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RISK AND RETURN

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A discussion of the pricing considerations for risk and measurement of the rate of return in light of unexpected contingencies, including:

- o Defaults
- o Economic downturns
- o Change in bond ratings
- o Market value changes

MR. PETER B. DEAKINS: I have recruited Muhamed Sacirbey from Security Pacific, who is the Vice President and Manager of the Mortgage Finance Group. Mo is an expert in a wide variety of security issues, serving at one point with Standard & Poor's. Some of the things he is going to be talking about are just how Standard & Poor's goes about putting together the ratings and what they mean in terms of risk and things like that. He will talk about the wide array of risk and reward issues that are special to the securitized instruments that have been coming out, such as collateralized mortgages. Mo is quite qualified. Aside from his work experience, he has both an MBA and a law degree so I think we will find what he has to say quite interesting.

The second speaker we have recruited is Irwin Vanderhoof, who I am sure needs no introduction to anybody in actuarial circles. Irwin has been doing a lot of work in the last few years on asset defaults, particularly for bonds. He is going to be talking about bond default issues. I believe that some of what he is going to be talking about is some pretty new material. I am certainly looking forward to hearing what he has to say.

I am going to talk briefly, after Irwin and Mo, about the practical stuff. I am going to talk a little bit about what all of this means to actuaries once we decide what the risk of default is, to the extent that we can decide that.

MR. MUHAMED SACIRBEY: I wanted to focus, at least the latter part of my presentation, on some of the new types of transactions that are coming up in the so-called structured finance arena. It is my area of expertise, but I think that to give a proper background, I will step back and describe in general the entire process of rating different types of debt instruments in the capital markets and how some of these instruments may differ from one set to the other.

Basically there are three different types of debt instruments that are sold in the marketplace. Generally, all these different types of capital markets' debt instruments are rated according to three categories for the purpose of this presentation. The first category is what I would call general corporate, or general obligation issues. That means you look at a particular issuer as an on-going entity and you evaluate their ability to pay debt service on both a timely as well as eventual manner. Then there are what I call structured financings where you really do not evaluate any one particular obligor or borrower, but you evaluate a composite. That composite may consist of credit enhancers of different types of collateral like mortgages or automobile receivables. It may consist of insurance policies provided by bond insurers or other types of multiline insurance companies. It may consist of a combination of all of these tools. Finally, for the sake of being complete, there are capital market instruments that I would consider to be hybrid instruments. Generally, I would consider commercial paper to fall into that hybrid category, because commercial paper in many instances, in terms of rating, not only relies on the

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credit worthiness of the commercial paper issuer, but it also relies upon some liquidity facility that may be provided by a third party in order to make more certain the likelihood of timely repayment on that commercial paper.

Now, as you probably know, there are four major rating agencies. Some people may argue that there are two, but there are four that are categorized as "nationally recognized rating agencies." That definition has certain real significance in the marketplace, both as a practical matter as well as a regulatory legal matter.

As an example, certain "legal investment" laws that may be applicable to insurers and other types of investors may hinge on the ratings provided by these nationally recognized rating agencies. As an example, many investors may be prohibited from investing more than 5% of their portfolio in unrated debt instruments. So obviously getting a rating designation from one of the nationally recognized rating agencies is important. The most the institute has to be is at least investment grade designation BBB and in some instances single A or better.

The two major rating agencies are Standard & Poor's (S&P) and Moody's. Moody's was originally best known for its municipal ratings. In today's world it is basically engaged in all sorts of rating activities. Standard & Poor's was best known for its corporate ratings and once again like Moody's, it has spread into all sorts of rating activities on all sorts of debt instruments.

Two other rating agencies that do have some significance in the marketplace are Duff & Phelps and Fitches. Duff & Phelps has gained a significant reputation in the area of rating utilities and most recently structured financing. Fitches just about a year ago made a big splash in the marketplace because they hired some of the key people from Standard & Poor's, including their chief outside counsel, to start up a structured finance group. So we have really four rating agencies that are now very much focused on structured financing and one of them as recently as six months ago determined that it would be a major growth area. So I suspect that we will, in fact, see at least some growth in that arena.

Now, what does a rating indicate? As I mentioned before, a rating indicates the likelihood of both eventual as well as timely payment. So if you have a piece of collateral that has tremendous value and that secures a particular capital markets instrument, it is not just enough that you know that upon liquidation of that piece of collateral you will be able to get your money back to pay off the debtholders. It is also important that you know that liquidation or any way of realizing value in a collateral will be sufficiently prompt in order to pay the bonds off as scheduled at maturity. This produces some very interesting considerations in the area of "structured securitized-type financings."

There are generally two different types of ratings offered by each of the rating agencies. There are short-term or sometimes called commercial paper ratings. They tend to go out for a term of a year or less. Then there are the long-term ratings which in theory have indefinite value, and indefinite horizons, but they go out basically beyond a year. Generally, most corporations and other types of issuers of debt, including municipalities, do not go out beyond 30 years. One or two of the other rating agencies have also started what they call their medium capital program, which means that there are ratings now for the one- to three-year time horizon so that they become very specialized both in terms of focus on the product type, as well as time frame.

What kind of considerations go into a rating in terms of looking at a particular issuer? Well the major consideration is obviously the health of that issuer, its balance sheet. The second consideration, which is probably just as important, is the industry perspective. If you are talking about the U.S. automobile companies, how well are those automobile companies doing as a whole? What is the prospect for those in the future? The third perspective is, what is the economy overall going to be like in the future? If you see a recession coming, then you have to be more conservative about the potential ability of that company to repay debt. Finally, there may be numerous legal and/or regulatory factors that would apply to a rating. If you are dealing with an industry that is regulated, what are the prospects in that industry in terms of regulation? If you are talking about a structured financing, the legal and regulatory implications become very important because in many of those deals, the ability of the lenders to access collateral may be affected by new case law within a particular jurisdiction, (i.e., state foreclosure laws), or may be impacted by bankruptcy and insolvency considerations at a national level.

RISK AND RETURN

Now, the gist of my presentation will focus on what is so different about structured financings and the ratings associated with those structured financings and what kind of risks and benefits are associated with those types of investments for particular investors. In order to make the point a little clearer, I should make a slight comparison between the traditional general corporate debt instrument versus the structured finance instrument.

Generally speaking, the general corporate debt is much easier to analyze. You are basically focusing on the balance sheet of one entity and beyond that there really isn't much more to consider except obviously for all the macroeconomic factors. If you are focusing on a structured deal, there are frequently numerous sources of collateral or credit enhancement that are applicable to this particular transaction. Therefore, it is safe enough to say that the structured finance deals tend to be considerably more complex. That tends to have its ramifications throughout the entire process of structuring and selling those deals from the point of the legal talent and expenses that are brought into play as well as the complexity of the marketing effort to the eventual investor.

The second distinction that I would focus on is the fact that in a structured finance deal, there are numerous layers of collateral that each have to be analyzed independently, but by and large, most of the rating agencies take the weakest link approach. I think it is critical for this audience to understand that when a rating agency looks at a particular transaction in the structured finance arena, they do not rate the deal on the basis of some sort of weighted average concept, or what the weaknesses and strengths are in the deal. They tend to focus on what the one weak area in the deal is that might cause the deal to collapse. Generally speaking, that one weak area is the one that determines the rating for the entire deal. So as an example, if you have 90% of the deal secured by a AAA instrument, whether it be collateral or letter of credit, and 10% of the deal secured by a BB instrument, the whole deal would be rated BB. Therefore the rating sometimes can be misleading by really underestimating the credit quality of a particular structured instrument.

The third issue which I think is very important, as a particular risk associated with structured financing that may not be accurately reflected in the ratings, is that the rating agencies do not address the issue of call or prepayment protection when they look at these deals. Generally, if you have a General Motors or an IBM issue out there, and it says this is a ten-year bond and you have five-year call protection, you know that the likelihood of you being prepaid early on that deal is equal to the rating of IBM or General Motors. In a structured deal, the possibility that you could get paid out early is not the same as the rating on the bonds. Therefore you could have a deal that has been structured as a AAA deal for credit quality purposes. Because of the potential that the underlying collateral, in this case let's say it is a commercial mortgage, has been completely credit enhanced to a AAA level by insurance or by letters of credit, or whatever, if that particular mortgage goes into default, there is a possibility that, even though the bonds will not go into default, the collateral would be foreclosed and liquidated upon and you would have an acceleration of the debt instrument. When you bought the instrument you thought you had a ten-year full-call protection instrument. The answer really is that it is a full ten-year call protection in terms of a voluntary prepayment, but in fact it could get called out early depending on the conditions in the deal at any point in time that the underlying collateral goes into default. I think that is a critical point to remember and, frankly, a critical weakness in the deal.

Now, to just compare some of the strengths and weaknesses in these two deals, I just mentioned a weakness. Another weakness is the complexity of the deal as I mentioned before. The third weakness, I think, is that because of the complexity of the deals, there may be some limited liquidity in the secondary market type for those instruments. Therefore, if an investor wants to, for one reason or another, liquidate its portfolio, then it has a little bit of a tougher time selling a AAA-rated structured financing transaction compared to a AAA IBM bond.

What are the strengths? Well the strengths as one might imagine, to some extent, are the flipside of the weaknesses. Number one, because of the complexity of the deal, I believe that the deals are undervalued and underpriced. Therefore if you are a sophisticated investor, you can get a very high-quality investment at very attractive spreads over treasuries compared to other AAA-rated instruments and recognize that benefit for your employer. Also, the complexity of the deal is due to the fact that there are different layers of protection in the deal itself. So when someone tells you that a particular structured financing deal is rated AAA, that AAA may be entirely based upon one entity that is providing 100% of the insurance on the deal. In fact, underneath that

coverage, there may be other sources of protection like additional letters of credit and additional collateral which would give you something really better than just that AAA rap as your sole source of coverage. In fact, you may have several different layers that would enhance this deal beyond the traditional AAA deal.

Finally, even though the liquidity in the marketplace for this type of instrument may be somewhat limited, if you are dealing with the institutional investors, the market has become sophisticated enough that it knows the value of these particular instruments and begins to recognize that value over time, particularly within the institutional investor base. Here is a good example of that. There is a company called FSA. They are a bond insurance company and many investors have been somewhat unfamiliar with the company itself and really unfamiliar with the type of structure that has been involved in deals. We found out that over time, after instruments backed by their insurance are sold to the marketplace, those instruments are trading tighter to the curve. The reason they start trading tighter to the curve is because the investor community becomes more familiar with both the insured as well as the complexity of the underlying transaction. They recognize the value in it and therefore the initial investor that purchased that instrument frequently tends to benefit from a tightening in spreads in the secondary marketplace. I can't say that this is going to continue happening in the future because that information arbitrage opportunity is starting to disappear and may have already disappeared. But in the early days of this business it was still present. I would suspect that there will be other areas of structured finance with that same information arbitrage opportunity existing in the future.

At this point in time, I am going to flip through a Private Paper Memorandum (PPM), that my company prepared about eight or nine months ago with the sale of a particular structured financing, just to give you an idea of some of the key points that I have outlined here. The PPM has several key factors in it. Let me first describe the deal for your benefit.

