

3/28/12 CDIAC Webinar Transcript- Risk Management

Slide 1 CDIAC Introduction Slide

Good morning, this is Mark Campbell, Executive Director of CDIAC. We welcome you to the Investment Structure and Risk Management of the Public Investment Portfolio Webinar. CDIAC has taken the opportunity to use webinars as a way to provide more focused training on topics related to debt issuance and investment of public funds. Unfortunately, we have concentrated most of our efforts on the debt side. This seminar will give us an opportunity to address another aspect of our portfolio, which are investments. We know that in this current yield environment there may be opportunities or a desire on part of public agencies to maximize their yield in the marketplace, and as they do, we want to be sure CDIAC focuses on the risks that are still present in this investment environment, irrespective of the yield that may be achievable in today's marketplace.

This seminar is going to give us an opportunity to reiterate those risk factors, and to remind public agencies of the role that risk plays in making investment decisions. With that I am going to cut short any other introductory comments, since we are starting a little bit late. In additions, I want to acknowledge this is our first time using the "GoTo Meetings" Webinar platform. If we do have any technical difficulties through the course of the webinar, I want to apologize for that in advance. We are certainly still learning the dimensions of this application.

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Chairing our panel today is Debbie Higgins. She is the Founder & President of Higgins Capital Management. Deborah has worked with public agencies and clients for over 27 years. Mrs. Higgins has 17 years of training for Higgins Capital. That being said, Debbie will take over now and introduce the rest of the panel members.

Welcome everyone. CDIAC has put together a wonderful set of presenters with extensive experience on this topic and each presenter has worked with public agencies in the fixed income arena. So with that I would like to take a minute to introduce to you the three presenters which are Nancy Jones, Sarah Meacham and Ray Johnson.

Presentation Opening Slide

Nancy Jones is a Managing Director of Public Financial Management, in the Asset Management Division. Public Financial Management is an independent investment management firm; it is not a broker dealer and they have been giving investment advice and portfolio management exclusively to public agencies, since the firm was formed back in 1980.

Sarah Meacham is a Senior Managing consultant at PFM. She's been working with Nancy for the past seven years and both of them have an in-depth understanding of all aspects of investing public funds.

We also have on the panel today, Ray Johnson, who is the Fixed Income Specialist at the San Francisco office, of Bloomberg Analytics. Ray is responsible for client training on a wide variety of advanced fixed income products. More specifically, Ray has a significant working knowledge of government agency, corporate, municipal, mortgage, derivatives and money market securities. In addition, Ray will demonstrate Bloomberg's tools to evaluate each of these markets on a macro level and will explain when to focus on the relevant value of individual security.

The objective of today's webinar is to focus on the risks you face with the day-to-day management of your investment portfolios, and how to mitigate those risks through sound risk management policies. This morning's panel will discuss with you, what you need to be thinking about when managing risk, such as, establishing guidelines and benchmarks, how to manage your interest-rate risk, call risk, call options, bullets versus callables, callables and durations, and step ups and credit risk . Then finally we will look at ways to monitor default and market value risk.

With that I will turn it over to Nancy and Sarah to begin the presentation.

Slide 1

Good morning, everybody it probably doesn't come as a surprise to everyone that in the investment arena there are lots of risks and I think for a while we were all worried about falling interest-rate risks. Now, I think we are worried about rising interest risks, callables, corporate, mutual funds, step ups and so forth. Sometimes it seems like there are more questions than answers however hopefully today we will help you learn how to identify the risks and mitigate them with your own portfolios.

Slide 2

The risk of not having a plan is a risk in itself and often overlooked when people talk about risk. You should be seeing a picture of the San Francisco Bay Area. As you may know, when you start a trip out of San Francisco you have to know where you're going. You are either going to go north on highway 101 and go up to San Rafael, take the I-80 east going over the Bay Bridge, or take highway 280 and go south. The point I am trying to make is direction is very important in the same way with your investment portfolio as you have to know what the purpose of your portfolio is. We know that everybody has a policy, but often it is not clear what they want the portfolio to do for them. Some people always want to buy the highest yielding securities while other people would like to grow the value of their portfolio, so people do pay attention to the total rate of return. Others really want to target their interest earnings. However, you manage a portfolio depends on what you want the portfolio to do, and depending on that factor, you will also have different kinds of associated risks.

Slide 3

Here is an example of the risk of not having a long-term investment strategy. When interest rates began to fall in 2007 and 2008, it seemed a lot of people started to worry, especially when the rates dropped lower into 2009, as there was no reason to be buying anything, other than putting all of your money into the Local Agency Investment Fund (LAIF). As you will see that was a period of time when LAIF had a higher yield than a two-year treasury, so there was really no good economic reason for investing your money in treasuries. However, if you have a plan for your portfolio that said regardless of where rates go I want my portfolio to have an average maturity of say 1 1/2 to 2 1/2 years, you would have had to do something very different. For example, you probably would've bought two and three-year investments as the red arrows show over the holding period. If you had a plan in place similar to my previous example your results would have been better. That being said, it does take courage and in some instances it might be considered risky to buy a security that has a yield that is lower than LAIF, although it is little counterintuitive.

Next you see a green line with boxes on it is an example of a portfolio that had about a 1 1/2 to two-year average maturity throughout the last five or six years. What you see is that over the holding period, the portfolio that had a plan, and was disciplined into sticking to it, did better than any portfolio that did not have a plan.

