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Session Title: Liquidity Modeling and Management

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Summary: The takeover of General American Life Insurance Company by the regulators heightened the focus of life company management on liquidity risk. This session presents ideas on what causes liquidity concerns and discusses how to model and manage liquidity risk.

MR. CRAIG FOWLER: This morning's session is on liquidity risk, and the three of us will be covering various facets of liquidity risk. The first person to speak will be Darryl Button. Darryl works for AEGON USA, and he has spent the past couple years working in Louisville for the institutional markets area. Darryl's responsibilities there were for pricing, product development, and risk management, including the overall liquidity risk management for the institutional markets or GIC portfolio of AEGON. Prior to that, Darryl worked at Clarica in Waterloo and held various positions at Clarica, including working in the financial reporting area of the investment side, doing asset/liability modeling work and some work on option valuation. He has spent the last couple of years of his time at Clarica in the corporate area, working on mergers and acquisitions (M&A) and demutualization. Currently Darryl is just transitioning back to more of a corporate role within AEGON in Iowa and will be spending his time there doing some work on M&A type of activity and also trying to coordinate the overall pricing and doing embedded value work for AEGON. Darryl's topic will try to give you a high level overview of liquidity risk, and also some of the things that are occurring in the industry.

My name is Craig Fowler. I work for ING Institutional Markets in Denver. I've been doing some risk management work and some chief actuary work for that line of business. I'm currently moving into more of a new business development type of role, where we're trying to take some of our capital markets expertise within the GIC line of business and trying to leverage that more with the reinsurance side. I'm going to try to walk you through the reasons why there's more concern right now with liquidity risk, and some high-level ways of trying to manage liquidity risk. And

we will discuss General American as a case study and example from the past few years of liquidity going bad.

Our last speaker will be Charles Hill. Charles has just joined the financial services practice of Tillinghast-Towers Perrin here in Toronto — just joined this week. He's had a tough first week here at the conference and next week goes back to the real world working at Tillinghast. Charles has spent more than 14 years working in the U.S. and Canadian insurance markets and has worked in a variety of facets — reinsurance, investment management, product development, and corporate actuarial, to name a few. Before working for Tillinghast, Charles spent a few years working for Employers Re here in Toronto as the appointed actuary, as well as managing the company's capital markets hedging activities. Charles is currently a member of the CIA risk management and capital management committee and is a frequent speaker, as you can tell, at many of the conferences, including CIA, SOA, and others. Charles will talk about liquidity risk with some more details on an example in the derivatives market of something that may occur down the road. He will also go over the Standard & Poor's S&P liquidity model and will fill you in on why liquidity risk is such a profound thing for discussion. With that, I'll turn this over to Darryl to begin the presentation. One more thing I'd like to add on Darryl that I forgot about when I was walking through his bio is that he was a member of the Academy's Life Liquidity Work Group, and that's part of what he's going to cover in his discussion.

MR. DARRYL D. BUTTON: As Craig mentioned, my comments are introductory in nature, and Craig and Charles will handle the meat of this presentation. Actually there'll be a fair bit of repetition for anybody that caught session 72PD, "Liquidity Standards — the Regulatory Aspects" yesterday with Dan Fox, Laura Rosenthal, and Mark Green.

There are some learning objectives that I hope to achieve in today's session. I hope people will appreciate the need to understand, manage, and monitor liquidity risk. I hope you will gain some insight into liquidity risk management issues, and, again, I'll try to throw out a few things that are going on in the industry and in the regulatory environment in the U.S. right now.

One definition I like to use is that liquidity is the ability to meet expected and unexpected demands for cash at an acceptable cost. What I like about this definition is it brings in the concept of acceptable cost, which I think is an important one. We need to realize that we're dealing with the tail risk here, and as such, it would be unrealistic to assume that we could try to manage this to a zero net cost under all scenarios. The concept of acceptable cost pertains directly to the source of liquidity, namely the asset portfolio. Conceptually measuring and monitoring liquidity risk is fairly straightforward. You're going to determine under some scenarios and assumptions your available liquidity and your required liquidity, and you're going to compare the two, usually in some form of a coverage ratio. However, as anybody knows who's tried to do this and has gone to an asset specialist to try to put those assumptions around available liquidity, there are

always predominantly two questions that come up: under what market conditions and what haircut are you willing to take?

Liquidity risk is not an asset issue. It's not a liability issue. But it is very much an asset/liability (A/L) issue. It's the interaction of assets and liabilities that matters. This probably seems obvious. It's an important first principle and provides a good smell test for any time you're assessing liquidity risk or establishing liquidity risk management policies. Essentially, any approach that attempts to draw conclusions by looking at one only side of the balance sheet is in all likelihood going to be flawed. As I mentioned earlier, the first two questions that invariably surface when trying to assess the available liquidity in your asset portfolio are: under what market conditions and at what haircut to fair value? Implicit in the second question is an assumption as to how much of a particular asset or asset class is being taken to the market. This is where the size could hurt a company, because you're going to run into flooding issues.

On the liability side, it's product features, not the product itself, that counts. If you were in the liquidity presentation yesterday, you heard Laura Rosenthal talk about her company's GICs with wings, as she referred to them. Essentially the point here, and it's a good one, is that GICs themselves do not bring liquidity risk. It's the liquidity provisions that are inherent in some of the GICs that may. She talked about her company — I think it was back in 1991 — establishing a policy to move away from market value outs in their GICs to essentially no out features whatsoever.