We had a client who had seven hotels that they wanted to finance. This was a good way for them to do it because of the fact that we could do a large deal. We could do a deal that was significantly more attractive to an investor in this format versus doing it as a whole low-mortgage deal, and I guess most importantly, it was a transaction that provided both the advantages of traditional financing in terms of flexibility and the economic advantages of a capital markets financing. The hotels are the first source of collateral for this deal and they are fully cross collateralized. The properties themselves have been in existence. They are all permanent and existing structures so there was no construction financing involved here. Depending on the properties, there was a different track record, but by and large most of them have been around at least for six months to a year and some of them have been around for as long as ten years. The properties were cross-collateralized or cost defaulted and they were basically financed at close to 75% loan to value. Right away there is a pretty decent piece of real estate collateral.

In order to get the surety to insure this deal, in this case the surety was FSA, we also needed to provide a 20% stop-loss letter of credit. Security Pacific, my institution, provided the 20% letter of credit to back this deal. That letter of credit said, to the extent that there were losses associated with this deal, we would take the 20% first hit on the deal. This in and of itself gave the underlying deal at least an A quality. The reason for this single A designation is because the bond insurer in particular, unlike the multiline companies, rely upon really a different type of capital allocation than most traditional companies. The bond insurers are really a fiction of the rating agencies. The rating agencies are effectively the regulators of these bond insurers. The rating agencies say that to the extent you only insure certain types of risk, you will continue to maintain your AAA rating from us. Generally this type of risk should be of a BBB or higher quality without your insurance on it. Then the rating agencies allocate capital to each of the transactions that these bond insurers enter into. So as an example, in this deal, the rating agencies will give it an A designation and then allocate let's say somewhere around 2% or 3% capital against this particular deal, vis a vis the capital of the bond insured. As I guess I've been implying, the final source of collateral is the bond insurance which is rated AAA and which is for 100% of principal and interest as due.

Important points: There is once again in this transaction call protection for the life of the deal, but only to the extent of a voluntary prepayment. To the extent that there is an involuntary prepayment, then you would face the risk of an early acceleration on the bond and an early prepayment. This call protection risk is somewhat mitigated by the fact that even though neither the surety bond or the LC are obligated to cover any sort of yield maintenance that may be called

upon in the event of an acceleration, there is an obligation on part of the bond trustee to collect any excess value from the underlying hotel mortgage collateral to cover any sort of early default call.

What that means is that you use the traditional yield maintenance formula to determine what kind of additional payment an investor may be entitled to in the event of an early acceleration due to default and then you try to collect that amount in a foreclosure and liquidation procedure. That doesn't insure that the investor is going to come out whole through yield maintenance, but at least it does do one thing, it certainly discourages what I call voluntary default. As you know, some borrowers may be inclined to go into default in certain instances just to get out of what they would view as an unattractive loan particularly due to rate.

Now, let me just backtrack a little bit and talk about the value of rating since we now see that there is a difference between a rating that is assigned to a particular deal as well as to the particular market value of a debt instrument in the marketplace. A AAA rating does not mean that there is one very narrow band of trading for that particular instrument, even assuming the same term and same call protection. Part of the reason is that, as I said, there is greater complexity in a structured finance deal as compared to the traditional general obligation deal. Also part of it is due to the overall perception of rating agencies and how they function in this arena.

Generally, the rating agencies have been perceived as being sometimes very slow to react to changing market conditions, changing conditions within a particular borrower, a particular company. Good examples would be Penn Central, Johns Manville, and most recently Integrated Resources. I was working with S&P's outside counsel when Johns Manville filed for bankruptcy. It caught everyone kind of by surprise because at that point in time, the company was rated BBB. All of a sudden we had that particular entity going down the tubes into bankruptcy, and because of the nature of the bankruptcy laws, all ongoing debt service payments were temporarily restrained. The reason for those types of circumstances are not so much that the rating agencies are negligent or reckless in their following of those companies, but that sometimes these things will just happen. BBB and A companies will sometimes go into default for totally unexpected matters. Johns Manville, once again, is a good example with a significant legal litigation involved regarding asbestos claims filed against them. Johns Manville decided that as a legal strategy, it was best for them to file in order to get the best result for them and their existing creditors.

The second point to be made is that the rating agencies view themselves as being reactive rather than proactive. They react to news rather than try to dig into a company like an investigative reporter. They are in theory entitled to and do frequently gain access to confidential information associated with particular companies, but frequently those companies are just not willing to give them the confidential information that they may need to make a correct assessment. Therefore, the rating agencies know that even though they may be told that they have the full story, they really do not. Once gain, this promotes a reactive type of nature.

Another reason is that the rating agencies have generally one or two analysts who follow a particular industry and a particular company, but that particular analyst only has so much authority. I guess depending on his or her ability, a rating agency may be more or less likely to react to a new piece of news. Even once that analyst is ready to react, then he or she has to take that particular piece of news to a committee which will actually make the ultimate decision as to whether or not a rating change is warranted. That committee process tends to be sometimes cumbersome and tends to favor the status quo. Whether a rating change is warranted or not, they would tend to react more conservatively either going up or down.

Finally, the rating agencies have attempted to deal with what is perceived as their slow reaction to news that is coming out, particularly in this age of leveraged buy-outs (LBOs). What they try to do is use a system; in the case of S&P they call it their credit watch system. S&P's credit watch system basically implies that they are going to tell the investor base that there may be a positive, negative or neutral rating implication for a company associated with any particular action or step that may be of a macro or microeconomic nature. Usually the credit watch indications come out very quickly. They allow the rating agencies to warn investors of potential change, but nonetheless take their time about reacting to that change with the appropriate rating. Finally, I guess an issue that always seems to come up with investors is to what extent does the price of a particular debt instrument truly reflect the rating of that particular instrument? To put it another way, to what extent does a rating truly reflect that market value of a particular debt instrument? The

answer is that most people believe that the marketplace already takes into consideration potential changes in rating so that in fact the ratings do nothing more than confirm the marketplace's suspicions. I suspect that in many cases that is true. I suspect that to some extent that worries the rating agencies, but by and large they view their job as being one more of a stable reactive entity rather than one that is going to act like a traditional unlisted brokerage firm or is trying to make buy and sell recommendations.

All of these factors are applicable to both structured as well as traditional deals. But in the area of structured financings, I guess the most important factor to take into consideration and what I have been focusing on, is that there is a fairly slow reactive process. Because of that process, the rating agencies have been more conservative in accessing risk associated with structured financing deals. I think as the rating agencies become more comfortable with some of these deals -- and they have, in fact, become more comfortable with some of the collateralized mortgage obligation (CMO) type deals where you have single family mortgages, or Fannie Mae, Ginny Mae, or Freddy Mac collateral -- they have become, I think, very aggressive and very reasonable in analyzing those types of deals. When you move to the other types of assets that may be relied upon in these transactions, I think you will find that the rating agencies still tend to be very conservative in analyzing that risk.

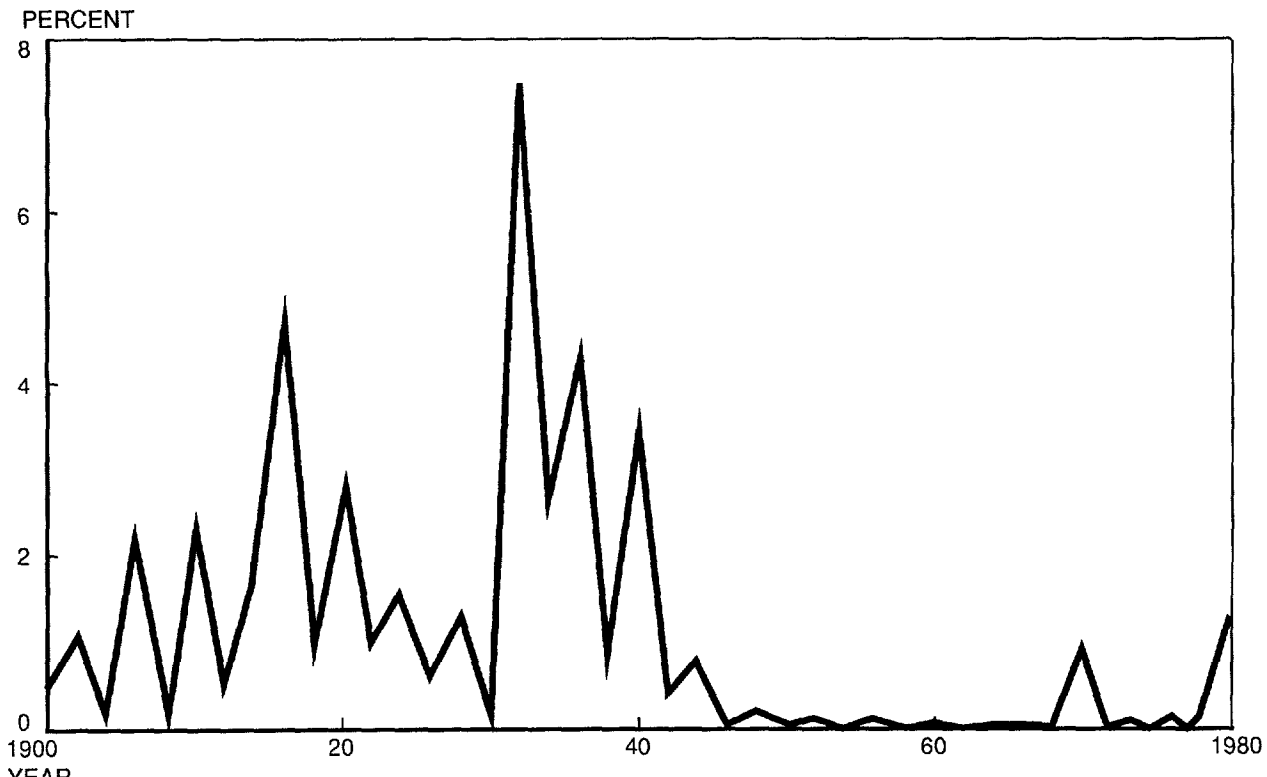
Over time, as the rating agencies become a little bit more reasonable, I think you will see an expansion of structured financings, in particular those involving commercial mortgage real estate, those involving less traditional types of assets, assets other than credit card receivables and auto loan receivables, which we have seen a lot of out there. Frankly, I think the marketplace is going to demand it more for the simple reason that many traditional real estate investors have found that their traditional real estate lenders no longer are capable of providing them all of their needs. This is either because of capacity or in many instances because of the types of structures that need to be incorporated to satisfy the needs of a particular real estate borrower and their particular assets. As an example, many of these deals can be "tranched." Tranching means that you take a particular debt instrument and cut it up into various pieces with different characteristics. Well, you can take those different characteristics, that as a whole would be very workable for a borrower, but when they are cut up into smaller pieces and sold off to investors, they also work for each one of those individual investors who may be very attracted to a fully amortizing instrument, a nonamortizing bill of pay instrument, a zero-coupon instrument, or whatever.

MR. IRWIN T. VANDERHOOF: I am going to talk a little bit about bond defaults. I have been working with the C-1 Risk Task Force for what seems like forever; maybe it is only five years. The report is going to be distributed in December 1989. There is some material we left out of the final version because it got to be too long as it stood, but I thought a few graphs that will not be included might give you some information that might be valuable to you.