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An important component of managing risk is to know the types of risks, and how much risk you are willing to take. This is one of the reasons that using benchmarks for comparing your portfolio to other portfolios is not a good one. Some people might be willing to jump out of an airplane, while other people might want to be tethered by a bungee line, and other people would rather take a walk down the block however, these scenarios all have different risks.

Slide 5

So one of the things you can do is manage your risks by establishing guidelines, and it is important that you write your guidelines down. When I am at seminars, I always ask people, “What do you think interest rates are today?” Or “what you think they will be tomorrow?” Then I always ask them to write down their answers. So once you've written it down on paper you have in essence committed to it.

Everybody should have a policy because it used to be required by law and I believe it still is. Many policies just mirror the California Government code, however you will see policies that have 30% corporate, 40% in Banker's Acceptance (BA), and perhaps 25% in commercial paper, unless you are a county. The difference between a policy and a guideline is that you actually write it onto a piece of paper. For example, you may write a policy like; you don't want more than some percent of your fund invested in any securities other than treasuries or agencies. Another example would be that your policy states that you want to have no more than some percent in any one issuer. In addition, the policy may only allow 30% corporate but I won't allow more than 10% in any one corporation under the corporate section, or I don't want to allow more than 10% whether it is bank Certificate of Deposit (CD), BA, commercial paper, or corporate note. Another consideration is considering whether you want the target average maturity, target average duration or just a target maturity bucket. So my point is that you always want to write it down.

The last point I want to make is measure how well you have did at achieving your goal for the purpose of the portfolio. Work within your guidelines, (and you should do this every quarter) to help you manage the risk and manage of your portfolio.

Slide 6

The next few slides are just examples of the ways we have seen people monitor their portfolio guidelines. Here is an example of a portfolio that has target maturity buckets, which is shown in blue. If you look at it carefully, between what is liquid and what's going to mature in the next six months they've met their needs shown in green for July 1, 2012 to December 31, 2012. This is an example of how you can look at your own targets and see how your portfolio is doing so that you can explain it to others.

Slide 7

Ever since California Government code required people to review their portfolios at least once a year, people began to use benchmarks and look at total rate of return. Here is an example of a 1 to 5 year US government corporate index, and if you were to shut your eyes and not look at the pie chart you might expect the percentage of corporates to be higher than it is. However, if you look at the left side of the pie chart in the yellow you see that there's only 17% corporates. The portfolio in fact has 63% US treasuries in the portfolio. That means, if you want your portfolio to perform like a one of the five year US government corporate index, your portfolio should look like this.

Slide 8

The last example I want to share with you has to do with securities. In this example, if you have a portfolio that you want to compare to something in the 1 to 3 year area, your portfolio should be invested in one of the 1 to 3 area as indicated in the dark blue bars on this chart. On the other hand if you want to have a portfolio that is compared to a 1 to 5 year benchmark, then your portfolio needs to be out in 3 to 4, 4-5 year area that is shown here by the light blue bars.

Slide 9 & 10

The most common types of risk that people in the high-quality fixed income area deal with are interest-rate risk, call risk and credit risk and Sarah is going to talk about interest-rate risks.

Slide 11

Starting with interest-rate risk, it's the risk that the investments value will change due to a change in interest rates, the shape of the yield curve or the spread of that investment to other sectors. Most of time we look at the spread of agencies to treasuries, then the corporates to treasuries as there is an inverse relationship between interest rates and price. Here we have an illustration of that with the chart at the bottom of the screen. Again, as interest rates rise your price will fall and as interest rates fall your price will rise.

Slide 12

The real reason we care about interest-rate risk is shown in this example, is if you are investing in this yield curve today and the yield curve rises, your concern should be the foregone income, which is the difference between the yield yesterday and the yield today, as shown in the shaded area between the curves.

Slide 13

Interest-rate risk can be managed by being aware of the measure of interest-rate risk in your portfolio, and the way we measure interest-rate risk is duration. Duration measures the percent change in the bond value as the yield changes, while interest-rate risk increases with increasing maturity which is shown on the chart at the bottom of the page. Here you see that a one-year investment for a 50 basis point rise in rates, on \$10 million you would lose \$50,000 of value and that increases as the maturity gets longer.

The reason you can control your risk is by knowing that if it makes you nervous to think that you are going to lose \$250,000 of interest with rates rising half a percent you should not be investing in the five-year area.

Slide 14

One of the things we wanted to talk about today is that there are multiple ways to structure your portfolio in order to get certain duration and Ray is going to talk about how the different structures are affected differently by the same change in the interest-rate environment.

Thank you. The two most common structures are simply stated, a ladder structure and a barbell structure and you will hear these terms referred to a lot. A ladder structure, which I think in terms of

trying to mimic the rounds of a ladder is basically where you are trying to spread out your maturity equally over the period of the yield curve you're investing in. For most municipalities is out for five years. As interest rates move up and down you are not particularly exposed to any one portion of the yield curve, however the idea of duration as being a measure of the risk, or how much your portfolio will gain or lose as interest rates change is commonly accepted. If you define it a little bit more you can examine duration and look at what we call partial durations, which shows you exposure to each portion of the yield curve. If you add up your duration to the short end of the curve, say to the two-year sector or, to the three-year sector, and so on forth those partial durations add up to the duration of your entire portfolio. How you manage those partial durations or more simply stated what sectors, what maturity sectors you choose to invest in, your fixed income securities can have an effect on the total return of a portfolio. It's not always intuitive because when we look at the effect of a portfolio, whether it gains or loses money. So, typically we do an interest-rate shock, a parallel rate shock of 50 to 100 basis points up and down. When we do that, you don't really notice the difference in structuring your portfolio between a barbell or some sort of structured portfolio versus a more common ladder portfolio. However, interest rates and practice almost never move in a parallel basis over time.

