (CEO) and the heads of each of the line groups in the organization you're dealing with.

Our claim is that if you measure and use EVA, you will maximize shareholder value. Our company is associated with this concept, but I think most consulting firms will say that they do EVA as well, and that they won't dispute the concept that we're trying to say here. We all have our differences about how to implement it. We're making a claim that EVA has a tighter linkage with market value changes than any other measure of operating performance. Therefore, if you want to set up an incentive compensation system and reward people for creating value, the right way to do it is to use EVA. We also claim that if you use EVA, you'll make different decisions in your organization than if you use any other measure of performance.

I've worked with several insurance companies, and I know some of the attitudes that are there. They're very similar to what I see in banking companies. It's very much an accounting earnings perspective. Goal setting and performance assessment are geared toward accounting earnings statements. We try to cut

through that with net operating profit after taxes (NOPAT). It is not the same as net income. It comes from some simple adjustments to income that are described in the book. There are only four or five adjustments you can make. The NOPAT value will be used to derive returns, allocations of capital, and the cost of capital—everything you need to do a proper performance assessment using proper corporate finance principles.

The first thing I want to do is put forward a little hypothetical case study example, which is right out of the book. I'd like you all to assume that you're the head of a lending unit for a bank. On day 1 of operations there are 6 loan proposals put on your desk, each for \$100 million. They're summarized in Table 1.

TABLE 1
LIST OF CASE STUDY OPPORTUNITIES

Opportunity Number	1	2	3	4	5	6
Loan Amount	\$100	100	100	100	100	100
Economic Capital	\$5	5	5	5	5	5
Net Income	\$2.00	1.00	0.50	0.25	0.10	0.05

To simplify the arithmetic, I will assume that each loan will be outstanding for one year, and they are each for \$1 million in outstandings. I'm assuming that on a RAROC/VAR/EVA basis, when you measure all the economic risks of each loan properly, they have the same risks. The proper economic allocation of capital is \$5 million for each loan. They have very different earnings expectations, different yields, different support costs, and different net income.

The earnings for the year on a fully burdened, properly matched maturity-funded basis, including support costs and taxes, are quite different for each of the loans. I've ranked the loans from best to worst without any tricks. Number one is the most profitable loan, and number six is the least profitable. You can calculate the incremental ROE of each loan from the data I've given you on the chart, and you can also calculate the EVA for each loan.

Because every loan has the same risk, I'm assuming every loan has the same cost of capital, and I'm also assuming the cost of capital is 15%. That's the hurdle rate and, therefore, the capital charge for the EVA calculation. Remember the capital charge is the cost of capital times the amount of capital allocated; we're allocating \$5 million in capital, 15% cost of capital, and \$0.75 million capital charge. I'm assuming this is a clean calculation of earnings, so that's my NOPAT number as well. For loan number one, NOPAT is \$2 million, capital charge is \$0.75 million, and EVA is \$1.25 million.

Table 2 shows the incremental profitability workups that you would see in a typical loan proposal within a bank. You may or may not see the EVA calculation, but definitely you would see the return on assets (ROA) and ROE calculations, the capital allocations, and the profitability expectation. Now, you're the manager of the lending unit, so you can see these data loan by loan.

TABLE 2
PROFITABILITY OF EACH OPPORTUNITY

Opportunity Number:	1	2	3	4	5	6
Net Income	\$2.00	1.00	0.50	0.25	0.10	0.05
ROA	2.00%	1.00%	0.50%	0.25%	0.10%	0.05%
ROE	40.0%	20.0%	10.0%	5.0%	2.0%	1.0%
SVA	\$1.25	0.25	(0.25)	(0.50)	(0.65)	(0.70)

From the Floor: By capital, do you mean the deposits?

Mr. Uyemura: No, it's the equity of the bank. It's an allocation of the equity of the bank to support the balance sheet implications that are here.

How will you be evaluated at the end of the year with these kinds of numbers? Whenever anyone evaluates the performance of any of the units in a banking organization, they never look at the transaction-by-transaction results; they look at the portfolio results.

I will assume here that you have to pick a number from one to six. How many loans are you going to accept? I'm assuming if you do one loan only, you'll take loan number one. If you do two loans, you'll do the first two loans. Depending on how many loans you accept, you can have six different hypothetical portfolios. Table 3 summarizes the portfolio results that could be created depending on how many of the loans you accept. So if you took all 6 loans, you'd have \$600 million in outstandings for the year, \$30 million of allocated capital, and \$3.9 million of earnings, which is the sum of the earnings expectations for all 6 loans from Table 2. You'd have a portfolio ROA of 0.65% and a portfolio ROE of 13%. If you had all 6 loans, you'd require a \$4.5 million capital charge—that's the 15% cost of capital times the \$30 million of allocated capital. The EVA would be \$3.9 of NOPAT minus \$4.5 million of capital charge for \$0.60 of EVA.

So now you can turn in any one of these columns to your organization. I ask you again, how many loans should you accept? There's one other thing I haven't told you—how your bonus will be calculated for the year. This is the crux of the issue.

TABLE 3
SUMMARY ID PROFITABILITY MEASURES

Portfolio Number:	1	2	3	4	5	6
Number of Loans	1	2	3	4	5	6
Total Assets	\$100	200	300	400	500	600
Capital	\$5	10	15	20	25	30
Net Income	\$2.00	3.00	3.50	3.75	3.85	3.90
ROA	2.00%	1.50%	1.17%	0.94%	0.77%	0.65%
ROE	40.0%	30.0%	23.3%	18.8%	15.4%	13.0%
SVA	\$1.25	1.50	1.25	0.75	\$0.10	\$(0.60)

If your bonus is based on earnings achievement for the year, as it is in most of the organizations I deal with, how many loans will you do? You will do six, and you shouldn't hesitate more than a nanosecond to answer that question. That's the right answer because that's what the organization's telling you to do. The organization's telling you to maximize short-term earnings. To maximize short-term earnings, you will hurt shareholder value because on the margin you will do deals that are lower in return than the cost of capital.