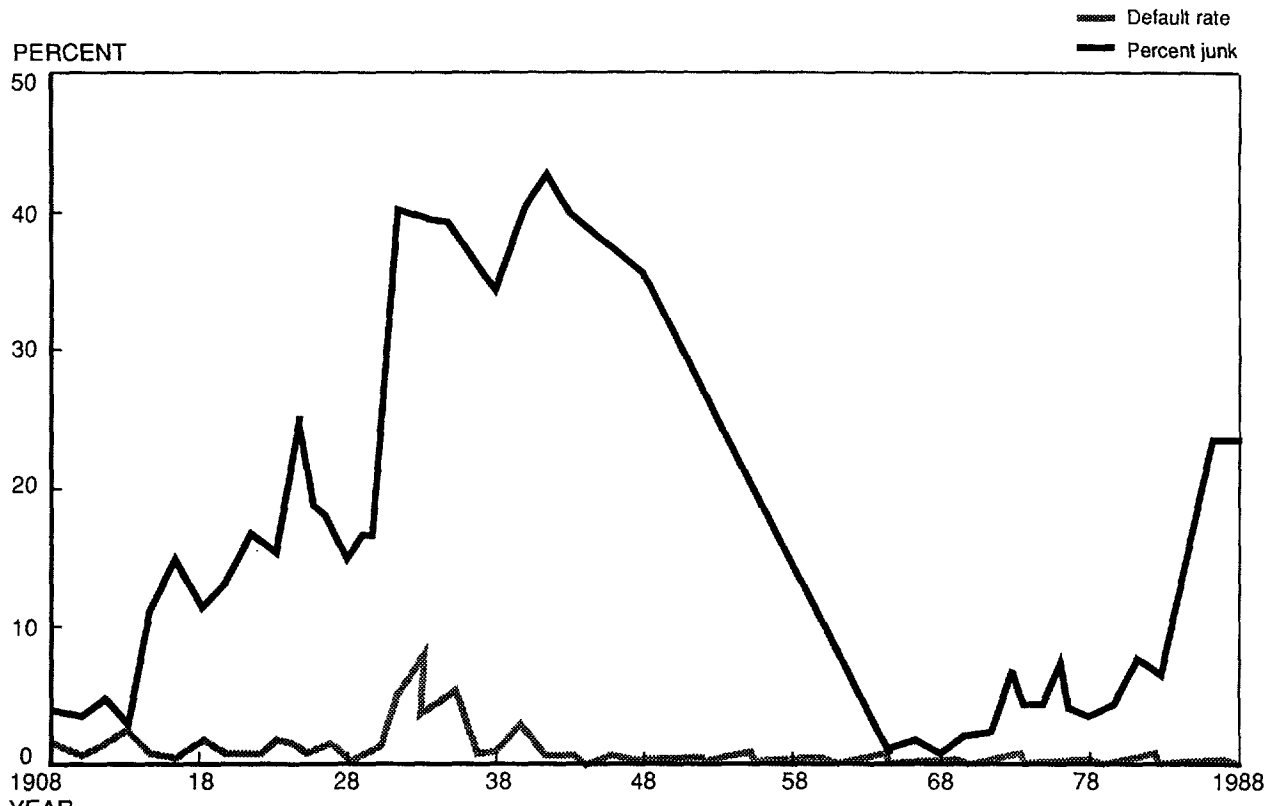
Graph 1 shows default rates on straight bonds. This basically is running together several different data bases. There's the old Hickman Data Base, there's Atkinson, there's Post and Hill and finally there is Ed Altman. We can see that the weights for all publicly traded bonds were 2.5, 3% during the first couple of decades. In the 1930s, all bonds went up to 7%. Since 1940-44, it was really so low as not to matter very much and in the late 1980s, moved up a little bit. Now, of course, it is not only a question of the aggregate, but also a question as to what would cause that result.

One easy thing is to say, and there are those who have said it, that the reason is the amount of junk bonds in the market. There are a few heroic assumptions involved Graph 2. Basically, the area from about 1948 to 1968 has been interpolated. I didn't have the junk bonds outstanding. I don't think it is going to mislead you though no matter what the actual figures should have been in there. The lower dotted line is the default rates and again you can see on a different scale that the default rates peaked in the early 1930s and they really have been inconsequential since. I think that it would be difficult to argue that the cause of the high rates of the 1930s or a predictor of the total default rate was in fact the percentage of junk bonds outstanding. (I don't know if you have heard about junk bonds, noninvestment grade bonds. Have you heard about the junk bond diet? It's for people who need to lose weight. You can lose everything in minutes.) Junk bonds do not seem to be a plausible explanation for changes in the default rates. This is very interesting because it's not what most people would tell you. They'd tell you about junk being a new thing or everything is different than it was.

DEFAULT RATES
Straight Bonds



DEFAULT RATE VS. PERCENT JUNK



Graph 3 is the percentage of the total issues of bonds in the junk noninvestment group category, versus the default rate. It's not what they will tell you for a couple of interesting reasons. One is that the peak was in the early 1930s. About 50% of the bond issues in the early 1930s were in the junk category. There have been a number of peaks since then. There was a peak in the middle 1960s. There doesn't seem to be any relationship between the percentage of bonds that were issued in the junk category and the default rates. You can see that the default rates -- the lower lines -- were a little bit raised in the late 1980s, but it doesn't really comport very well with the argument that default rates for the total bond universe is strictly related to the proportion of junk.

Graph 4 is issues by quality grade. I am not sure where this would have fallen in a larger progression of these charts. I am not sure what a larger progression of these charts would be. It still seems to be fairly interesting. You can see the peak of junk bond issues in the 1930s. Also in the 1930s and early 1940s, there is a third line: unrated. There was a substantial amount of unrated, so it wasn't just between junk and investment grade. Unrated is not a major factor anymore.

Graph 5 shows ultimate default rates. The solid line above the broken line is the junk ultimate default rate. The lower line is again the investment grade ultimate default rate. This only goes through 1943. I don't think that the results are greatly impacted thereafter for a couple of reasons. You will note that ultimate default rates on junk seem to be averaging somewhere around the 30% area for the first half of this century. Around the 30% area is what we are now getting as ultimate default rates on junk from the recent studies by Altman, Asquith, etc. The results therefore are generally consistent with what we had in the early part of the century. That's interesting because again it's saying that things have not changed all that much. We do not have a sharp change between the earlier part of the century and what's going on now.

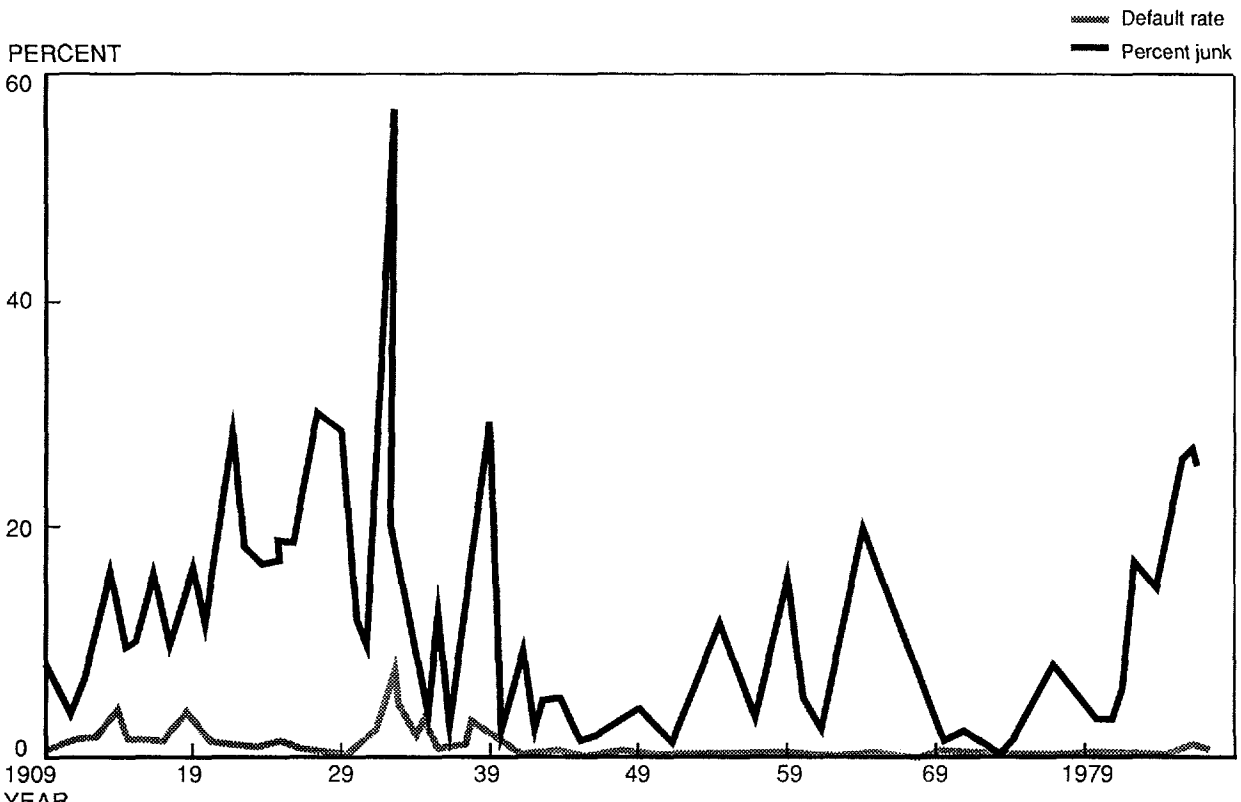
Graph 6 shows the percentage outstanding by quality rating. Again you see that long interpolated section, but you can clearly get an idea of the percentage of junk bonds in the market today. They said 20% is a tremendously high figure. It's not a tremendously high figure. It's a figure that's been achieved a number of times in the past. Nothing bad, but nothing very good either. Basically it's saying there is a continuity in the economy, except for a period of a few years in the 1930s.

Graph 7 is pretty interesting. This is the default rates by quality grades for the last 80 years. I don't think this has been shown anyplace before. I find it interesting. The lower line is the investment grade, the upper line is the noninvestment grade of the junk. There was a period from about 1944 through 1969 when the junk default rates were very, very low. That was a period, when there was substantial junk issues, but it seems to have been a long, warm lovely summer in the economy. Since about 1970 we have returned to a level of defaults on the junk bond category that's pretty consistent with what we would have observed in the early part of the century. It is essentially the same kind of range of data you find in Hickman's stuff. However, you will note that in the early part of the century there were perceptible real default rates on the investment grade, the lower line. You are talking about default rates of 1%.