Slide 15 & 16

When we talk about flatteners we are referring to when interest rates are rising, usually at the short end of the curve and will rise a little faster than the longer end of the curve in any usual environment you can structure barbell securities where by using cash, and some longer dated securities you can achieve the same duration and then as interest rates move, your total return to your portfolio will in all likelihood have outperformed the laddered portfolio.

It was very interesting to see that if you have a laddered portfolio and the yield curve changes, you can see the impact or difference it has on your portfolio.

Slide 17 & 18

With any portfolio, Bloomberg has a lot of analytical tools. Simply stated and as discussed in the previous session we did back in February, on Duration Calculations. For those of you that participated in that session, we spent a lot of time showing you how to use analytics to evaluate securities in not only static environments where we just looked at yield, but to get away from a static environment and look at securities out how they roll down the curve, and how they perform over a variety of a different interest-rate scenarios.

Ray, I have a question for you on the barbell strategy:

Question: When you've got it, what are you trying to do with securities skewed to the short end and then securities out to the long end?

Answer: Ideally what you are trying to do is minimize your exposure in areas of the yield curve where you have the most movement in terms of basis points. So if the Federal Reserve were to announce a different monetary policy, such as was announced yesterday for instance you would see a reaction in the short end of the curve where in all likelihood 2 year notes and shorter would go up a significant amount of basis points relative to a 5 year notes. So we enter into a market where the Federal Reserve is contemplating tightening in the near future and you see yields on 2 year notes go up much more than yields on 5 year notes. This is typical in a "bear market" where you would want the barbell strategy to minimize the exposure you have in those securities, which is why you want to buy 2 year notes when you know interest rates for instance are going to go up, perhaps 100 basis points in that sector, versus 25 basis points in 5 year securities. So you would typically overweight

in five years and over weight in the short end of the curve in money markets, in order to achieve the same duration. Is that clear are you following that?

Yes, thank you

Going back to this particular slide of an analytic in Bloomberg, as you can examine how individual securities perform in a variety of interest-rate scenarios, you can take a portfolio security in the analytic and in effect it just aggregates the performance of the individual securities and shows you how your portfolio as a whole, will perform under an environment. In this slide I am illustrating a very simple strategy here between what happens if the yield curve were to flatten and in this example I moved to money market securities up 100 basis points, 2 year notes up 75, excuse me year bills up 75 basis points, 2 year notes up 65 basis points, 3 year notes up 35 basis points, 4 year and 5 year notes up 25 basis points. So essentially I was modeling the flattening curve that Sarah had an earlier slide of and you can see in that environment the return for the two portfolios are not equivalent. You lose over twice as much money with the laddered portfolio versus the barbell portfolio and that's because you have exposure, which is your own securities in sectors where interest rates are going up significantly.

An interesting point to note about this chart is I think a lot of us work with hindsight and these tools that Ray is talking about help you. They help you know what will happen to your portfolio under any kind of scenario that you want to test and later in the presentation we will talk a little bit about how you might guess at which scenarios you want to test. So because we are talking about risk it might make you think that you never want to belong, but there are instances where buying long-term investments makes more sense and it does make sense right now because the yield curve is quite steep like the example on page 18. This is a chart of the federal agency yield curve as of the end of last week and we put the relevant numbers on there, but what you would want to do is think maybe I want to go out four or five years, and how do you know if that is something that you want to do and you would be able to do a break even analysis between a 4 year today or a 2 year today and we will walk you through what that looks like.

Slide 19 & 20

Subsequently, if you decided to test the 4 year against the 2 year, you would start by calculating what you would earn on the 4 year over the next four years, which would be \$90,000 every year for on \$10 million investment which is a total of \$396,000. Then you compare that to the 2 year, which you know you're going to earn \$ 45,000 on a \$10 million investment for two years, but you don't know what you're going to earn for the last two years or in total. So you test it, and what you want to do is to say well what if rates rise 50 basis points, am I still ahead buying that 4 year today and as it turns out, you are because your final 2 year investment you would earn \$95,000 on a \$10 million investment for the final two years for total earnings of \$280,000. Then you perform this analysis let's say two more times with an interest-rate rise of 75 basis points giving you total earnings of \$330,000 because you are able to buy a 2 year with the yield of 120, again with a 1% rise which gives you total earnings of \$380,000, because you can buy the new 2 year agency yield of 145 and it shows you that in any of these scenarios you are still ahead. Do any of you have those numbers in front of you, the earnings?

Yes, the next slide on a 50 basis point increase you are still ahead by \$116,000, on a 75 basis point increase you are still ahead by \$66,000, and on a 1% increase you are still ahead by \$16,000. So this is such an easy "back of the envelope" way to help you make a decision. So you just have to know what you think interest rates are going to rise by say 50, 75, or 1% or more and how do you do that?