If the organization is slightly more enlightened and says, "No, we have a shareholder perspective, we want to maximize returns to the shareholder," your bonus will be based on the ROE you achieve for the year. How many loans will you do? You'll do one, and that's exactly what happens. Who knows who the most famous EVA client is? It's Coke. This was Coca-Cola's problem when they hired Stern Stewart. Their bonuses were paid on ROE. The CEO of Coke called in Stern Stewart and said, "I can't get my management team to bring out a new product or to open up operations in a new country because anything we propose will bring down the aggregate ROE of the company." Stewart brought EVA into that organization and what has happened is legendary. Coca-Cola brought in EVA 15 years ago and instead of being traded at 20 times earnings, they're now being traded at 40 times earnings.

The total shareholder returns have been through the roof because they unlocked value. Coca-Cola's problem was that it failed to set correct performance measures and pay people to create value. If you pay people to maximize returns, what you're telling them to do is shrink the organization and be ultraconservative in any decision they make. Take the best opportunity you can find and don't do anything else. If you tell people to maximize earnings in the current year, you're telling them to be ultra-aggressive and the heck with the consequences to the shareholder.

The only measure of performance that tells you the proper stopping point for doing incremental deals is EVA on a portfolio basis. That simple idea is one of the main themes of this book, which is why I believed early in my banking career that EVA

was the right way to manage a banking organization. It took me most of my banking career to get the people at First Interstate to acknowledge that. Once they finally did, the stock price took off. The stock price went from approximately \$19 to \$120 in about 3 or 4 years, at which point they were bought out. They turned that franchise around.

When you unleash people and you point them in the right direction, the returns are mind-boggling. There have been many academic studies about companies that go on the EVA program and accept these principles. There are academic studies of companies that use this technique versus a pure benchmark of the company's competitors that don't use this. The total shareholder returns achieved by companies that use this range from 600–1,200 basis points higher or 6–12% higher in total returns on average than in companies that don't use this.

In our opinion, this is the key to organizing decision making in general for corporations—not just from a risk management perspective. How do we know whether we should expand the organization and be more aggressive in our decision making and our pricing, or whether to pull back? What should we do on the margin—that's the dilemma that I run into with every line manager I meet—and it's this framework that gives them and every level of the organization a clearer direction. If you can get people to use this, then you'll see everyone making the right decisions.

From the Floor: If this was truly a one-year deal, how would this EVA calculation be any different from an NPV calculation?

Mr. Uyemura: Oh, it wouldn't. But the problem is that not all deals are short-term, and the NPV calculation can actually get quite complicated and subjective. The NPV calculation on a ten-year deal has a wide range of values.

From the Floor: But at the outset of choosing how many of these loans you're doing, you're using the projected risk-adjusted net income.

Mr. Uyemura: Sure.

From the Floor: Judgment obviously is used in coming up with that.

Mr. Uyemura: Oh, absolutely. I mean this is not a panacea. In spirit, we're trying to take the NPV problem and simplify it for the organization, for line managers, and for risk managers, and our claim is that most of the time, people don't really hold themselves accountable for the capital implications of what they're doing. Capital is seen as either free funding or as a drag on an ROE incentive program; that is, don't

give me more capital, give me less capital and then calculate my ROE. They've unlinked the risk structure they've created from the capital allocation and the cost of capital. They don't see the linkage, and they don't understand there's an implied linkage. Every decision you make changes the cost of capital and the amount of capital that the marketplace will impute to the organization.

From the Floor: If you only do the three loans, have you ever measured what would be the potential cost of lost future business opportunities on the three loans that you didn't do?

Mr. Uyemura: The opportunity cost of lost deals? Sure. All of those things need to be factored into a real-world framework. The capital charge here is an opportunity cost charge, so the framework is very much in sync with those kinds of notions. Again, this is an oversimplified situation. I'm just trying to show you the difference between using EVA, ROA, or ROE and using earnings as the basis for performance assessment.

Here I've taken off the EVA lines; this is what most banks look at. When people tell me that they know when they're maximizing shareholder value, I erase those two lines at the bottom of the chart, and say, fine, let's play a different game here. Let's assume you're the head of incentive compensation for a real bank, and it's your job to recommend the bonus pools for each unit.

Here are the results for six different lending units in your organization. You tell me which manager ought to get the biggest bonus. Which manager has maximized shareholder value? My claim, from the numbers you see, is it's impossible to know who's maximized shareholder value without doing the EVA calculation. You can have unit number one that has the highest returns, but is the lowest in earnings and the lowest in growth prospects. Unit six is the most aggressive. It has the highest earnings, and fastest growth prospects, but the lowest returns. Every unit has ROEs way above the cost of capital, and way above the 15% hurdle, so they will all claim they're doing an outstanding job. There's no way to make that trade-off, and that's the problem that bankers have not done a good job sorting through.

Ninety percent of the banking organizations in this country claim that their primary focus is on maximizing shareholder value; less than 10% of the banks in this country measure shareholder value. There's a disconnect there, and that's why you're seeing concepts like VAR and EVA coming to the floor at all bank conferences. You can't find a conference where these topics aren't being discussed actively. Many organizations are trying to implement these concepts now.

From the Floor: The presumption here seems to be that the capital is a variable, depending on whether it's in one loan or six loans, but I thought the corporation's capital is somewhat fixed.

Mr. Uyemura: Yes. I'll get into a detailed discussion of whether capital is fungible and scalable, or whether it is something that's locked into an organization, and you have to do something with it whether you like it or not.