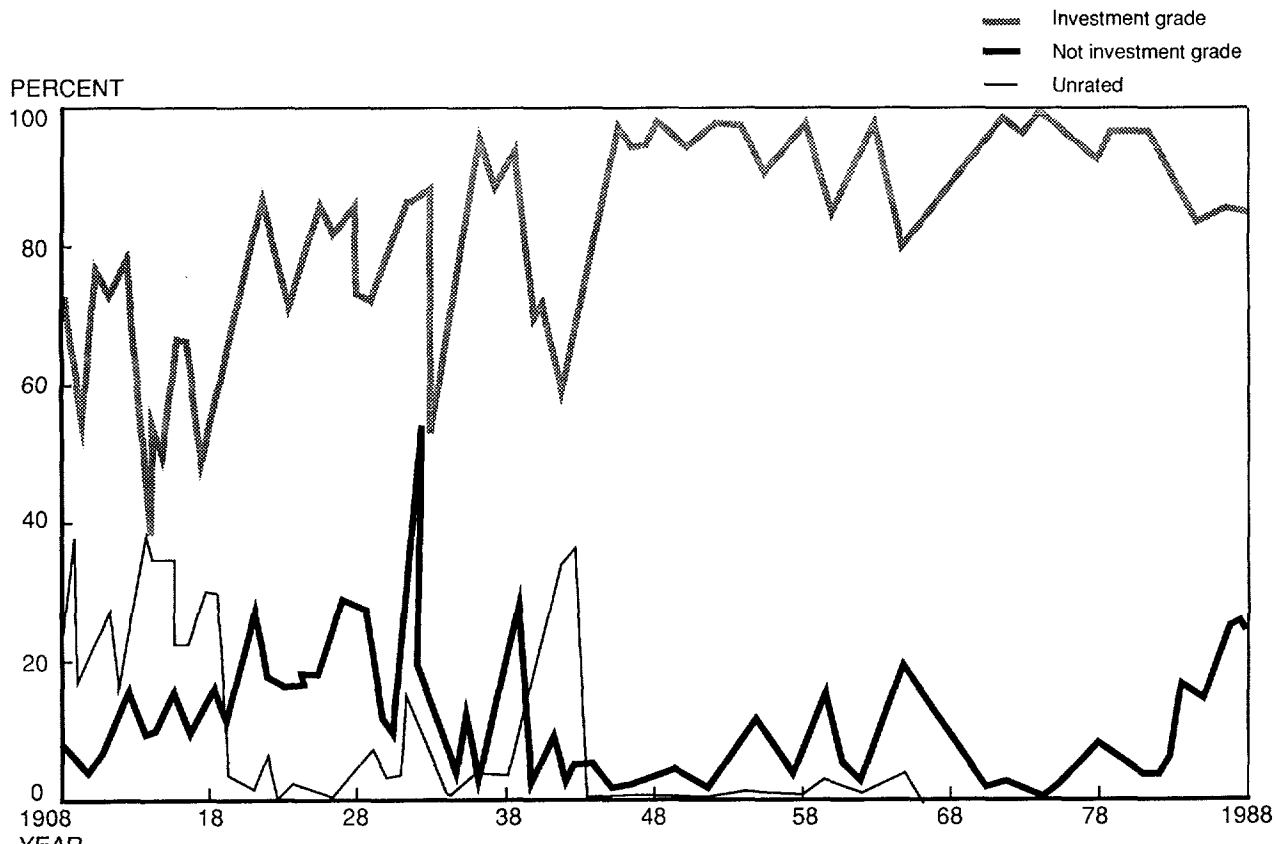
We now see that since about 1944, except for the very rare, Johns Mansfield situation, there have been no defaults on bonds that were investment grade. One explanation for that might be that the agencies had been doing their jobs much better than they did earlier. Maybe they have more staff and more time. That explanation is the only one I can come up with. If people have any suggestions I would be interested in hearing them. That explanation basically says that the agencies have been able to more rapidly move bonds from the investment grade to the noninvestment grade category. Since they are more up-to-date then they were 50 years ago, the opportunity for bonds to default from an investment grade no longer exists. That concludes this section of graphs, basically designed to produce some sort of historical perspective on the risk question.

The title of this particular session is risk and return so I thought I would give you some other interesting information. Part of my job now is not only to convince people that actuaries have to learn from other fields, but also that actuaries should contribute to other fields. One interesting question is the default premium on junk bonds. The finance people, some friends of mine, have been saying, "Well, the average weighted default is 2% and when multiplied by a loss, with the investment so, here is the premium we should get." Actually, they have not realized that this is basically an actuarial problem.