One of the ways that we used to do that was looking at which hand Greenspan was carrying his

briefcase in, was at the left hand, or was it the right hand, but now under the Federal Reserve with Bernake we are getting a little bit more clarity as now that the Federal Reserve members are voting on where they believe the federal funds target rate should be at each of these year ends. And all of the 17 members believe that the federal funds target rate should be 1%, or under in 2012, and I think 14 of those actually don't think there should be any change by the end of the year. So on this slide each dot represents the votes of one of the Federal Governors, and what I think is interesting for 2012, is of course nobody thinks that interest rates are going to be up over 1 %, one of the 14 of them thinks the rate is going be up over .25 %, and even when you go to 2013, 14 of them still think those rates are going to be under 1%, and in 2014, 11 out of 17 think still think they will be under 1%.

I might add a little bit of an aside note, if you look at an economy that has experienced tremendous real estate collapse, say if you look at Japan of 15 years ago, note that they still have sub 1%, 10 year notes, GGB's over there and they have been through I believe many, many, cycles of quantitative easing. So, there are scenarios where interest rates can stay low for a very, very, long time.

Slide 21 & 22

So that is interest-rate risk, next where going to talk about call risk which is a risk that an investment will be called prior to its date of maturity. These securities typically offer a call risk premium, which offers a higher yield because as an investor you want to be compensated for the risk that the bond may be called or the uncertainty of whether or not it will be called. The issue is usually with a federal agency, such as Fannie Mae or Freddie Mac federal home loan banks they always exercise their call options, so to you the investor it is a disadvantage. So, you can tell by the direction of interest rates whether a callable security will get called. If rates rise, your call option will probably not get called because the issuer has issued a security and is paying below market rates, however if interest rates fall they will exercise the call option because they will want to take away the higher coupon, and reissue at a lower rate. So the result is that in a rising interest rate environment you end up holding your callable security to maturity or the next call date, depending on where interest rates are at that time. In contrast in a falling rate environment you always have to reinvest at lower and lower yields.

Slide 23

There are several different types of callable securities, this is why non-callable or sometimes called bullet securities looks like. These are different callable structures such as a continuously callable or callable anytime, there are specific dates, or there are one time calls. Also, there are callables where the coupons steps up and we typically just call those step ups.

Slide 24

On this slide we are showing you where bullets versus callable yields have been over the past 10 years as we wanted to take a historical look at what you would have earned on a callable versus a bullet, and as you can see it is not a favorable environment for callables. So, if you bought a 3 year callable in 2002, your callable security would have been called at almost every six month call date over that time period, and you would have had to reinvest multiple times and would not have earned the average yield of 2.8%.

Noticeably the only time it did not get called is when rates were at the bottom of the yield curve, and then rose significantly over that period. So, as an investor owning a callable security you would

of had to own the underwater security for three years, and then if you look at what would have happened had you purchased the bullet investments over the same time period, you would have only had to reinvest three or four times while earning a yield of 3.49% which I believe is 61 basis points higher. Furthermore, over a 10 year period the amount of interest is \$610,000, (earnings on a \$10 million investment), and notice that the dark blue line with the yellow stars, in every instance you started with a bullet that has earned less than a non-callable so when you are trying to make a decision on earning the highest yield in your portfolio you have to think longer than at which you buy it

Slide 25

When you are managing your portfolio maturity distribution, you do need to be aware of the effects of callable securities. A lot of public agency investors expect their bonds to get called, and they are okay with the bonds being called, because for them it provides cash flows. So, if you look at your portfolio and assume that all of your bonds will get called on the next call date, and say you have a portfolio with a duration of 1 1/4 years, and that would look like this, but as interest rates rose then your maturities would be extended, and you would actually end up with a duration of 2 1/4 years and so the duration on your portfolio would have extended a whole year. So what is really important here is that if your bonds were called you have no maturities in the 3 to 5 area, so if interest rates rise you are going to have 40% of your portfolio locked up for more than three years.

Slide 26

There is an analysis you can do on Bloomberg depending on when interest rates rise to see how well this will affect your duration, and what you are looking at is a little snapshot of our yield analysis screen that we are trying show the effect of poor convexity associated with the callable securities and show how this impacts your portfolio. So, we are looking at callable securities and typically you would by this at par, the yield is 1 1/2% if you look at the top right-hand corner where we circled OAS, or effective duration, or option adjusted spread direction duration, which is what Bloomberg calls it, and you'll notice it is approximately 1.85 years as compared to four years to maturity, or it would be six months if you were looking at it to call, however effective duration is the best measure. Furthermore, and what we are trying to illustrate is if you look down to the bottom portion of the screen, to the yield analysis you will see we just modeled interest rates going up to a relatively benign 50 basis points. So, if we look at the effective duration of your security with a significant move in interest rates you notice that it is over double in terms of effective duration. So, although you thought you had a relatively low risk, or not a particularly risky security in terms of how it's going to behave with upward interest rates and you only look at it as a static investment, you might be surprised when interest rates rise even just marginally as you end up with a portfolio that is much more sensitive to higher interest rates.

This goes back to the slide that we showed earlier with the red bars, when I said if you are not willing to lose of \$250,000 or if you have money in a five-year investment as indicated here, your duration triples and you have just taken on three times the amount of interest rate or market value risk. As we said before, the reason all of this matters is it is really your market value of your portfolio as you are risking the foregoing interest that you could get in the future.

This is Debbie and I want to ask for the audience's sake, what kind of structure are we looking at in this illustration? Is this Fannie 1 1/2, and what kind of call structure is this?