To measure the economic performance of any financial strategy, not just for a bank, but also for an insurance company, mutual fund, or your own personal investment portfolios, you need three sets of information: The pattern of returns you've achieved with the strategy, the gross volatilities of returns that you've achieved, and the correlations of those volatilities; that is, the systematic versus nonsystematic split of the volatilities.

In developing the framework, the way the marketplace would deal with this is to examine a time series. Take IBM stock, for example. Say we want to measure the economic performance of IBM stock. What does the marketplace do? It takes the monthly total shareholder returns of that stock for its definition of average returns. It measures the volatility of those returns to get a measure of gross volatility risk, and then it takes a covariance of those returns against the Standard & Poor's (S & P's) 500 to get a beta and a cost of capital. Finally, it makes an evaluation of whether the returns are higher or lower than the cost of capital to decide whether IBM has outperformed the market or underperformed the market. We do the same thing. First we define economic earnings. Second, to take the standard deviation of those economic earnings, we measure the covariances of those returns. The economic earnings definition we will use is NOPAT. You can measure NOPAT for any line of business, for any product, for any customer segment, and for any customer relationship. In our framework, you have to be able to drill down into the organization to any level of detail. Because marginal decision making is affected by this framework, you must apply it at the margin in the organization.

We will measure NOPAT, we will determine how much volatility capital is being put at risk, and we will measure the cost of capital. The way we do it is to take the standard deviation of the NOPAT time series. Every consulting firm has its models to convert the standard deviation of NOPAT into a proxy of the standard deviation of market value. NOPAT is just economic cash flow. The volatility of economic cash flows has to be linked to the volatility of the market in order to get a market price. We base it all on the NOPAT time series.

From the Floor: In your book, you described using the standard deviation of those earnings. In an option portfolio, the returns aren't symmetrical. How do you handle that?

Mr. Uyemura: Convexity risk?

From the Floor: Well, just the fact that, when you try to do an efficient frontier using an options portfolio, you can get misleading results.

Mr. Uyemura: I'm going to talk about convexity risk later.

The three items you see here are the three major components of the EVA calculation. This is one place where we differ from VAR and RAROC. VAR and RAROC focus on one item only—how much capital's been put at risk. They don't link it to the cost of capital. That's a completely independent framework. I think that's dangerous because there is a linkage between volatilities and betas. You should use the same framework to link both measures.

They don't link it to the measure of earnings, and the way you define earnings has a huge implication for the apparent volatilities. We think it's important to integrate all of this.

Now the complication for financial institutions is in this definition of risk capital. It relates to the question that was being asked: "Wait a minute, I thought capital was hard dollars invested, you know what that amount was when you set up a bank, you know how much in hard dollars the shareholders have put into the organization, isn't that what you have to be held accountable for?" That's part of the problem, but that's not the whole picture for financial institutions.

For a manufacturing company, there's no debate: You know where the capital is because it's in real assets, plant and equipment, inventory and so on, and there's no doubt about which product line is using what capital. In a financial institution, the conventional notion of hard dollars invested and calculating capital from the balance sheet accounts (which is the traditional way to measure capital for a manufacturing company) doesn't work. Why? If I told you there were two financial institutions, two banks that had exactly the same balance sheet structure and exactly the same hard dollars invested to create those companies, and they had exactly the same economic risk, you'd say, "There's no way that could be true." Why?

The balance sheet structure does not tell me how much risk each of those banks is taking. It's not apparent from the balance sheet structure; it's not apparent what their credit standards were. A million dollars of loans here and a million dollars of

loans there—they can be quite different in risk structure, and you don't know it from the balance sheet. The interest rate risk mismatching might be completely different in those two organizations, but the balance sheets could look identical. You can't tell from the balance sheet structure how much capital has been put at risk in an economic sense or a market value volatility sense.

You must measure both cash capital which is conventional capital, and risk capital, which is based on this notion of market value volatility, VAR, and RAROC. That's what RAROC and VAR are trying to do. By the way, there's no free lunch—the market will hold you accountable for whichever one of those concepts is bigger. They will want a return for perceived risk.

The difference between EVA, and RAROC, and VAR is that while we're trying to get at the same concepts, the implementation's completely different. VAR and RAROC do it from a bottom-up procedure; that is, they dissect the risk characteristics of every transaction in the organization, which requires supercomputing power, and they have variance/covariance matrices with thousands of cells. They hire Ph.D.s in stochastic calculus to run these systems, and the numbers-line-oriented people do not relate to the process.

We take exactly the opposite approach. We believe, you should be able to explain these things from a high-level perspective. After all, risk management is a portfolio management problem, not a micromanagement problem. Accountability for capital is really a high-level problem. Don't get bogged down in controversies dissecting the variance/covariance characteristics of one Treasury bond. Who cares? Measure it from the top down. We start from the top of the organization and measure everything with consolidated NOPAT in exactly the way I've told you; then we go down to each line of business and split the NOPAT into the line of business NOPATs. We get a volatility, a risk capital, for each line of business, and a beta, a cost of capital, for each line of business and work our way down. We can see the diversification effects at each step in the drill down, we can go down to the product categories, we can go down to the customer relationships if we have to, and we can go right down to single transactions if we have to so we can get to the same level of detail.

All things considered, the difference between RAROC, VAR, and EVA is just the approach that we take. Others may take a bottom-up microscopic approach, but we take a macro approach, deal with the consolidated numbers, and drill down a step at a time. We find that line managers can understand our methodology. They intuitively understand earnings volatility, and they know that there will be a model that we put it in, but at the end of the day if they can bring down volatility, they will have a lower capital charge. By the way, that's true in the real world too. If the

organization can bring down the volatility of its economic earnings, it will have a lower capital charge as well. The marketplace will reward it. So is capital fungible, or is it locked in? The answer is no, it is not locked in.