DEFAULT RATE
All Straight Bond vs. Junk Percent

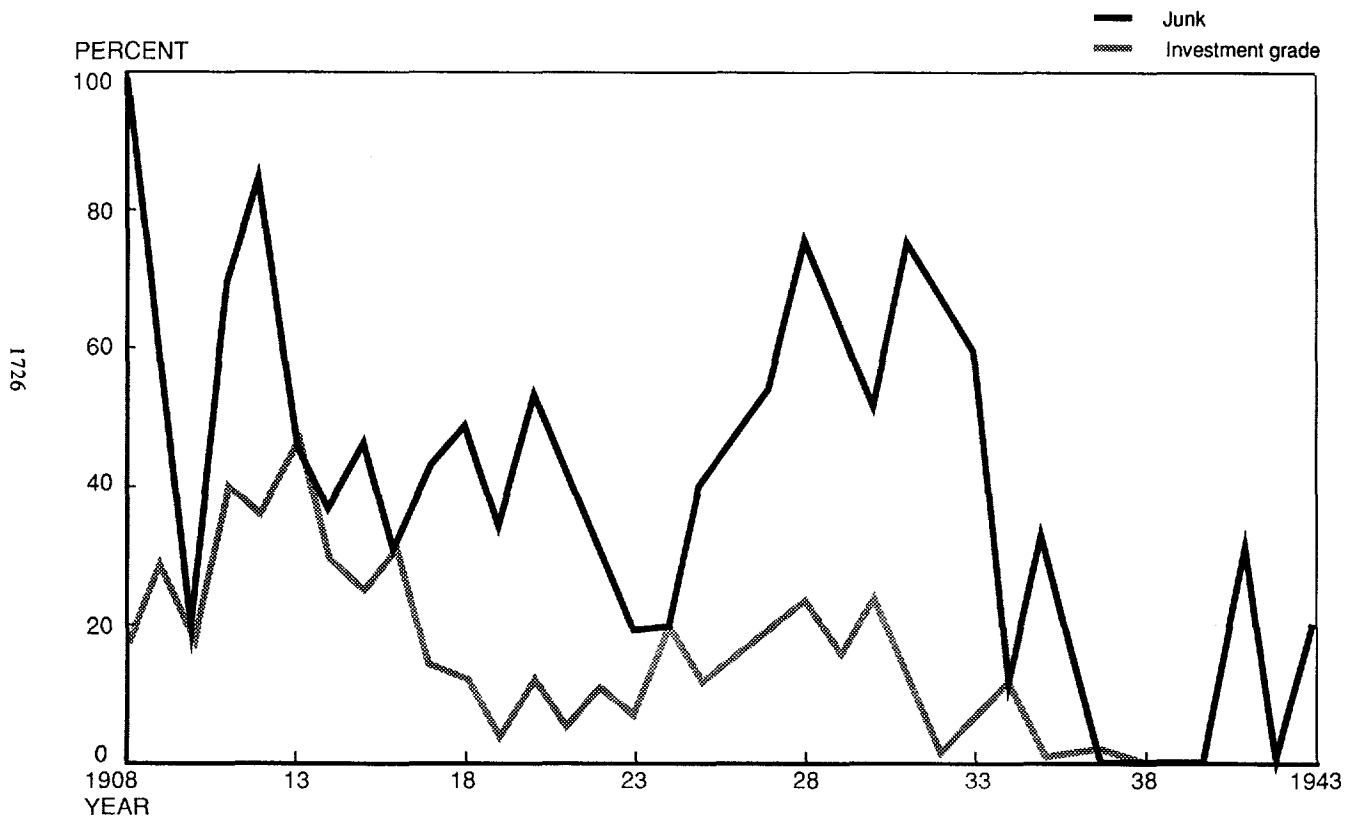


ISSUED AMOUNTS BY QUALITY GRADE

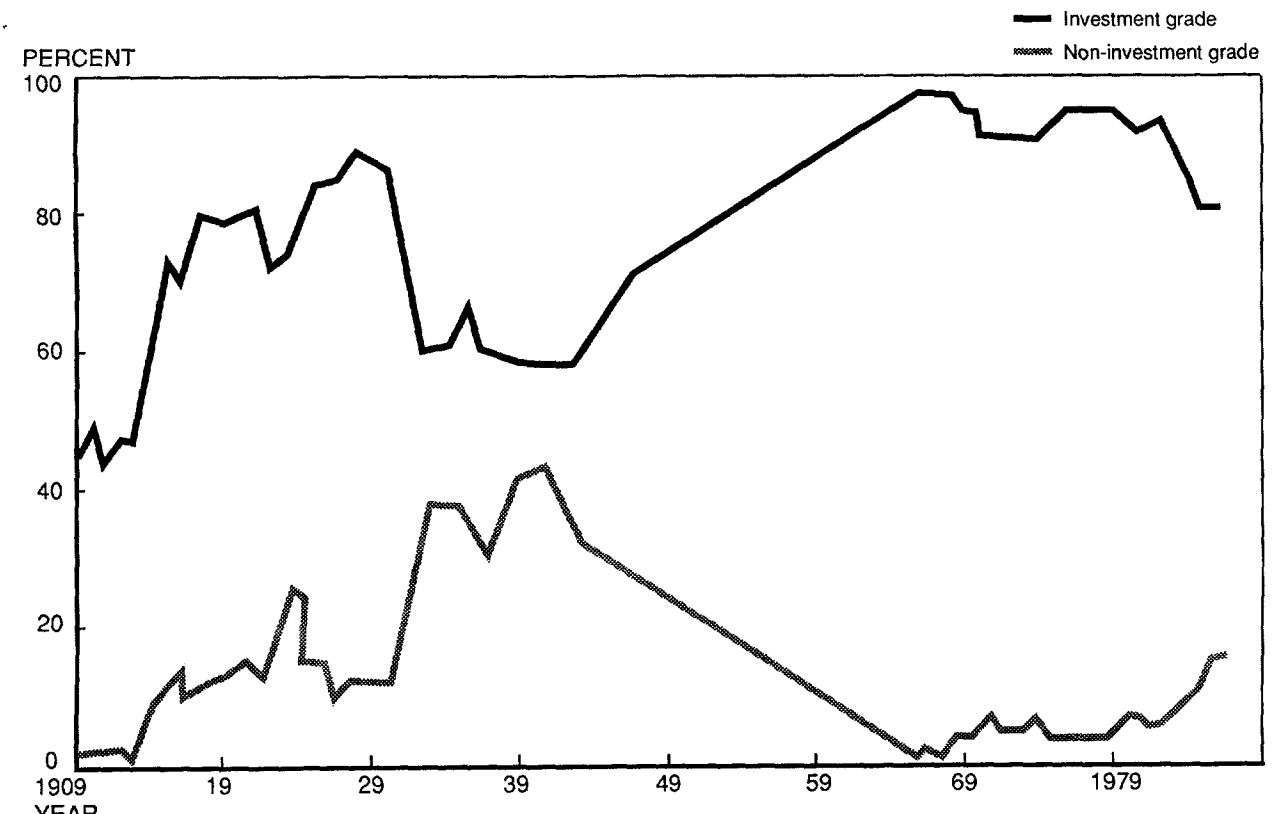


GRAPH 5

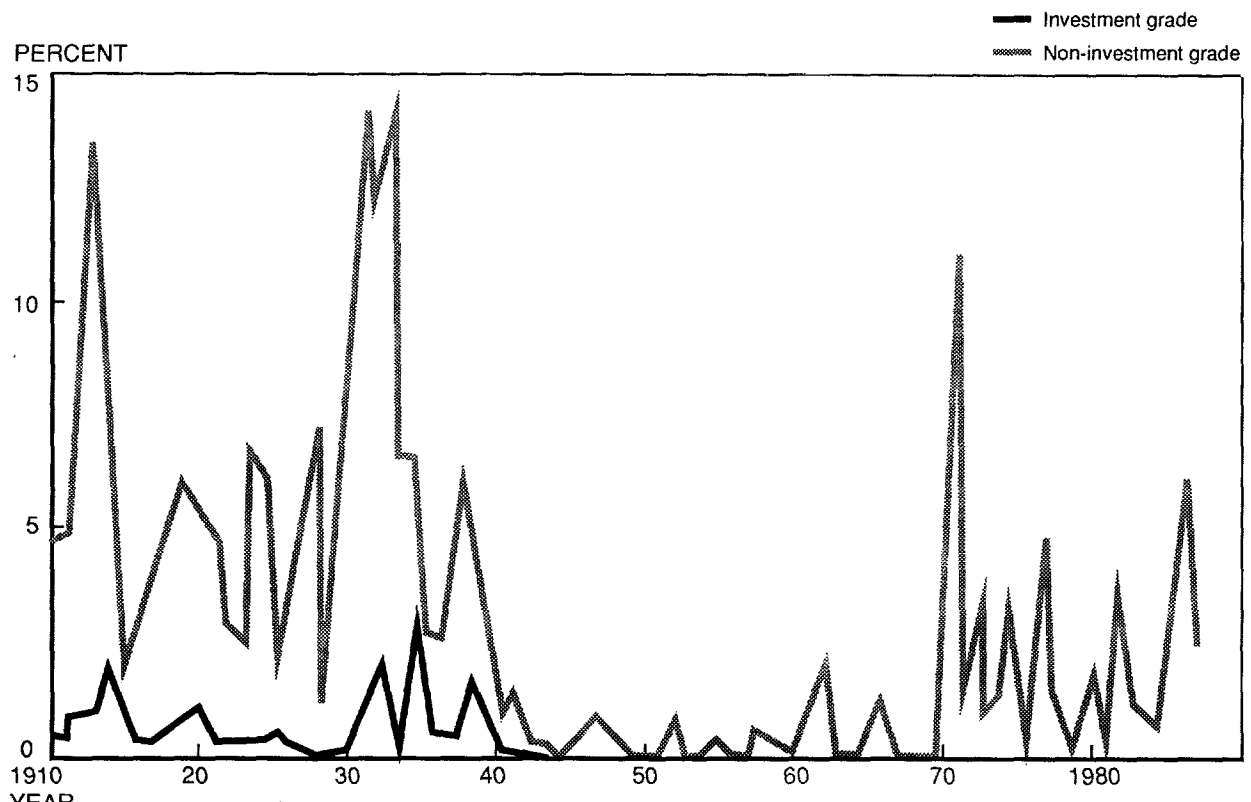
ULTIMATE DEFAULT RATES
Investment Grade vs. Junk



PERCENTAGE OUTSTANDING BY QUALITY RATING



DEFAULT RATINGS BY QUALITY FOR OUTSTANDING



There is not only a question of default however, there is also a question of distressed exchange which in recent years, exactly the same as it was in Hickman, is about 25% or somewhere between 25% and 30% of the actual defaults. We therefore are not only faced with a single decrement; we also are faced with a double decrement. Actuaries are supposed to remember about double decrement tables and the way to calculate a premium. If you do that sort of a calculation, you get a more current answer as to how much you should take off the top on your risky bond or junk bond portfolio to get the adequate margin for default. That is if I buy a portfolio of bonds, you want to watch it until it finally goes away one way or another. There is a certain amount I should take off the top to compensate for the risk of loss. That risk of loss calculation is not properly done by taking an average default rate and an average loss rate. That only gives you a figure if there is only one decrement.

Also, it is particularly misleading if, as we find, the default rate tends to increase with age since issue. The reason for that probably is that bonds have a tendency to be downgraded and the more they have been downgraded the more likely they are to go into default. Therefore, a combination of an increasing risk with time and multiple decrements means that the basic calculation you have probably been reading about in finance journals is not properly done. Proper calculation is a multiple decrement table which is shown in Chart 1. I don't want to spend a lot of time by explaining how to do a multiple decrement table. Once I say it, it should be obvious to you, but basically we are calculating an annuity. The annuity is the amount I should take off the bonds every year in a portfolio for the expected remaining number and amount of bonds such that I am compensated for the losses on account of a default, which I figure is about a 60% loss of value, and the loss on exchange, which I am guessing is about a 30% loss of value.

I'll show you finally how this comes out with respect to one particular class. This is Altman's data, 1971 through 1988 (Figure 1). This is the result Altman actually got from his data on defaults for ten years and five years. I did a sort of quick graduation of the data which is implicit in this.

FIGURE 1

Altman 1971-1988 B

Parameters			Results			
		Average Annual	1-Year Default = 5.24 E-03		Altman = 0.0056	
q1 =	0.00183	Cost	2.5-Year	5-Year	10-Year	15-Year
w1 =	0.00061	Default =	0.00568	0.009326	0.014763	0.018034
Power =	0.9	Exchange =	0.000947	0.001554	0.00246	0.003006
6-Month		Total Cost=	0.006627	0.01088	0.17223	0.02104
Interest =	0.05					
Default		Total				
Loss =	0.6	Default =	0.024027	0.079717	0.249157	0.433937
Exchange		Altman =		0.0793	0.2492	
Loss =	0.3					

These are my graduated results so I fit data pretty well for five and ten years. Based upon those results in my graduation, the predicted ultimate default rate, that is what percentage of a cohort of B grade bonds will eventually default, is 43%. The total cost of the default shown here over a 15-year period if the bonds have 15 years to run with an increasing default rate as indicated by these numbers is 210 basis points. This is sort of crucial, though, because if you look well in the first year on a cohort of bonds, you would say all I needed is six or seven basis points. That is, if the bonds are going to run only five years following this pattern of increasing defaults with age, then I only need to set aside 100 basis points per year to compensate for default loss. If the defaults are going to continue to increase however, and the bonds are going to stay in my books for ten years, then I need 170 basis points and for 15 years, what I would consider an ultimate default rate, I need 43%. I find these figures very interesting because again, they are consistent with the Hickman data on ultimate default rates for junk bonds, which we showed earlier.

During this presentation, I've tried to convey two ideas to you, maybe three. One is that the experience on investment grade and noninvestment grade bonds seems to be coming into coordination. The experience that Altman and Asquith and the rest of them are showing for the last 20 years now seems to be falling into the pattern of defaults on noninvestment grade bonds that was

Parameters

q1	=	0.0025
w1	=	0.000625
Power	=	0.9
6 Months Interest	=	0.05
Default Loss	=	0.6
Exchange Loss	=	0.3

Results

1-Year Default = 7.15E-03

Average Annual Cost	2.5-Year	5-Year	10-Year	15-Year
Default =	0.007766	0.012724	0.019926	0.023945
Exchange =	0.000971	0.001591	0.002491	0.002993
Total Cost =	0.008737	0.014315	0.022416	0.026938
Total Default =	0.03271	0.10743	0.323915	0.537025

6 Months	v**t	lt	dt	ext	ct	wct	Et
1	0.952381	0.996875	0.0025	0.000625	0.001429	0.000179	0.949405
2	0.907029	0.991062	0.004651	0.001163	0.002531	0.000316	0.898922
3	0.863838	0.982737	0.00666	0.001665	0.003452	0.000431	0.848925
4	0.822702	0.972043	0.008555	0.002139	0.004223	0.000528	0.799702
5	0.783526	0.959113	0.010344	0.002586	0.004863	0.000608	0.75149
6	0.746215	0.94408	0.012027	0.003007	0.005385	0.000673	0.704487
7	0.710681	0.92708	0.0136	0.0034	0.005799	0.000725	0.658858
8	0.676839	0.908254	0.01506	0.003765	0.006116	0.000765	0.614742
9	0.644609	0.887748	0.016405	0.004101	0.006345	0.000793	0.57225
10	0.613913	0.865712	0.017629	0.004407	0.006494	0.000812	0.531472

shown during the Hickman study. So we have sort of historical consistency which we didn't know existed even a few years ago.

The second thing I am saying is that you should remember that even though we have much to learn from other disciplines, the actuarial discipline has not been completely used up. I've shown an example in which normal actuarial techniques, double decrement tables, are in fact the correct way to assess the risk premium necessary on a portfolio of risky bonds and that the methods that the finance people are using is not the correct way to do it. I have to write this up sometime for the *Financial Analysts Journal*, so they realize that we still have some dry powder in the arsenal of actuarial techniques.

Finally, if you had a portfolio of B grade junk bonds, new issues, because of the default pattern, they looked great in the first couple of years and you'd say you only needed ten basis points to compensate for the risk of default. As time goes on, that number would go up and up and up, and if in fact you want to correctly judge the attractiveness of this investment vehicle, you are going to have to do the kind of graduation that was implicit in these calculations and run them out as an annuity to get the right sort of answers and even the right magnitude.

MR. DEAKINS: I have made the assumption, an incorrect assumption I might add, but I nonetheless have made the assumption that we can somehow say we know what defaults are going to be on a specific portfolio. As you just saw, there are an awful lot of outstanding issues as to what the default rate on a given portfolio is going to be, but I have made the assumption that there aren't any questions.

Now that we know what the default rate is, what do we do with it and how do we analyze it? I put together a few figures that show one way I tried to analyze it. I was trying to test to see what was important: How critical an issue diversification was, how important economic scenarios are, what the impact of interactions between the interest rate risk and the default risk were, and things like that. I will go through the figures quickly and then talk about some of the issues we need to be thinking about, not the least of which, as I alluded to, is that recently there has been a lot of good data coming out, say in the last year-and-a-half. Suddenly we have gone from virtually no usable data on defaults to quite a bit of data. But there is still quite a bit more data that we need.

I did the kind of analysis I would do for testing interest rate risk and came up with a set of interest scenarios. Then I layered on top of that an analysis of the default risk. Figure 2 is a quick description of what the interest scenarios I was using looked like. I made a whole bunch of the same kind of assumptions I would have to make to do interest scenario-type testing about call provisions and that sort of thing (Figure 3). Then, of course, I wanted to bring all of these things together rather than just look at defaults, so I needed assumptions about what our liability would look like (Figure 4). For right now, suffice it to say that there were liabilities.

FIGURE 2

Yield Curve Universe for Default Analysis
Treasury Rates

Curve Number	Short-Term Rate	5-Year Rate	10-Year Rate	30-Year Rate
1	.50%	.83%	.92%	.97%
9	2.22	4.87	5.42	5.78
17	3.59	6.22	6.76	7.11
24*	5.90	8.16	8.62	8.86
31	9.24	10.82	11.12	11.16
39	14.33	14.73	14.75	14.46
47	20.77	19.57	19.22	18.47

* Current Curve

Volatility: Standard Deviation Equals 2%

FIGURE 3

Investment Assumptions for Default Analysis

- Seven-year bonds are callable three years from the date of acquisition at 103% of par.
- Twenty-year bonds are callable ten years from the date of acquisition at par plus one coupon.
- Thirty-year bonds are callable ten years from the date of acquisition at par plus two coupons.
- Bonds are assumed to be called when the rate on comparable new bonds falls 2.5% below the coupon.
- Seven-year bonds are assumed to earn 117% of the treasury rate.
- Twenty- and thirty-year bonds are assumed to earn 120% of the treasury rate.