Debbie, it is a five-year non-callable, with either a three-month or six-month call option, and I apologize for not knowing the exact date, but the behavior of the security is going to be the same for the most part whether it is a three month, six month or one month call. However, the shorter the call

the probability the behavior of convexity will be worse.

The main point of this was we wanted to show what happens when you have a continuous call after the lockout. In addition, all of these risks that we have discussed can be managed, and one of the real messages I would like you to take away is that we recommend you put a percentage limit on your portfolio such as what percentage of your portfolio you are going to allow to invest in a callable security and earlier when I spoke about having a plan and guidelines, stick to them as I can assure you that if you have guidelines and they state you will not allow more than 25% or 30% or 10% (whatever you pick of your portfolios) be invested in callable securities, and the next time you are offered a security and the yield of the callable is significantly higher than that of any bullet, it is going to be difficult to turn down that security. So this is one of the key components of managing your risk. In addition, when evaluating securities, if you are simply going to evaluate yield on your security without taking into account potential interest rates as a scenario, you are going to end up with a bunch of callable securities in your portfolio. And this slide illustrates the underperformance of the callable security over changing interest rates which is going to mimic your portfolio, so it is not simply a price yield analysis, but a price yield interest-rate sensitivity analysis, that will aid your security selection.

Slide 27

So in order to manage this you can limit the percentage of callables in your portfolio and use different call structures. We have showed you the six-month call, the quarterly call, the continuous call, so vary them and use different issuers. Then evaluate whether or not you are even being paid enough, even though you are getting a higher yield, are you getting paid enough interest to take that risk. In order to answer this question you should look at the option adjusted spread analysis, (which Ray is going to talk about) but note that your broker can give you this information if you need it, but the key is in your input because you can have very different results depending on what you input.

Slide 28

Here is a very widely used option adjusted analysis screen that a lot of Bloomberg clients use to evaluate callable securities, and without putting everybody to sleep about the details, the mathematics behind the formula I really want to focus your eyes on the top three boxes that are the input boxes that we've circled in blue. As you can see the price being 99-16, the volatility is being 51.29 which is a black ball, and the resulting OAS spread which is an option adjusted spread that you can think of as a credit spread to an underlying curve being the 4.99 rate.

So you can see the analytic applies an interest-rate model and effectively strips out the embedded value of the option which you can see right underneath the volatility number as being 1 ½ points the value of the option, so we are effectively short and as in this case Fannie Mae has the right to call your bond.

So the key to a good option adjusted spread analysis is knowing your inputs however, one of the key inputs is not only price but the curve your benchmarking it too. So a negative 50AS would be horrible to a government curve and it is probably not too bad to a Fannie Mae curve and is certainly in the ball park by not paying tremendously for the security, and is very attractive to the swap curves. But then you have to know what curve you are actually evaluating your securities to, and you also have to know the volatility assumption which is another key input. So on the following slide we have not changed the price input, and we haven't changed the base curve you are evaluating the security to, all we simply did is change the volatile input to the widely used 14%, or 51, and by the way that volatility comes from the actual observed swap options volatility market. So a lot of times when Fannie Mae and Freddie Mac agency issue bonds they actually approach a swap desk in one of the street firms and they actually swap out the security to some sort of floating rate

instrument, say LIBOR let's say between 25 and 30 basis points so you know that's the volatility that's driving the swap and driving the callability.

What you will see by using a different volatility assumption you get a much different story, and the bond effectively cheapened up in terms of credit spread by 30 basis points. So once again it is important to know your inputs in terms of how you are evaluating the security, different assumptions on callability and these will lead to several different decisions.

Ray, my thoughts on something like this is that a broker can easily give you this information to you, but if you're going to rely on the OAS you will definitely need to learn more about the volatility figure because you go from maybe not buying this security, to probably buying it, just based on an arbitrary number somebody puts in there you should know how the number is derived.

Slide 29

So in terms of yield to call, versus yield to maturity is when you are looking at different yields for different securities and this slide is meant to illustrate the yield call call versus the yield to maturity and is actually just saying that you know, you might buy a step up callable because you like the fact that later on you are going to have a higher coupon rate which today gives you an average yield maturity of 2.13%. However, you can evaluate the security over its life period to see whether or not it gets called at any point, and whether you actually achieve your assumed yield to maturity because so many in separate callable securities get called before they actually reach maturity. This is typically never the case so the dashed line at the bottom of the chart shows you the yield to call if the security got called at any point before it's last call date of October, 2014, and you have not earned the yield to maturity and given up all of the yield or earnings in the light blue shaded area.

So although you might only earn 50 basis points for the first six or eight months of the holding period, you may decide that was a good yield for six or eight months, however that is a decision that you should make by being aware of what you really are getting to your call date or your maturity date.

Slide 30

Next you can look at the step up callable versus the fixed coupon which is what Ray was talking about versus a fixed coupon callable. In the case of evaluating a callable versus a step up as a callable, you really have to look at the forgone income because the callable you are going to earn the full coupon for the entire life of the security. However, the step up will eventually step up to occasionally a higher coupon, but the likelihood of you actually receiving those coupons is probably less than 50-50. So in effect when you are structuring a step up structure, you are structuring in the money call stripes. In addition, when you do the OAS analysis on a step up security you will notice that both the effective duration of a similar fixed coupon callable is going to be shorter because the likelihood of the security being called is higher when you run it through the interest rate models. The other thing you will notice is that convexity is actually even poorer and more negative which is not attractive because of those same in the money calls. Hence you have to evaluate the return on the step up over a variety of call dates such as the first series of call dates, and you will see that yields are usually somewhat less than the comparable fixed callable coupons.