That's why you're seeing these massive share repurchase programs going on; capital is not locked in. You can adjust capital levels to the nth degree, and refine it as much as you want, but our finding is that companies that use these economic value principles never, never believe that they're afraid of giving back capital because they won't be able to get it when they need it. That's baloney. If you are value oriented, you can get all the capital you need for positive value-adding transactions. The marketplace loves these companies because they've got a return track record that justifies their performance.

In regards to convexity risk let me first talk about asset/liability (A/L) matching. We do funds transfer pricing in our NOPAT calculation. You have to. You have to match durations to have a proper measure of profitability, so we do funds transfer pricing, but, again, we don't do it from the bottom up. We don't go loan by loan and deposit by deposit and force companies to spend millions of dollars to do that; we do it from the top down. We look at the portfolio yield characteristics and match funds on a portfolio level. It's done on an Excel spreadsheet. You do not need big computer systems to do this. I have fun with this because I used to do these big match maturity systems when I was in banking, and I'm now convinced that I can get better results from the top-down approach than from the bottom-up approach. I love going into organizations, putting myself to the test, and saying, "I can prove to you I can do better in transfer pricing than your system does."

The criteria for who's better are quite simple. A transfer pricing system by definition is supposed to give you stable margins if it works correctly. That's the whole point of a transfer pricing system: to match fund A/L so you get locked in spreads and stable margins. It's very simple—you run your transfer pricing system, and I'll run my transfer pricing system and my little Excel spreadsheet, and we'll see who generates more stable margins for each of the units. I believe I can beat you nine times out of ten with my simple approach. What I haven't dealt with is convexity.

There are four ways that I've seen organizations deal with convexity risk, i.e., options risk. Two are what I'd call ex-ante; that is, they charge up front for the risk. You can make a lump sum charge to the unit for the present value of the options premium, by charging them up front, or you can spread the charge over the expected life of the transaction in what's called an option adjusted spread (OAS). It's a spread adjustment to the cost of funding in a lump. Either one of those are correct ways theoretically to charge for options risk. The OAS is the most popular approach.

The problem is that they don't do anything with the charge; that is, they don't really hedge the risk. Once you've charged a unit for prepayment protection, in theory that unit ought to be insulated from the effects of changes in prepayment rates. I see organizations charge and then they don't insulate the unit from prepayment risk. If those loans prepay unexpectedly, that margin disappears. That unit paid for option protection but never got any option protection. In essence, you're really creating a very bad situation because you're putting them at a pricing disadvantage by these built-in charges, and then you're not insulating them from the volatility.

The better way to handle options risk is to charge for them after the fact. A third method is, if prepayments happen, we will mark the funds to market and we expect you to pass that charge through to the customer. And if you collect a proper mark to market for the surprise prepayment, you'll be whole; that's one way to do it. A fourth method, which I like, is to let the volatility happen, but adjust their cost of capital for the volatility, which means you have it in the risk capital calculation. Surprise prepayments will add to the NOPAT volatility, all other things being equal, and you'll have a higher capital charge, so we adjust for it automatically in the cost of capital.

By the way, that's the way the marketplace adjusts for convexity risk for any real-world company. Convexity risk comes through as NOPAT volatility for real-world companies, and the more volatility you show, the higher your cost of capital will be in the marketplace. We're just making the same adjustment that the marketplace does, but we won't double charge you and we won't charge you and then not give you the protection. What we say is, if you accept prepayment risk, you will have more volatility in returns, and to compensate the shareholder for the higher volatility, you must meet a higher hurdle. You must achieve higher returns, and we quantify that for you in your cost of capital.

In a nutshell, the whole name of the game here is how you put into operation this concept of maximizing the NPV of the firm. You maximize the NPV of the firm by having returns that are higher than the cost of capital for all the transactions you do. And you want to accept all investment opportunities down to the point where the marginal return just equals the cost of capital. That's how you maximize the total NPV of the firm.

We find that it's not practical to use this literal equation in the real world. We needed to find a way to make this operational and to simplify the concept. We simplified it by taking the equation, which is taking annual forecasts of earnings, and slicing it into one-year increments. The current year increment is called EVA. It's just current year operating earnings in excess of a charge for the use of capital.

Then we tell everyone, if you maximize EVA, you automatically maximize the market value of the firm, and total shareholder returns will reflect that over time.

We use this framework for all risk dimensions, credit risk administration, and interest rate risk. For liquidity risk management we apply the same framework because all of those have volatility implications. We can actually take our risk capital number (here's another place where we differ from VAR and RAROC), dissect it, and tell you how much of the risk capital we're allocating to you is due to credit risk, how much of it's due to interest rate risk, and how much of it's due to operations risk. That's because we can decompose the NOPAT numbers into the interest rate risk component, which is just the volatility of the margin; the credit risk component, and the volatility of the charge-offs; and the operations risk in the operating expenses, and the volatility of the operating expenses. It will capture operating leverage correctly. The more operating leverage you take, the more volatility you will have and the higher the capital charge will be.

We can provide that intuitive linkage for line managers so that they can see not only how much the capital charge is, but the composition of the capital charge by risk category. They can see the trend lines. Boards of directors love this because we can show for the consolidated company how much capital is at risk and how much of it is due to credit risk, interest-rate risk, operations risk, actuarial risk—that is, how much of the volatility is due to the life insurance mortality or claims incidence and severity—and persistency or underwriting.

What are the volatility implications of those items? We can show you diversification effects across those risk categories. We make it very intuitive; that's the thrust of this book— to operationalize these basic ideas operational. They are the most fundamental concepts of corporate finance, and we've tried to take the real world problems that financial institutions face and put them in the basic framework of risk and return, volatility, and capital charge, and measuring returns properly in the way that the marketplace operates.