FIGURE 4

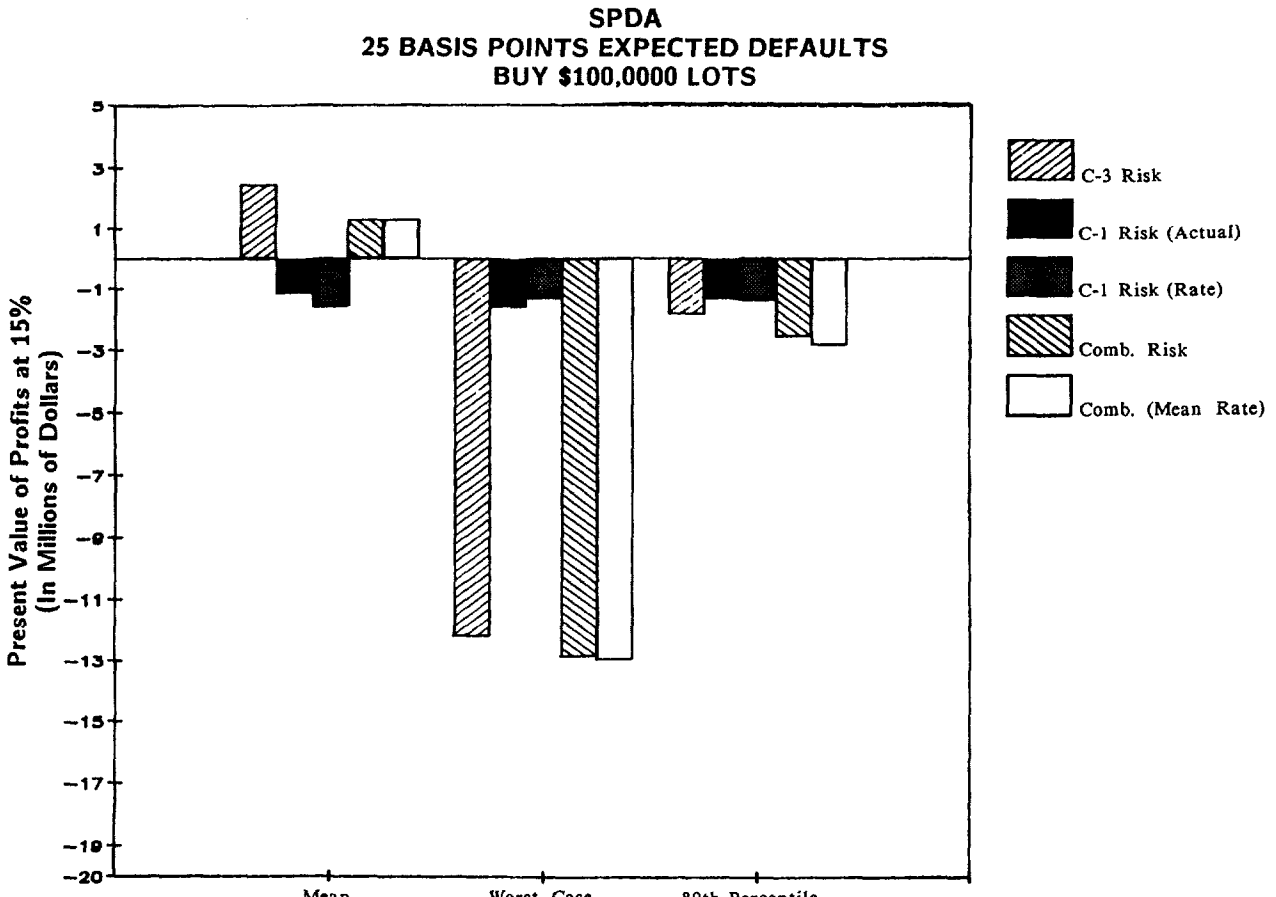
Single Premium Deferred Annuity (SPDA) Assumptions for Default Analysis

Average Size:	$25,000
Sales:	$100 Million
Expenses:	$30 per policy each year plus 15 basis points for investment expense
Reserve:	Account Value
Projection Period:	15 Years
Bailout:	Initial credited rate less 1%
Surrender Charge:	7, 6, 5, 4, 3, 2, 1, 0%
Competitors' Rate:	Seven-year treasury rate
Guarantee:	4%
Crediting Strategy:	Credit the lesser of the competitors' rate and the average of the current competitors' rate and the previous year's credited rate
Commission:	5.5% of premium
Partial Surrenders:	Reflected through a 10% reduction in surrender charges
Deaths:	75-80 ultimate table, male age 55
Lapses:	$15\% + 2 \cdot Z(MR-CR)^2 - 3 \cdot SC$; $Z = 1$ if $MR > CR$; $Z = -1$ if $MR < CR$; minimum of 3%; The following are expressed as percents: MR = market rate; CR = credited rate; SC = surrender charge
New Investments:	Seven-year bonds

I had made an assumption that we would issue $100 million of premiums. I then made the assumption contrary to what Irwin was talking about and what I think just about every commentator in this area has found in that the default rate increases dramatically as you go further and further from the point of issue. Notwithstanding, I made the assumption that the given bonds would have a default rate of 25 basis points a year no matter how old or how new it was. I put that across the entire portfolio. I was going for very simple assumptions here because I was trying to get a feel for how important different parameters are. We had about a $100 million portfolio here.

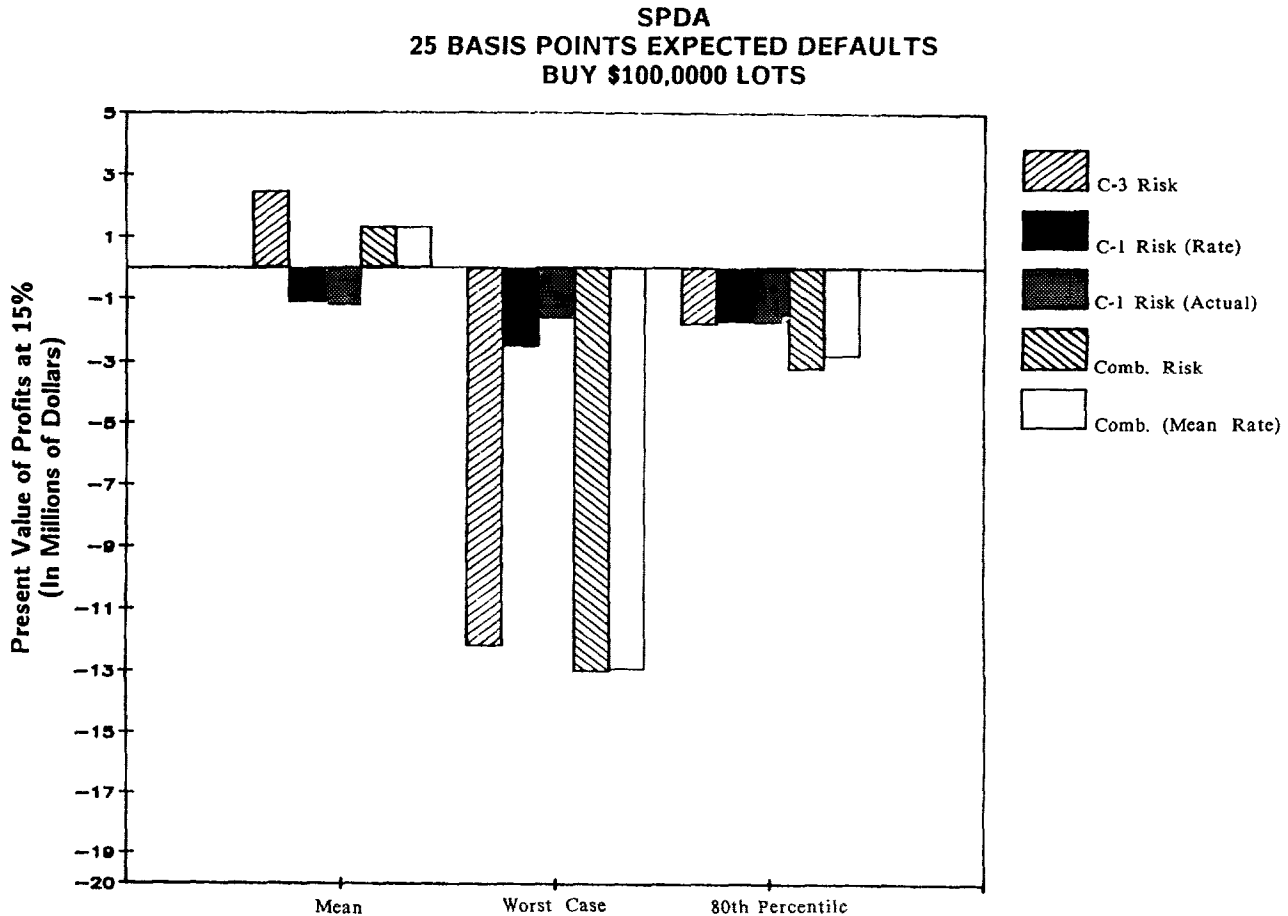
One of the things I wanted to look at is how important is diversification. I said we buy $100,000 lots. In other words, if we have a $100 million portfolio, we will have about 1,000 securities. Then we use this stochastic process to test the defaults. We basically flipped a coin for each security each year with a .25% probability of it defaulting and pulled it out of the portfolio if it defaulted. So obviously the more diversification you get, the closer and closer your results get to the expected. As you can see in this particular case (Graph 8), if you have 1,000 securities, there is virtually no difference due to diversification issues between your worst case default and the expected default rate. In other words, based on this information, 1,000 securities would have a .25% default rate; you are virtually certain to come up with .25% default over a 20-year period. You would have a little more fluctuation year to year, but I think the critical parameter ends up being the number of expected defaults. In this case that is 2.5 expected defaults each year. Over a course of a 20-year projection, you are talking about 50 expected defaults. If you think about the way the probabilities fall out, you'd be pretty surprised if you had less than 45 or more than 55 in that case. It ends up that 1,000 securities is probably more than diversified enough.

Then we looked at what happens if you are buying million dollar lots (Graph 9). In this case, we're going to have 100 securities at any given time so that our expected defaults each year are .25. Clearly we are never going to get .25 defaults in a year. Some years we are going to get 0, some years we are going to get 1, some years we may even get 2. As you can see here, there's quite



RISK AND RETURN
GRAPH 8

GRAPH 9


SPDA
25 BASIS POINTS EXPECTED DEFAULTS
BUY $100,0000 LOTS
Present Value of Profits at 15%
(In Millions of Dollars)
5
3
1
-1
-3
-5
-7
-9
-11
-13
-15
-17
-19
-20
Mean
Worst Case
80th Percentile
C-3 Risk
C-1 Risk (Rate)
C-1 Risk (Actual)
Comb. Risk
Comb. (Mean Rate)

a bit of fluctuation between the worst case defaults and expected defaults. The expected present value of defaults in this case was about $1.5 million. The worst case present value of defaults was almost $3.5 million. We are talking about tremendous potential fluctuation in defaults if you only have 100 securities.

I've reached the conclusion that diversification is a critical issue to some companies, but for most mid-sized and large insurance companies, diversification isn't going to be a big issue. With somewhere around 1,000 securities the problem you have with default rates will be because of the economy and your selection, not because of having too few securities.

The second thing I wanted to look at was economic scenarios. We look back at this data from the last ten years, twenty years or whatever and based on a specific economic scenario, the one that happened. That scenario may be better than what actually happened going forward or may be worse. I found that one of the most critical things is how wide you think the economic scenario can swing around your basic mean scenario if you make the assumption that history is mean.

A separate issue is when you look back at the data for the last 20 years, do you view that as being best case, worst case or mean case? The way I tried to model this was to say that each year for each security, we would put an additional process on default rates which was that all default rates would be multiplied by a number. That number each year was pulled from a log normal distribution, so it had a median of one. It was equally likely that the number we pulled would be bigger than one or smaller than one. You can see (Graph 10), I had a .35 standard deviation. I am a little unsure at this point what all this means. I have just been fooling with this stuff a lot. I have some idea of what it means, but I don't feel like I've really got it all.

What I see here is the deviation from a fairly mild set of economic scenarios. The deviation due to these economic scenarios is about as great as the deviation that you saw due to only having 100 securities. What that's saying to me is that even if we get the data we need, we have a lot of analytical questions to ask like, How bad could the economy swing? What I've seen is that if you make fairly modest assumptions about possible swings in the economy, at least in terms of risk levels, you need to dramatically increase your provision for risk. Economic scenarios seem to be one of the most critical factors in this whole process.