Do you have anything to add, Sarah?

Yes, on this page we compared the call to step up versus the yield to call on the fixed coupon security as represented in the area under the dark blue line, and above the lighter blue dashed line. During that period you would have earned more in the fixed coupon callable security and the area

under the dashed line on the right side of the chart is the only place where you would have earned more in the step up, and that doesn't occur until after April 2015. This is something you should be aware of and that is step up callables get called most of the time. So when managing risk these are some of the things you can consider and do analysis work on, before you buy a security.

Slide 31-32

Next we are going to discuss credit risk. There are multiple types of credit risk and sometimes they say that there are many faces of credit risk, so I hope you can see both the young and the old woman in the bottom corner of the screen.

The credit risk that most of us worry about is default risk. Is my security is this company that I am buying a security from, going to be around to pay me when the security matures. There is also market value risk, which is the risk that the price of your bond or the yield of your bond will change and cause you market value losses, and this can occur because of a downgrade on the credit rating of that security. It can also occur if the credit spread widens relative to government securities as bond yields for corporate and other credit spread securities are correlated strongly to their perceived credit risk. So even if there are not necessarily fundamental reasons, but headline reasons this can also cause these changes to change the spread and pricing.

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The risk of default was felt acutely by many public agencies when Lehman Brothers went out of business in 2008. If you had been paying attention to the bond price, which is the chart at the bottom of the page you would not have actually noticed anything was wrong until September 9, 2008, which is when S&P put Lehman Brothers ratings on negative credit rating credit watch. However, they did not actually downgrade the security until 15 September, 2008, which was one day before Lehman declared bankruptcy which did not give investors much time to get out of those bonds. So, if you are only paying attention to the bond price the message here is that you really need to be paying attention to other markets, such as the stock price of your investment, and the credit default spread which is essentially buying a default insurance on your fixed income investment. These markets signaled that there were problems with Lehman Brothers well before the bond price or the credit rating agencies signaled that there was a problem. In addition, at the far right-hand side of the top right graph shows if you just looked between September 9 and 15th, and you see how that credit default spread went up you would have been quickly alerted to a problem and as investors possibly been able to do something.

I would also like to point out is that by just monitoring the bond price you need to keep in mind that when we create graphs like this we look for liquid bonds that reflect the change in price break. So if own a bond that doesn't trade very often, price discovery may be problematic as all of this could be going on without being reflected in the bond price. You will never see it trade in trace because it may be a smaller issue and you would not notice the price movement.

Slide 34

When you own a corporate security there are several things that you need to monitor outside the bond price or even just a credit rating and Ray is going to go through the next few slides about what these things are.

On this slide we prepared a generic AA yield on a corporate bond and then compared that yield to a 2 year treasury and the difference between these two is always referred to as credits spreads. We know that municipalities have limited ability to buy corporates and although it is restrictive policy

both at the state level and local level, you should examine the overall corporate spread environment. Maybe not every time you have a maturity in a corporate credit but the point is do not just re-put it on the corporate as you can see going back to 2008, there were times when AA corporate credits yielded 380 basis points over the comparable yield in the treasury as compared to the low, which is was taken just when we printed this graph last week of 48 basis points. So, in effect that is an equivalent move around 3 1/4% on the 2 year note, so if you bought a 2 year note at 4 1/4 and having the yield on it go down to 2%, the total return impact of the credit spreads are not static and change considerably over time. In addition, over the credit environment the ability to monitor them and pick and choose when you decide to use your power in this area I believe to be an effective approach.

Slide 35

This graph here shows a snap shot of what can go on in a credit environment in terms of upgrades and downgrades. So keep in mind that when you buy an investment grade credit, and as we learned with banks recently just because it is investment grade when you buy it, it does not mean it is going to be investment grade when you have to evaluate it in six months from now. So the idea here was corporate credits can be subject to down grade which often times get management very concerned. So keep in mind in terms of having a proactive investment strategy so perhaps when you are buying corporate bonds or bonds with credits embedded in them, you want to maintain them perhaps on the short end of the yield curve where the impact of the increased credits will have less effect on the market value of your security. The most risky corporate is the one that takes on both duration risk and credit risk by being in the long end of your structure in say the four or five year area where if you are subject to either a downgrade or a higher interest rate environment that credit is both going to depreciate in price, and perhaps become less liquid and cost more if you want to get out of it.

Ray, one of the things I thought was interesting about this chart was looking when you look at the credit of any one organization the analysis was looking at trend gaps and again for those of you that don't have Bloomberg, this is something your broker can send you if you are about to buy a corporate security, and it would give you an idea of the credit environment at the time you are entering into the market. I can tell you that our company PFM, in 2009, did not buy any corporate credits even though we keep a list of approved issuers, there was not one name on it.

Slide 36

Here is just an overall graph showing the credit spreads and the probability of corporations so this is simply some macro information you can look at in terms of corporate profits. Note that you can see the dip in corporate profits in the 2008, area as we entered into the housing recession and the housing bubble burst. Also, during this time and it is not unrelated that we saw the slew of downgrades in both financial and non-financial firms.