From the Floor: Do you know whether this applies to mutual companies?

Mr. Uyemura: Oh, absolutely. Forty percent of our clients are private or mutual. They deal with the same issues. The accountability is different, but they face the same business issues, the same planning issues, and the same resource allocation issues that any type of company faces. So, yes, absolutely.

From the Floor: You set your variance and covariance matrices by looking at the operating earnings in relation to stock markets.

Mr. Uyemura: Right.

From the Floor: Are those time series available?

Mr. Uyemura: Sure. Earnings-times series are very accessible; there are databases out there. We can get this for any company. For regulated industries, it's very easy to get. Statutory or GAAP statements are based on regulatory principles, so the adjustments we make will vary depending on the source of the data that we have. For statutory statements, for example, we'd have different adjustments than GAAP statements, but, again, what we're trying to get at is a cleaned up measure of the true business volatilities in terms of economic cash flows or economic earnings.

From the Floor: For a multinational, you'd want your operating companies to be generating EVA in all the currencies. How does that work?

Mr. Uyemura: Good question. Coca-Cola does deal in multiple currencies, for example, and when you get into the realm of lesser developed countries, defining a cost of capital, or defining a capital allocation can get very tricky. In fact, I have several clients who are based in Europe and are quite multinational in nature. We have very active discussions about this, but I'm going to sidestep the question about how to deal with multiple currencies. The shareholder's focus is not on the absolute measure of EVA. The shareholder's focus is on the change in EVA. Whether your starting EVA is positive or negative, we say it doesn't matter because that's history. Whatever got you to where you are, that's history, and you can't change that. What the shareholders care about is how you're going to change it going forward. You don't need a superaccurate cost of capital or a superaccurate capital allocation, which is why we're so comfortable with this top down approach. We don't care about precision that much because we know how companies make decisions and we know that if they can get within the right ballpark with this framework, they will make much better decisions in the future.

There are plenty of frameworks for dealing with the currency problem. You can deal with financial statements in the different currencies, in which case the basic problem is inflation adjusting the cost of capital for the currency inflation rates. Everything else is quite similar. Or you can translate all the foreign currency statements into a common currency statement, and then you can literally use that currency's criteria for cost of capital. Once you have a NOPAT series, whether it's in a foreign currency or U.S. dollars or Canadian dollars, the framework is simple to apply. It's volatilities and covariances.

From the Floor: I was thinking in terms of trying to make a decision across currencies. Let's say your capital base is in a common currency but you have

operations in multiple currencies, so you could look at economic cash flow time series in each and come up with a capital charge. Let's say that you have two competing decisions: One creates additional economic value of \$10 each, \$5 of each currency, and the other has \$10 all in one currency. They're not equal. How do you handle it?

Mr. Uyemura: Well, I'll tell you. What happens in practice is that companies will do every transaction that has positive EVA. EVA companies tend to grow faster than their competitors because they find a way to do all positive EVA transactions, and capital is not a constraint for these companies. You talk to Coca-Cola and ask them whether capital's a constraint—

From the Floor: So you do them both?

Mr. Uyemura: You do them all. You want to do all positive EVA projects just as you want to do all positive NPV transactions, if you can. And, of course, if you are capital constrained for whatever reason, you rank order them by the size of the NPV. You do the same thing with EVA.

From the Floor: Can you elaborate more on the adjustments for mutual companies? Certainly there are limitations for mutual companies issuing surplus notes.

Mr. Uyemura: Yes, but there are other ways to deal with that. Though you have some constraints, you have opportunities too. You can leverage capital, and you can put it to work. Everyone has that option as well. The tough question is whether you have the right criteria to get the proper rate of return. On the margin you can improve it, regardless of the starting situation. On the margin you can put some of that excess capital to work. You just use the right framework for making a decision about what business opportunities you're going to pursue.

From the Floor: Is it true you're talking about GAAP operating earnings? Is that the core of—

Mr. Uyemura: NOPAT is how to take GAAP, regulatory, or statutory earnings and make them into something meaningful. There's a whole section of the book on that. If any of you want other articles and references, I'd be happy to send you additional material that deals with this topic.

Mr. Koltisko: There were many provocative ideas there. You touched on a number of issues that we face in insurance companies that I'm sure we all struggle with. Part of the emphasis of exam F-585 is to improve the ability of actuaries to work in this brave new world that we find ourselves in—a world of stronger competition,

especially banking-related issues. I will describe some of the material that's also on the syllabus. Banking is a key element there, but will not overlap in much detail about bank operations per se. The background for this exam assumes a solid foundation in investment management.

What is the difference between investment management and finance? I guess the image you have of an expert portfolio manager would be of someone sitting at a screen, looking at the price of some security, and deciding when to buy or sell.

The image you might want to bear in mind with this particular syllabus is a conference call with several private investors. You're trying to explain to them why what your company does is so great that they should be giving you their money to invest, with particular risk and return characteristics. I think the F-585 exam syllabus is meant to help actuaries learn to be their firm's CFO. It presumes a background in investment management; and it discusses financial institutions and management in more detail.

There are several applications that I want to discuss. One relates to risk management as practiced by Enron (which is one of the readings on the syllabus). In this exam, candidates should be able to evaluate financial securities, understand the function of financial markets in raising capital, describe the securities that companies use in order to raise capital, comprehend their risks and returns, and know more about why those securities exist—what function they're providing with all of this innovation, the reduction in cost, what's the benefit other than the fees to the banker (which is sort of a cynical way of looking at it). Innovation in financial securities does make a difference. The syllabus helps people gain a greater understanding of that.