Interestingly, unlike the interest rate risk, the credit risk is symmetric in that there is no reason to think that it's consistently going to be biased. If you look at the credit risk, the results under the mean scenario should be about the same as the mean results under all scenarios, which is not true at all for the interest rate risk. That has some interesting implications for the questions we should be asking. I think the economic scenario question that I am raising is really a risk issue, not a reward-type of issue. The diversification issue is also a risk issue. Neither of those are reward issues, whereas with the interest rate risk, we are looking at both risk issues and reward issues. By building an option into our product, we're getting asymmetric distributions as interest rates jump around. You are not seeing that here with credit risk.

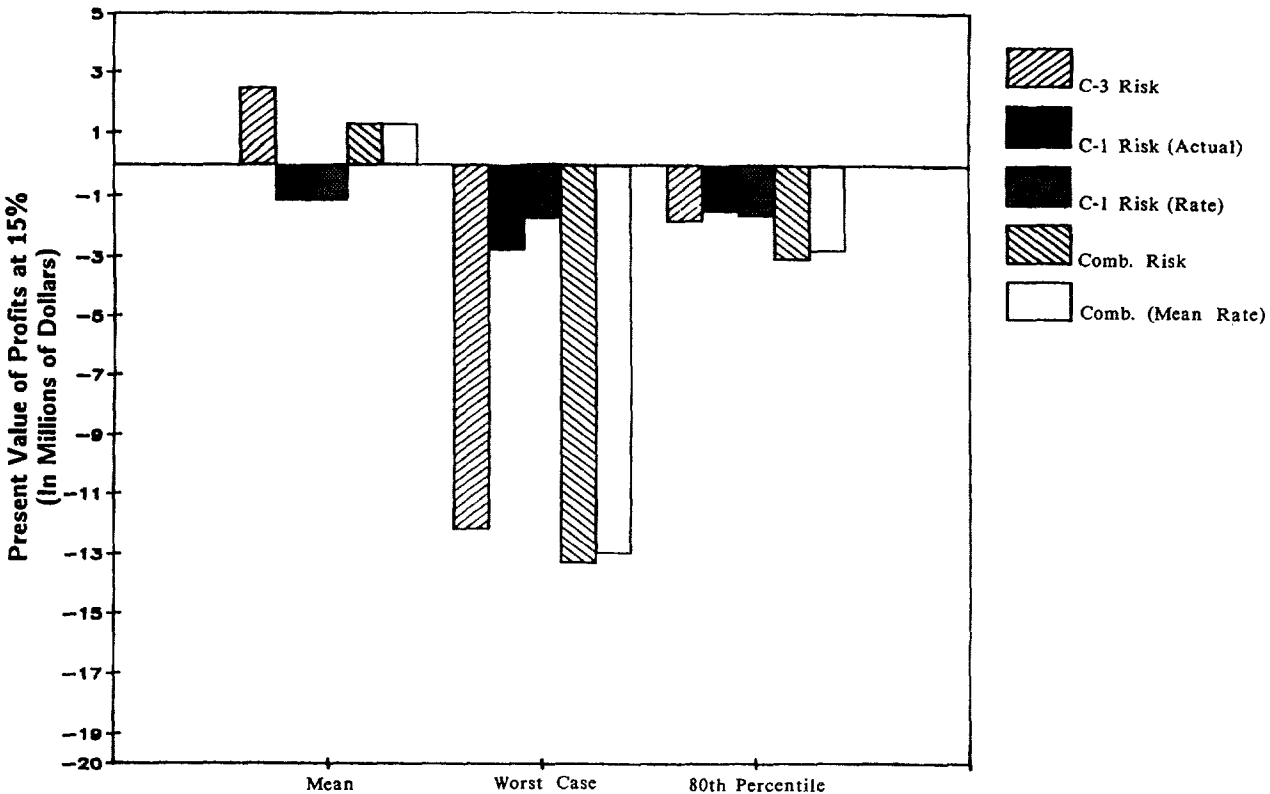
Next I looked at what happens if instead of a .35 standard deviation, which is a fairly mild set of economic scenarios, we have a standard deviation of 1 for our log normal distribution (Graph 11). What we see is dramatic possible fluctuations in the default rates. What this says is that once we settle on mean default rates, at least when we are thinking about risk, we have to make provisions for substantial deviation from those default rates regardless of how well you underwrite the bond and regardless of how diversified you are. There is this underlying economy risk that you can't get away from which is dramatic.

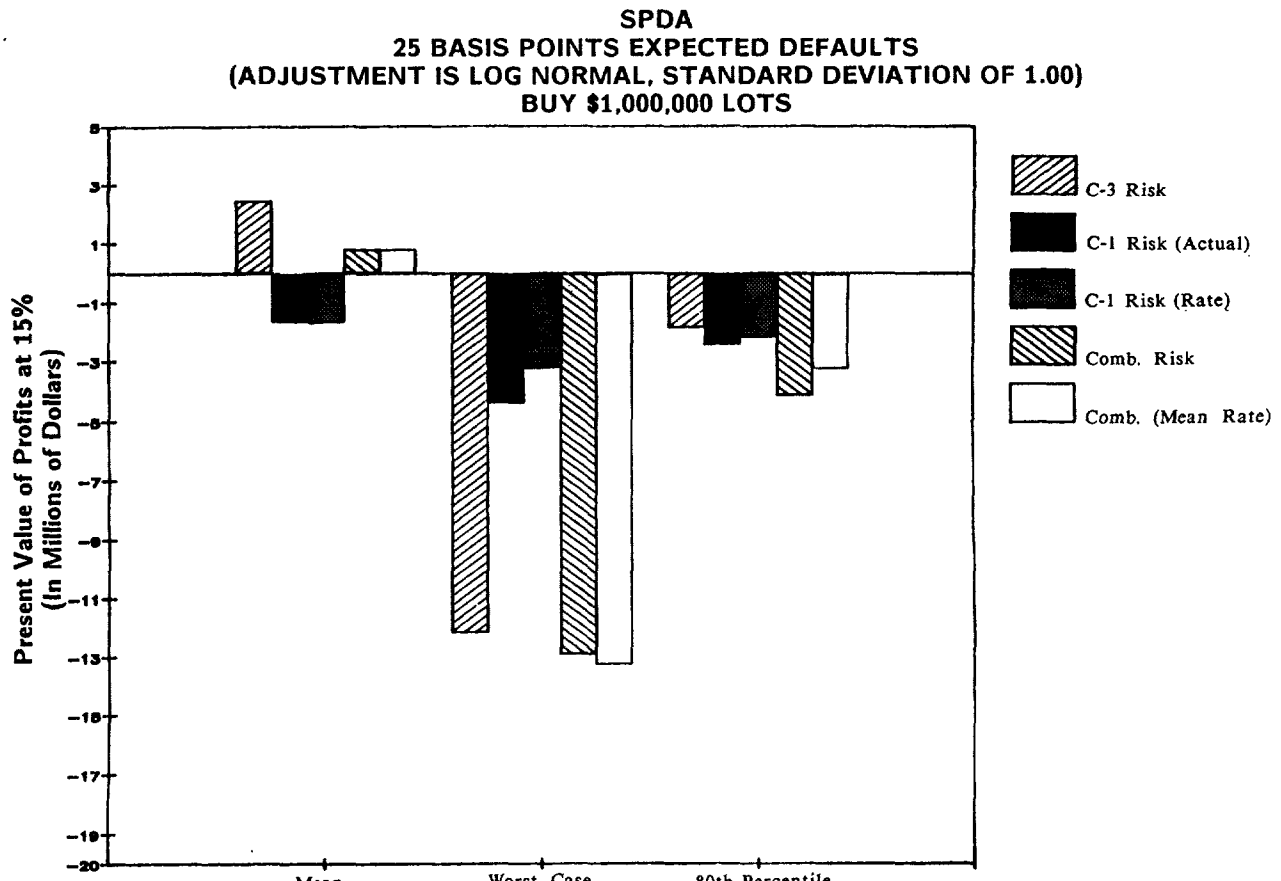
All these examples we have seen have been with 25 basis points of defaults. The other thing I wanted to look at is what happens with really high default rates like 250 basis points (Graph 12). One of the interesting things is that you have about the same amount of fluctuation from mean to worst if you are at a 250-basis-point default rate, but $2 million fluctuation in these defaults is not nearly as significant, relative to the expected default.

The diversification issue is much less significant as you start getting up, within reason, into the high-yield securities. The real critical issue there is how good a job you are doing underwriting the securities. A good evaluation of the default risk is far more critical than how diversified you are. Obviously, you don't want to have ten high-yield securities. A portfolio that small would be subject to incredible fluctuation risk, but within reason, I am not finding that