Slide 37

Here is another tool to monitor credit, and I do realize that not a single person on this call could ever invest in a credit derivative, however credit derivatives are useful because they are in many cases more liquid than their underlying corporate bonds they are related to, and you can use credit derivatives to simply monitor credit sentiment of the corporate bonds you may have been involved with. Here we are looking at credit default swaps, specifically 5 year credit default swaps for Citigroup, Wells Fargo, JP Morgan and Bank of America, and as you can see what has happened over the last two years, subsequent to the housing downturn in 2008, there have been institutional credit concerns with the money center banks such as Citigroup, and Bank of America and you can see their senior credit default swaps in these cases approached 500 basis points.

Interestingly here if you just had this one chart in your hand and you are being offered a financial institution corporate credit at similar yields, this would help you know whether or not those yields were worth the risk. And the why there is a basis between CDS and cash bonds, but in effect the correlation between credit spreads in their cash bonds and credit default swaps is effectively one. So when CDS's are widening, cash bond spreads are widening, and when CDF's start tightening, and cash bond spreads are tightening you can use this to monitor what's going on with credit spreads in your cash portfolio.

Slide 38

What we are trying to illustrate with this slide is that not all corporate credits are the same. In this case I took two very good household names that typically might make an approval list for a very conservative financial institution and in this case here we are looking at a Goldman Sachs bond, and a Boeing bond. They both have similar ratings and we're looking at historically how they've traded both in yields and then a spread to one another. So as you can see as we go back over the last period is that in many cases the bonds trade very differently from one another. Specifically, there is a period of time where the Goldman Sachs bond from mid-2011 to the end of 2011, you saw a significant increase in their credit spreads and yields on their bonds, so that bond would actually have depreciated during that time frame. However, when you look at a Boeing bond, which has less financial exposure and did not have the financial exposure to Europe crisis, (which was really a driving issue here) and as the majority of their planes are sold in the US and Asia this bond would've been an incredibly attractive investment. Even though the yields dropped during the same timeframe from around 2% to 1% the total return of this bond would have been substantially greater than the Goldman Sachs bond. And these are the current yields.

So another thing that this demonstrates although anecdotally is as in these two specific securities rather than the indices show that there is a difference that has been emerging between financial sector names and non-financial sector names. Boeing bonds demonstrated an investment type corporate structure and with much lower yields, it trades very close to an agency, or through an agency, meaning it offers less yield which would make it an attractive investment. However, certainly relative to Goldman Sachs it has outperformed.

If you look at the top left-hand box where it says "mid yield to convention" the white line means today that the yields on that security are 2%, and the orange line is telling you that the Boeing is at .79 basis points which that is the 1%, (79% would be nice). But again, this is really important to ask yourself that if you are going to buy a corporate security why is there that difference, and in fact you might come up with a decision to buy the least risky one or decide not to buy the less risky one because it is too close to a federal agency. However, again our whole message today is, before you buy a corporate security really understand why it has the yield that it has and eventually illustrates the kind of the portfolio approach we were trying to get at the beginning of our presentation. So by looking at Boeing and possibly diversifying your portfolio not only in terms of maturity, but in terms of the industry exposure of the corporates you own (as you don't want to own all the financials) as illustrated they can perform much differently in certain environments.

Slide 39

This is a sample of how you can monitor events that are going to affect the value of that security. If you buy corporate bonds you are going to have to take some responsibility and have a more proactive need to monitor what's going on with that company, so there are various screens in Bloomberg that you can help you monitor when companies are going to announce earnings, have conference calls and other things. The system will allow you can set up alerts in terms of what

rating agencies are showing on particular securities and Bloomberg just released a quantitative ratings tool, which unfortunately I could not put in here that will give you a quantitative default risk on financial institutions.

Slide 40

We are going to run through the next three slides to speak about the structures of certain portfolio investments. So when you buy a security you should know what you own, and you should always have your broker send you the Bloomberg chart. So what we show here, on Slide 40 which comes to you from Bloomberg is of a MassMutual corporate note that was issued under SEC Rule 144A. Often you hear talk about quick securities incorporated building qualified institutional buyers or those buyers who are approved under Rule 144A you should not buy these. They are typically less liquid because Rule 144A type security is considered a private placement and are not legal for public entities to own. The most important thing is if you see on the bottom left hand side of the Bloomberg chart and it says issued under Rule 144A you cannot own it and that is all we want you to know on this page.

Slide 41

Next is a corporate structure that's often called a death note, and what these do for a retail type investor is when the owner passes away this security can be put back to the issuer so that the funds can be part of their estate. The problem here is this type of security for a public agency is that you pay a fee for this option of putting it back to the issuer. So there is a cost for this option that would affect your yield and an institution or public agency should never ever buy a security if at the bottom left hand side of the Bloomberg screen says, as it says here, which is "put in the event of the holder's death", if you see that in a security you're not getting a good yield and there's no secondary market for them, don't buy them. In addition, if you do find you have some of these types of securities in your portfolio you should be able to get somebody to pay you a fair amount of money to unload them because they are very difficult to find. In contrast, they are very difficult to unload, too. So you should know this. Look for that.

Slide 42

Lastly there are corporate note structures that include Main Cold Call calls. This is when the issuer decides that they want to pay off the bond they can call it back at a predetermined spread to you. The predetermined basis is usually treasuries and this bond as used in the example, was purchased by a client with a predetermined spread of 23 basis points to an agency or a treasury and because the main cold call is 50 basis points over that index, when it was called, that client then realized a 27 basis point loss. That means that the yield was 27 basis points higher than when they bought it.