Chart 1 shows texts on the syllabus. The text by Donald H. Chew is also blessed by Stern Stewart. He is still with the firm?

Mr. Uyemura: Yes.

CHART 1

EXAM SYLLABUS - F585

Financial Risk Management in Banking

Dennis G. Uyemura & Donald R. Van Deventer, 1993

Contemporary Financial Intermediation

Stuart I. Greenbaum & Anjon V. Thakor, 1995

HBR case study — Enron Gas Services

The New Corporate Finance

Donald H. Chew, Jr. 1993

One System of Financial Intermediation: A New Paradigm

Erich W. Sippel, 1995

Mr. Koltisko: The book by Greenbaum and Thakor gives a good nuts-and-bolts practical introduction to how and why banks work. I recommend all of these texts to you. The Sippel talk was given at an ACLI conference—the ACLI chief investment officers conference in 1993. It is the 1% inspiration that leads you to better understand the perspiration that's in the 99% of the rest of the exam.

I want to talk briefly about that side of the business, but understanding innovation and the process that goes along with innovation, I think, is key to making sense of what's going on around us. Let me start with the Sippel text. Then I'll discuss some of the corporate finance ideas in the Chew text, and finish up with the issues related to Enron, which you think of as a gas company. What it's really doing is engaging in banking.

When you look at the general topic of financial risk management in banking, don't think you need to have a legal form of a bank to be a bank. Many companies are engaged in banking, and this is one example that illustrates the broad applicability of that topic.

It's a truism that there's a revolution going on in finance. Revolution may sound like a lot of fun when you're 20 years old, but for the rest of us old people, there's a guillotine in this revolution somewhere. All of the commercial paper outstanding, is short-term bank loans that didn't get made. All of the junk bonds out there are long-term bank loans that weren't made and, of course, all of the money market funds basically are bank deposits that weren't deposited, so there's a threat to the old order in these innovations and we need to try to understand why they are happening.

Sippel tried to redefine a paradigm for financial institutions and financial products. He would start with the question, what's a financial product after all? Let's start with a product, call it interest-sensitive whole life or whatever you want. What goes into a financial product? What are the key ingredients of a product? Sippel says they are capital information and "brains." I'll call it "savoir faire" because we're in Montreal today. "Savoir faire" means, specifically, the ability to get your organization to act upon its opportunities. It means defeating institutional inertia. It means no more excuses, such as, "We've always done it this way. Our systems don't do it. We can't do this. We're in this business. We're not in that business." It's the ability to move your organization to "capitalize," to take advantage of what presents itself in the market.

These are the inputs to making a financial product. What are the outputs? They're competitive advantage. Basically, all you get out of a financial product is a little lead time. You get a few steps ahead of your competitor. A successful product lets

you get out in the market maybe a couple of years before other people catch up. You know they're bound to catch up, but basically the output of this will be of some competitive advantage. Competitive advantage can be either consumer preference for your product or a cost advantage; you can produce things cheaper for a while; increasing the profitability per product. A key output is going to be more information. You will learn more about your customers, and your products, and you can apply that to new products.

In Sippel's paradigm, he's basically saying you don't need to be doing every aspect of finance to be successful. All you really need is a way to make money. You need to be filling a customer need, you need a legal form, and you also need a customer. Sippel has redefined what we mean by a way to make money and a customer need. Table 4 summarizes how and why companies make money and fulfill customer needs in certain ways. Sippel says forget about the financial supermarket and focus on doing one of these things very well.

TABLE 4
INSPIRATION - SIPPEL ARTICLE

How	Why
Bearing Risk	Less Uncertainty
Spread Management	Advice
Info Processing	Record Keeping
Aggregation	Access to Capital
Distribution	
<i>....Capital, Information, and Savior Faire</i>	

Think about the generalist savings and loan (S & L). If you were at the credit seminar, you'd know that a thrift or a trust bank is just like a bank, except that it has boards in the windows. Why is that? The reason is that today traditional generalist thrifts have a hard time competing. Mortgage bankers originate and service loans, investment bankers structure them as securities; and other banks credit-enhance these securities. They're distributed by brokers, and they're bought by mutual funds. What do you add as a traditional generalist thrift? You're competing against five different kinds of businesses that are doing five different things very well. In this new environment that we're facing, we find that companies can succeed by picking one way to make money and fulfilling one customer need and doing those things very well. For instance, a traditional bank makes its money by a traditional way of spread management—by investing at a greater return than its cost of funds. It has a very hard time competing against Fidelity in the same kind of business. You need much less capital to run a mutual fund than you need to run bank deposits. In Table 4 bearing risk is a traditional actuarial method of adding a risk charge, adding expected costs, and charging people for that risk. Spread management is a more traditional banking approach.

We can move down the line to aggregation of products the way State Street or other mutual funds do it by simply collecting other people's deposits. Distribution is a traditional role fulfilled by brokers. As you go down this column in Table 4 you meet the same need with less capital. In real life, it seems that if you can get things done with less capital, society's better off. Maybe in exams you might get credit for doing things the hard way. The general trend in financial markets, although it seems somewhat threatening, is toward less capital-intensive ways of meeting the same customer needs. I think this is an interesting way of focusing ourselves on how to succeed and compete in the new environment.

Let me discuss quite briefly a couple of things that are on the exam that are covered very well in the Chew text, which I highly recommend reading. In talking about risk management, there's a view that banks make their money by infinitesimal risk management. Do you believe bank trading rooms really make money by risk positioning, measuring their convexity risk to the fifth decimal place, and having absolute facts day to day of their combined risk positions?