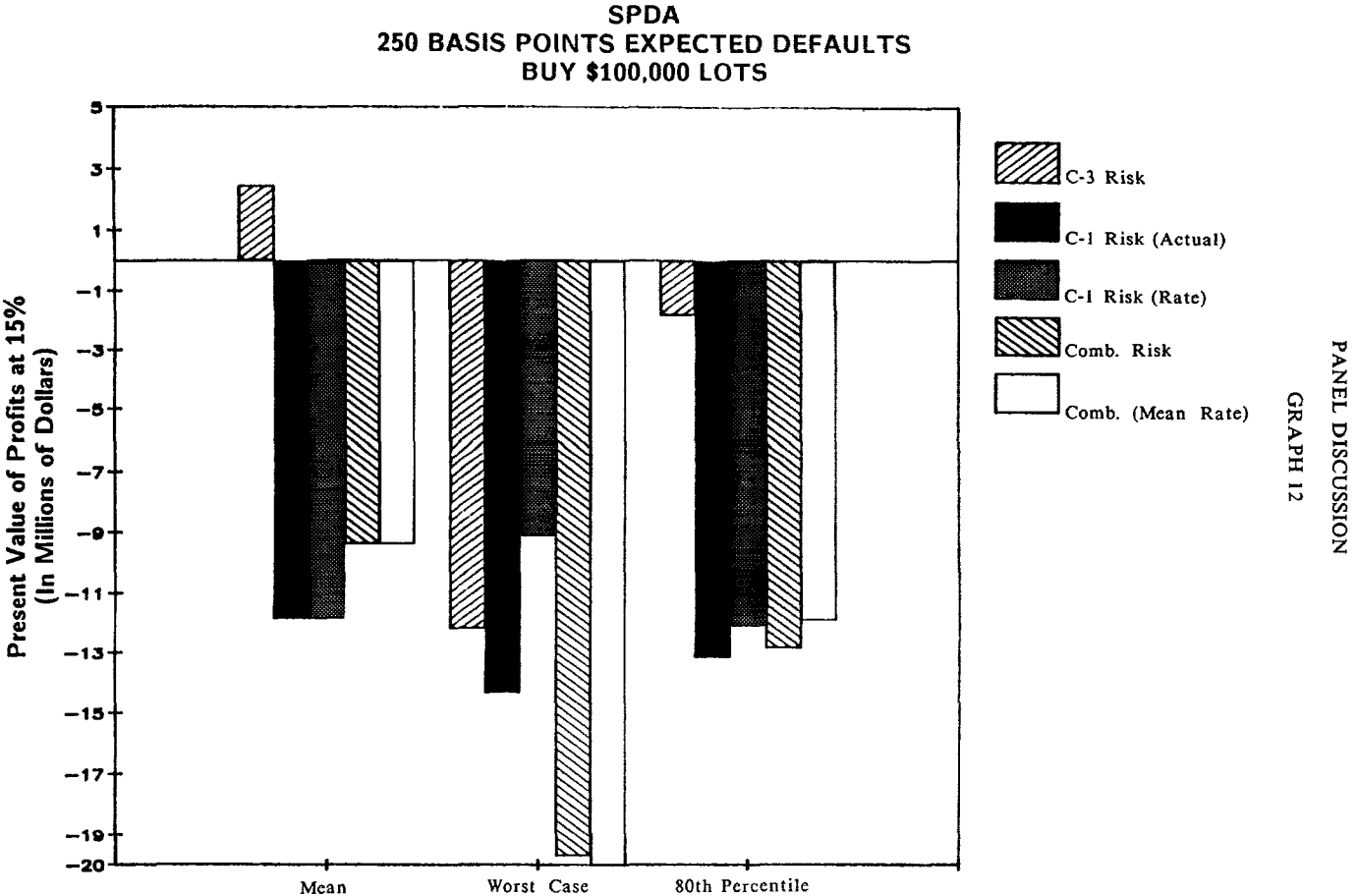
GRAPH 10

SPDA
25 BASIS POINTS EXPECTED DEFAULTS
(ADJUSTMENT IS LOG NORMAL, STANDARD DEVIATION OF .35)
BUY $1,000,000 LOTS





RISK AND RETURN
GRAPH 11


SPDA
250 BASIS POINTS EXPECTED DEFAULTS
BUY $100,000 LOTS
Present Value of Profits at 15%
(In Millions of Dollars)
5
3
1
-1
-3
-5
-7
-9
-11
-13
-15
-17
-19
-20
Mean
Worst Case
80th Percentile
C-3 Risk
C-1 Risk (Actual)
C-1 Risk (Rate)
Comb. Risk
Comb. (Mean Rate)

diversification is as critical as evaluating that expected default risk. Again, with high-yield securities, even more than with the investment grade securities, what you believe about economic scenarios becomes critical.

The biggest issue we have, and really the reason I thought it would be so useful to have Irwin and Mo speak to us, is because no one really has a good handle yet on what the right default rate assumption to make is. We have made a lot of progress just in the last two years. Prior to about 1987 or 1986, there was an unbelievable shortage of data in this area. I've heard at least one person comment that for a long time the respect with which the investment community treated data on asset defaults was criminal. There has been a tremendous shortage of data and we are only now starting to get some interesting studies. In addition to Asquith which we mentioned, Moody's did a really interesting study fairly recently which I would recommend to anybody who is interested in this area. That was the best of the studies I have seen. Asquith's was very good. I thought Moody's was slightly better. I saw some of Irwin's earlier work, but I haven't seen the stuff that he is going to be putting out soon. I am sure it will be interesting.

A lot of people have been talking about interaction between the interest rate risk and the default risk. We are so far from having a good handle on the default risk, at this point it doesn't seem to make sense to do an elaborate model interacting the two like I was trying to do. What makes more sense is to do some default analysis with elaborate default models and do interest rate analysis with elaborate interest rate models. Then add the results, because the interaction of the two doesn't seem to produce much offset. There is a little bit of offset depending upon what you believe about the interrelationships between the two, but not much.

The other thing is that if you are buying investment grade securities, default risk and credit risk is an issue, but if you are buying a lot of high-yield securities, default risk and credit risk is the issue.

MR. GARTH A. BERNARD, SR.: Mr. Vanderhoof, you mentioned that the correct way to determine a risk premium on the high-yield bonds was to use a double decrement methodology. One of the decrements is the default rate. I don't think I got the other one.

MR. VANDERHOOF: One is the default rate, the other is the distressed exchange. The data is inconsistent. The Hickman data which was from 1900 to 1943 defined default as either a failure to pay interest or principal on time or an exchange forced by the creditor. That same definition was used by Atkinson in his updating through 1965, but subsequently the reporters Hill & Post and Altman have used only the first part. Default in the later years has only been that they didn't pay interest or principal on time and they have ignored the distressed exchanges. This is basically when a company comes to you and says, "Do something for me or I am going to slit my wrists and get your rug dirty by declaring bankruptcy." The proportion of distressed exchanges is basically consistent, compared to defaults, between the Hickman data and the data shown by Asquith and First Boston, at something like one quarter of the amount of the defaults. Those are two decrements. If you assume there is some difference in the loss on account of a distressed exchange as compared to a default, then you have two decrements and you have a multiple decrement table with the rates increasing with duration and that's the way you do an annuity.

MR. BERNARD: The distressed default was basically refinancing?

MR. VANDERHOOF: Yes, if they come back to you and say they can't pay the interest, you'll have to refinance. There are a lot of those going around. They don't get as much publicity as defaults because it is not an actual bankruptcy. I would like to throw in one thing however, on investment grade. They say on investment grade, "Don't worry." I say on investment grade, "Worry." There is something called event risk. RJR was an investment grade bond. Then they did the leveraged buyout and all of a sudden all of your investment grade bonds were junk bonds. I have one client who makes a practice of not buying investment grade bonds. They buy mortgage-backed securities or junk. The reason is, if they buy junk, at least they get paid for taking the risk. If they buy investment grade bonds with inadequate protective covenants, they're not being paid an additional risk premium and yet their bonds can be turned into junk at the discretion of the management.

MR. DEAKINS: I'd just like to add two things to what Irwin said. One is that I hope that the market is going to see more protective convenants. I think that the market is going to start

demanding them. The second thing is to clarify that I did not mean to say you should not worry about defaults or downgrades on investment grade, but rather to emphasize that if you have a lot of junk, defaults take on overwhelming importance, so that investors in high-yield bonds should study this issue carefully.

MR. CHRIS G. SICARAS: With respect to the papers that have been widely disseminated and quoted, the Asquith paper based the calculation of default rates on the amount of securities originally issued and on the original high-yield issues of 1977 and 1978. The default rates exhibited in that Harvard paper were quite close to the ones Altman calculated, which led me to conclude that Altman had not adjusted his exposure for calls. I think the yield calculation of the effect of calls can be done in a number of ways. One way is to do it through a present value of the cash flows. I was intensely interested in this and did something very quick and dirty. I concluded that there is lost yield due to the existence of calls, which if the money were reinvested in another high-yield instrument puts you at double jeopardy of having a default. The lost yield was in the range of 25 to 35 basis points which is no more than a preliminary result and may not be as serious as it might have been. But nevertheless, I think the fact exists that the call risk on high-yield bonds is a different type of risk than the call risk on investment grade bonds. This is particularly illustrated by the issues of 1977 and 1978 which, as I recall were issued with coupons roughly in the 12% range and were presumably not called because of a drop in interest rates.

MR. VANDERHOOF: I'd like to make my feelings in this quite clear. I'm a big supporter of Ed Altman. Ed Altman was out mining this whole area and compiling data when nobody else was bothering with it. Now that he has been at it for 15 or 20 years, the guys from Harvard come in and say they are going to do it, and Moody's is going to do it, and Data Resources, Inc. (DRI) is going to do it. I don't think he can be criticized too much for his methodology. Basically, he said let's look at a particular class of bonds, let's say all the initial B-rated bonds in my data base. Let's take all the defaults in the third year, that's adding all the cohorts together. Let's divide by the average of the amount of such bonds outstanding at the beginning and end of the year. All right, if bonds were called then they are out of the base. Now if you take those default rates and string them together, I think you should get something corresponding to the defaults in the Asquith study. To me the most important and interesting thing is that if you take bonds outstanding for 15 years, and the Asquith study, the Altman study, and the Moody's study basically show the same pattern as the Hickman study, which means tremendous continuity of economic results over a period of 80 years. It's not split into different periods.

MR. BRUCE E. NICKERSON: Just a couple of observations. One of them follows through on Irwin's comments about the application of actuarial science. The questions I've heard addressed in certain areas seem to bear a remarkable similarity to the issue of if you issue a number of ten-year term policies, what is the probability that there will be a death within the term? Most of us have found it much more useful to calculate the period-by-period, year-by-year rates of decrement because we find them a lot more useful in doing our calculations rather than in looking just to the initial and the number of decrements total from a given cause. A second thing that struck me rather strongly from Irwin's presentation is that to model defaults security by security on a toss of the die, using just an independent distribution, seems to be a rather bad model because they seem to come in very real correlated clusters. You get in fact, a lot more variance in your results than would occur if you use some sort of a binomial or Poisson distribution for your modelling or just randomly draw.

MR. VANDERHOOF: That happens to be correct. If you assume a constant rate on bonds at a Poisson or a binomial distribution, with a large number of bonds in the junk bond universe, let's say 500 or 700, you get a variance which is much lower than is actually observed over the last 20 years, which supports the statement you made.

MR. NICKERSON: The other observation is that if we are looking at using securities to meet future objectives and we are anticipating potentially significant, out and out predictable variance in future yield curve scenarios, then in the case of these junk bonds, it seems that we probably get a double whammy in achieving our results. That is to say that if we have a material change for the better, or lower interest rates, then all of those companies that issued junk and are in reasonable shape will call even leaving aside the issue of intended calls. If on the other hand you get the material change in the bad direction, then quite plausibly your default rates go way up. The ones you are left with, which don't default, certainly don't call, but again the expected variance of your results becomes a lot higher than just doing analysis under a narrower or

constant interest rate scenario. The expected variance from the constant rate result on the junk bonds would probably be a lot higher than it would be on the investment grade.

MR. VANDERHOOF: It may or may not be higher in the variance, but the thing that you have left out of the analysis you just stated is how much you're being paid. If I'm being paid 200 basis points for taking a junk risk, that does not seem very attractive to me. If I'm being paid 500 or 600 basis points on an otherwise unappetizing risk it may become delicious.

MR. ALBERT V. SEKAC: I'd just like to share something that I heard at a Life Office Management Association (LOMA) meeting in Boston a few weeks ago. There was an asset default presentation at that meeting and the presenter established that the level of default rates is most highly correlated with the state of the economy. Well this has two implications that I would like to hear some comments on. First, the default risk is really a catastrophic risk in nature and second, diversification really becomes meaningless in this context.

MR. VANDERHOOF: Who established that there is a relation between the default rates and the state of the economy? I tried to do it and I couldn't. Tillinghast tried to do it and they couldn't.

MR. SEKAC: The presenter was Mr. Barry from Aetna Life and Casualty.

MR. DEAKINS: Well, regardless of whether we can establish that it is highly related to the economy or not, and I don't know, I think it is pretty clear that it is a catastrophic type of risk. I think you're right about that. While it is important to diversify enough so that just straight binomial risks don't do you in, the more important issue is the economic scenario, whether it is strictly the GNP or it is something more complex. I, like Irwin, have noticed that any time you look at that data you notice it jumps up more than would make sense for the bonds to be unrelated. There is some sort of catastrophic risk, which is what I was trying to get at with those economic scenarios and the simple analysis that I was doing. Somehow we have to bring that into play; if not for evaluating the expected returns, we have to, at the very least, bring it into play when we are deciding whether or not we are holding enough surplus or reserves to make sure the company will survive.

MR. SACIRBEY: There is also, I think, a third type of catastrophic risk, if that is what you want to call it and that's related to legal items. Regarding changes in regulatory and legal conditions, some of the things that have happened in the last few years (again Johns Mansfield as a good example), were prompted by the change in the bankruptcy code in the late 1970s. Companies found that they could use the bankruptcy code and other legal measures to result in a bond default to basically pursue business battles with either third-party claimants, in some cases, regulators, or in some cases, creditors.