Once again the reason we are showing you this example is if you get a Bloomberg screen and it says "may call" at the bottom of that screen you really need to understand what you are buying because it is highly likely is highly a complicated security and is not going to be good for you. So just know that we find these types of securities when we look at portfolios and as we inherit portfolios and we see things like this and ask people why they bought them, they say they never saw the Bloomberg sheet that told them that however, it is part of the nature of their bond.

The other point I want to add is these types of securities over my tenure at Bloomberg, is that make calls were largely ignored because as a rule if they were executed you are probably going to be very happy given where credit spreads tend to normally be. The point is that when you're buying a corporate bond you need to spread it to treasuries and take note, that if that current spread you are purchasing with the bond is less than the make call, then you are exposed to a potential loss than if

they were to execute it. The reason these securities are getting executed right now is because corporations have a ton of cash and it is just easier for them to retire the bonds even if it is fairly expensive for them to do so as they have nothing better to do with the cash given where yields are.

Slide 43 & 44

In summary, credits are actually complicated and you need to have staff experienced in evaluating credit quality. There is nothing wrong with having a portfolio that comprises of only treasuries and agencies and that might be a better way to go if you don't have the time, tools or experience to manage credit quality. This sort of hits the second bullet point and that is credit evaluation resources. I am a big believer in issuer percentage limits and not just within a sector. So, you may want to have something as restrictive as no more than 5% of anyone issuer name in a portfolio regardless whether it is a BACPCE or a corporate note. In addition, you should have an approved issuer list, and a formal process for which corporations get put on that list along with a formal approval process. This should be in writing and then you should have credit procedures for monitoring credit and do them. Often when we are looking at clients written credit procedures we see that the policy will state to review the company's financials once a year however, clearly that's not good enough in taking a proactive approach as you will not see the warning signs come. When Lehman was going badly we had somebody who called us and I believe it was a county treasurer who asked us what we thought she should do. She was not a client at the time however, we told her to sell and even though she called another three or four more times, each time we said sell it. She was concerned about the market value and that she was going to lose more and more money eventually she sold it, and within two weeks Lehman Brothers went bankrupt so she was thrilled with the market value loss that she took. So the takeaway is she was a happy camper as if she had not sold the securities the recovery rate of Lehman bonds was 8%. So for every dollar and if you had invested 10 million dollars, you would get \$80,000 back, right?

Yes.

In conclusion, always have written guidelines, stick to them and know that your risk can be managed and you do not have to be afraid. You will need to monitor duration to manage interest-rate risk, you want to limit callables to manage call risks, and you want to manage credit risk by monitoring spread relationships. Finally, you want to measure how you are doing toward the goals that you set out. And one thought to leave you with. Just because you don't pay attention to a risk doesn't mean that the risk does not affect your portfolio.

Slide 45

With that we will take any questions.

Question: Okay I have a question for you. This is Debbie: Gradually more local Agencies are turning to municipal bonds as investment vehicles for their superior yields given the current interest rate environment. Can someone discuss the distinct risk and risk management strategies associated with municipalities as investments and how they differ from corporate?

Answer: Sure, we do try to purchase municipal investments when they make sense for public agency clients. However, there are a few issues that I want to mention. Firstly, is that most municipals are issued on a tax-exempt basis which doesn't benefit a public agency because it is already a tax-exempt institution. Secondly, they have underlying credit risks so you will need to be able to do the kind of credit work that you would do on a Corporation, and provide the same kind of monitoring. Thirdly, municipal securities are typically issued for more retail investors and with longer maturities, say generally longer than five years. So those are all considerations and it is a

much less transparent market and a fractured market than the corporate agency or treasury markets.

There are two other things that I want to mention, and that is that we typically look at the market and the credit rating and what we like the security to be is a General Obligation bond, or something that has a recurring source of revenue. Then the way we would use a municipal in our portfolio would be for the portion of the portfolio that can afford to be less liquid because municipal bonds are a much less liquid investment than almost anything else that you would buy.

And as Nancy mentioned the GO bond we are typically looking for something that is being issued to pay for an essential service like a water or sewer system rather than a stadium.

I would add one more thing is by nature you should buy bonds that you know. That is, there may be instances when you see a taxable municipal security for either a municipality that you know well, or a hospital project that has a solid investment grade rating that you know the project well and is an integral part of the community. And I would say a rule of thumb, is simply buy what you know. There is an inherent risk whenever you are venturing out of your normal marketplace each marketplace has unique risks, but unfortunately sometimes they are not apparent so you have to take that into account.

Closing Remarks

I want to thank all those that participated today and particularly the speakers Debbie, Nancy, Sarah and Ray. I also want to make mention of the fact that the power points for the presentations will be available on our CDIAC website. In addition, we have an upcoming Seminar May 3, The Municipal Market Disclosure: Applications to Pension Disclosure, to be held here in Sacramento. If you are not receiving notices on CDIAC's upcoming webinar and seminars please log onto the CDIAC notification system by visiting the CDIAC's website. Also, there will be a survey sent out to all the participants immediately following this webinar and we encourage you to fill that out, respond with any concerns or recommendations as it helps us improve our webinar program. Furthermore, and as I mentioned earlier this is our first opportunity to use the "GOTO Meetings" application and we will certainly get better at it. There will also be certificates of attendance for those who require one. Please send an e-mail to the CDIAC_Education@treasurer.ca.gov and request one and we will get that out to you. Again, thanks to our speakers and thank you for participating and that ends our webinar.