There's a very interesting article in the Chew text that talks about how bank trading rooms make money. If you believe that, you might want to pay a few hundred million dollars for a spreadsheet that I recently worked on. In this article, the view is that banks really make money by their strong market-making capabilities, that they're able to hold on to market share; and force their counterparties to trade at their prices. If you accept that paradigm, you think what's really going to make you successful as a bank trading room is to be able to constantly buy and sell—to be known as the yen dollar trader, for example—or to have a niche in particular basis swaps or other kinds of trades, not the view that you have to be taking big risk positions to make a lot of money. Some research in this text suggest that it's really the market-making capability that counts.

The text covers a number of issues related to the controversy of whether initial public offerings, takeovers and leveraged buyouts in particular, are adding value. To that end, Chew examines the information added or the agency costs that are part of the complex relationships between managers, shareholders, and bond investors, and how those are addressed through corporate takeovers. It's a very personal and fascinating look at what happens with the capital markets.

Recall that image of the phone call in which I'm trying to explain to you why you should give me your money to invest in my little company. In real-life venture capital, you'd probably want to stage commitments to the venture. The issue of trying to provide capital to a company involves setting standards that force me and you and our bondholders and equity holders—all those groups—to reduce the agency costs. When a new kind of security can do that, it effectively reduces

economic friction. It adds value. It encourages the effective interaction between shareholders and bondholders, which adds value to society. Those are the kinds of new securities that one finds.

An example of that would be a puttable bond. If I, the manager, choose to issue debt as a puttable bond, I basically reassure bondholders that I will not systematically turn around and increase the risk of a firm, which should provide a little more protection against the decline in credit rating, and it may help me to raise capital more effectively.

Let me discuss the Enron issue, which I think brings together many of the topics on the exam. The study note, a Harvard Business School case study, is not an introduction to natural resources, but instead covers what was occurring in banking and corporate finance in the 1970s and 1980s. What was happening? We found that many banks were not willing to lend, in the mid 1980s, to oil and gas ventures. Why is that? Of the ones that were still around, some of them got there by not investing in oil and gas. It was a highly volatile business. Natural gas is about a fourth of our energy consumption. There's a wide array of participants in this business. You have producers, transporters, and long-term utilities, so basically you have firms that are looking for long-term purchases, and you have individuals, most of whom are supplied by some local distribution companies, in the middle. Transport includes the pipelines and the other distributors. You also had gas marketers like Enron, providing market-making services among all of these groups. They all had different interests. This business became much riskier in the 1970s and 1980s. In the late 1980s and early 1990s the oil and gas business became a brave new world as a result of deregulation.

To set the stage a little more, after the Depression, the energy industry was segregated into separate businesses. You could be an oil pipeline business, but you couldn't be a local distributor as well. You could be a producer, but you couldn't also be a pipeline business at the same time. Companies were restricted by regulation into these categories. They had to apply for rate increases, and they couldn't pass them on to the market.

What's attractive about this? It's very stable and that's what we wanted in the New Deal.

By the 1970s, it had become obsolete. There was less incentive for exploration. I'm speaking, of course, from the U.S. perspective because I really don't know anything about the Canadian perspective. What happened, of course, is with less incentive for supply, available supplies dropped. With the Iranian revolution and the oil embargo, prices went very high and there were shortages. The risk of the

business increased, but regulation prevented businesses from earning a commensurate return. In 1978 in the U.S., we deregulated new gas. You could charge spot prices for new finds. That was meant to increase the supply. From a number of other sources we started to deregulate this entire system. We allowed gas pipelines to compete with, say, Brooklyn Gas, Boston Gas, or other local distributors. We allowed people to participate in different markets and that increased the efficiency of that entire business.

By 1990, about 70% of all the gas sales were in the spot market, which meant if you wanted to buy gas, you had to buy it at that day's price. If it was very low, you had to pay that price; if it was very high, you had to pay that price.

Buyers and suppliers have different interests. A long-term utility, for example, would like to pay a fixed price and lock in a long-term fixed rate. The local distribution companies would like the ability to sell as cheaply as possible. They may want to take a view on whether rates are going to rise or fall, but basically they want to be flexible and competitive. Managing gas price exposure is very important to them. What happened at this point is that Enron, which today is a dominant player in this business, eventually succeeded by providing brokerage and banking services within the industry, which gave it a very strong, competitive advantage. Enron was able to innovate. It produced a competitive advantage.

The sources of this were both on the demand and supply side. Individuals want either long-term, fixed price contracts or floating contracts. They want either a price that's indexed with the market price or one that's perhaps capped or dampened, allowing those local companies to participate in the price, but not be completely exposed to it. There's heavy demand for some participation in these prices without full exposure.

EGS is a gas marketer that was able to step in and offer contracts of this sort. On the demand side it was able to sell a wide variety of contracts that made these kinds of promises.

On the supply side, basically we saw that certain firms wanted fixed gas with long-term fixed prices. In the late 1980s and early 1990s, the gas supply had increased; conservation had worked. There was less political instability, which led to tremendous oversupply of gas and of gas-producing firms. Prices were low, but many of the producers thought that the prices were going to rise. Many of producers were holding back. They would not provide long-term fixed rates on contracts because they thought they could put their smaller competitors out of business by keeping the price low.

In steps Enron Gas Services. Enron was able to obtain its gas by financing some of the weak producers. Recall that with the S & L crisis many traditional lenders to the weaker producers were out of business too. Enron provided this through a wide variety of loans, acquisition finance, and equity capital partnerships.

One of its most interesting innovations on the supply side was in a volumetric production payment (VPP) contract. It's an innovation, in a legal form, of a security. Under a VPP, the producer gets cash up front for the right to gas production. Gas is a natural resource that gets depleted, so the amount needn't be level. The VPP was a legal innovation because the buyer was secured by the actual gas reserves, even if the producer weren't out of business. The right to the gas is bankruptcy remote.

Where did Enron get the money to provide this kind of financing? It did it through securitization. Enron started with a pool of VPPs, which gives a known stream of gas payments that can be sold at the spot price. Add to that what's known as a natural gas swap, in which they received some fixed cash flows for that contract. They levelized the price paid for this gas. Layer on to this an interest rate swap. When these three things are packaged together, you get an amortizing, London InterBank Offered Rate (LIBOR) based security that can be marketed and held by banks that don't know anything about oil and gas.

The banking opportunity came to the fore because many of the Texas banks with gas expertise were out of business. Enron was able to introduce this security and bring it to other institutions that could provide the cash to the industry and fill in the proper role of financial institutions.

Let's just talk a little bit about risk and the risk measurement that goes into running these contracts. Enron does it through a set of databases called “books.” If you, the long-term utility client, want gas at a fixed price for 30 years, Enron will price it through a set of transactions in several databases, or books. One involves trading the fixed price of gas for a floating market price. This is the price at a particular standard location used for the New York Mercantile Exchange (NYMEX) futures contract.

Suppose the client is based in Idaho rather than in Louisiana where the index location is. Perhaps Enron can get that gas at another site closer to Idaho, in which case Enron will be taking price risk—the risk that the price at the standard location (based on the NYMEX futures contract) is different from the source from which that gas is actually produced. There's basis risk between where the gas is actually produced and that which underlies the NYMEX contract. There's a final database that involves quantities, for example, to be sure that at each site there's a matched

quantity of gas rather than just the price variation; it involves meeting its quantity needs.

To provide competitive prices, Enron allowed each segment of the risk—Index price, basis risk, quantity risk—to be measured and managed by separate traders. This was the key to their success.

Dennis, I think you advocated not taking interest rate risk. I think you said that good companies don't need to assume a systematic interest-rate mismatch, the rationale being that if investors wanted to take interest rate risk, they could go right to the futures market themselves.

Mr. Uyemura: Right.

Mr. Koltisko: But the criticism I've heard of that is that there are many frictions in an insurance company. You're stuck with certain A/Ls anyway; therefore, you might as well earn interest-rate mismatch profits. Could you comment on the mismatch issue?

Mr. Uyemura: I guess the fundamental question is from the frame of reference I built: What is the EVA of interest rate mismatching? In the studies that I've done and the studies that I've seen, others do indicate that systematic mismatching is a negative EVA proposition; that is, it won't cover the cost of capital for the volatility that it has created. No doubt you can earn profits doing it, but the issue is, are you earning enough incremental NOPAT in our framework to cover the incremental cost of capital implication of the activity? This is why you don't see many financial institutions doing massive mismatching of their balance sheets anymore. You used to see that. There used to be institutions that would try to do that.

The other kind of intuitive argument I make on this front is the claim that you can make economic value in mismatching your balance sheet, which mismatches the yield curve. What you're saying is you can outguess the marketplace about interest rate movements. I don't deny that there might be some people who can do that; in fact, I believe there have to be people who can do that. I deny that they work for financial institutions. I certainly deny that they work for banks because there's no reason for them to do that. They can trade for their own account or they can work for firms whose focus is betting on the yield curve, and they put all their capital on the line to do that. Financial institutions, banks, insurance companies, and others would not have that propensity, so it simply wouldn't be a proper activity for them to do.

It's fun to just quantify it. The question is, are you creating value or are you losing value? I admit there are plenty of management teams who believe they can create value in doing this, and what I do in those situations is hold them accountable. I say, fine, we will track the performance of your mismatches, and we'll measure the incremental earnings you achieve from your mismatches. We also will measure the incremental cost of capital implication from your mismatches, and we will see whether you can cover the cost of capital. I've never seen a case yet where an organization can do that.

Mr. Koltisko: So when you measure the incremental cost of capital associated with this activity, how does it do that?

Mr. Uyemura: You have to do a full transfer pricing exercise so that you can sweep all the mismatches into a Treasury unit or an A/L unit of some kind that has nothing but interest rate mismatches in it. That's one of the things that a fund's transfer-pricing system does; it sweeps all the mismatches into one place. Then it's easy once you have it in one unit to do the full EVA framework, the NOPAT, the volatilities, and the covariances to get the cost of capital. You can measure the EVA of the unit, but I have yet to find one that has positive EVA.

I can cite you public cases. An interesting case study you might want to take a look at is the BankOne case, because that's a situation where they got into trouble on exactly this issue. Or Mettalgesellschaft, which got into trouble with some long-term hedges that looked like good hedges. So there are some public examples of how organizations have gotten into trouble on this issue.

From the Floor: Do you think the market is smart enough to figure out on its own that people engaged in this activity are negatively impacting shareholder value, in which case, in an efficient market, the market would penalize them?

Mr. Uyemura: I agree with that. I think the marketplace can tell. You can see it in the volatility patterns. There's actually analytical ways to go about this. If you give me the earnings profile or the margin profile for any unnamed institution out there, I can tell you what the duration of assets are; I can tell you what the duration of the funding base is; I can tell you the amount of mismatching that's going on from just two sets of numbers. Give me the average yield on earning assets and the average cost of debt funding they have over time, i.e., a time series. This is our top down analysis. We run regression models against those patterns and we can discern the durations and the convexity characteristics, and we can tell you how much mismatching is occurring, so it's easily apparent to the marketplace the degree of mismatching that's going on. It's not something that's hard to do and, I agree, with you markets do penalize organizations.

Joe cited the studies in Chew's book. Those are fascinating studies. When you dig beneath the covers on speculative trading operations, what you find is they don't create value in the speculation. They create value in the market-making. They ring a little cash register every time they do a deal for their client base. They take a little spread—that's where they create value—but they lose their shirts in the speculation side. Markets are quite efficient. That's all it says: Market pricing is quite efficient.