Sticking with the liability side, the next item to discuss is expected and unexpected demands for cash, and I'll break that down a little bit. What do I mean here by expected? Often you hear people say it's only the unexpected liabilities that cause liquidity risk, but that's not necessarily true. Short-term liability, conduit structure-type liabilities, funding agreements backing CP structures…these cash flows are very short-term and very predictable. However, they can present liquidity risk to the extent that you're expecting to roll that conduit supporting a longer-term asset base. Of course, what we usually think of when we're generating liquidity risk on the liability side is the unexpected component, which is usually correlated with consumer confidence. It's likely to be company-specific, but not necessarily.

There are other considerations on the liability side. Institutional investors obviously are savvier. Contractual deferral rights and lock-ups are very important in any product feature. And collateral provisions can be a very valuable tool to access liquidity within your portfolio. It helps you avoid flooding the market and allows you to access liquidity and some of your more illiquid assets. However, in your liquidity modeling and measurement, you've got to make sure that you're not double counting. Essentially you have to make sure you're not posting an asset for collateral purposes and selling an asset at the same time.

If you haven't figured it out by now, my comments have focused on managing what I'll call stress liquidity risk, or the tail risk. Actually the Academy liquidity

working group paper defined three forms of risk related to liquidity: a day-to-day risk, an ongoing or intermediate risk, and a stress or catastrophic risk.

1. The day-to-day is simply your treasury function; making sure that you're not inordinately giving up a lot of bid/ask spread by buying and selling assets routinely; making sure you're managing your cash.

2. The concept of ongoing or intermediate liquidity was brought out to make sure that you're looking ahead — at the product mix, asset portfolio mix, and deviations that you can see coming down the pipe in the next six to 24 months. And also to make sure you're proactive and not incurring significant portfolio restructuring activity as you go.

3. Tail risk, or the stress or catastrophic risk, is the General American crisis scenario. This is what can happen when I wake up one day and is the very short-term catastrophic. Can I survive?

Liquidity risk is inherent in the financial services industry. The issue is not whether to take it, but how to manage it. Liquidity risk is a diversification of risk that's compensated for. We're paid as a financial intermediary to disintermediate liquidity risk. So, if we can manage and diversify that risk, it can be a solid boost to the earnings and to the solvency of any company. When dealing with stress liquidity risk, the objective should be to take the death risk off the table. In other words, can the company sustain a run-on-the-bank scenario? Can it meet cash demands on a timely basis? Can it remain solvent?

What is a stress scenario? Typically it is company-specific. It depends on the mix of the products, markets, and distribution. Examples of events that might lead to a stress liquidity scenario are loss of consumer confidence, a ratings downgrade, high interest rates, industry problems, and bad publicity. So you can see that while most of the time stress scenarios are company-specific, they need not be.

Moving over to the risk measurement side, if you were able to attend yesterday's liquidity session, you heard Dan Fox, also from AEGON, walk through AEGON's risk management approach to liquidity in more detail. Essentially, he presented a coverage ratio concept, which involves measuring your available and required liquidity, taking the ratio, and ensuring at all time periods that that ratio is greater than one. The key here is to do it over a time horizon. What you have when you measure cumulative required liquidity out of your liability side and cumulative available liquidity out of your asset side is two increasing functions, and you never know where your weakest link will hit. Obviously this approach requires liquidity profiling on both your asset side and your liability side.

You've got to make assumptions as to how fast you can sell assets to the market on the asset side, and you've got to make key assumptions about how fast liabilities can walk out the door. From the institutional market perspective, that's fairly easy. Ours will go out the door as fast as contractually possible. On the retail side, things get a little more subjective because of policyholder behavior. Obviously

the key is the time horizon. Eventually these coverage ratios will hit one. Assuming you're managing to a solvency position, your assets will eventually be 100% liquid and your liabilities will be 100% liquid. So again, the key is the timeframe that you measure this over. Liability profile will typically define your breakpoints. These are two increasing functions. So whenever you have a step up in your liability liquidity needs, that's going to be one of the breakpoints at which you're going to want to measure your liquidity coverage ratio.

One of the keys to any good liquidity risk management strategy, of course, is preparedness to act. A liquidity model forms documentation for senior management. It houses both the asset liquidation assumptions that should tie to the liquidity plan and the liability profile assumptions that you can use to monitor and manage the liability cash flows under a stress scenario. You need to set up collateral accounts well in advance; otherwise you can forget about using them as a tool to help you through a crisis scenario. The same thing can be said for securitization procedures. These have to be set up in advance. Assets have to be identified. People have to know what they're doing. Time is of the essence in these scenarios. An order of liquidation is something else that should be spelled out in a good liquidation plan. Yesterday Dan talked about a liquidation plan that should be tested whenever possible. Missing from this table is the fact that a written liquidity plan, including identification of a crisis management team, contact information, and roles and responsibilities that the team will assume, is another essential component to the preparedness to act.

I have a few update items, many of which were covered in yesterday's session. I encourage you to pick up the slides from that session. Mark Green covered some of the New York circular comments, as well as the NAIC initiatives; Laura Rosenthal walked through the summary of the Academy working paper. I'll just go through this fairly quickly.

The NAIC life liquidity risk working group was formed almost two years ago. It has a two-year charge to look at liquidity risk and make some recommendations to the NAIC committee this December. You know some of the early conclusions reached by this group. There have not been a lot of developments since then.

Things have been going pretty much down this path. Essentially there was early consensus that liquidity risk is not something to be handled inside of reserves, the cash-flow testing, the Actuarial Opinion and Memorandum Regulation (AOMR). It is tail risk. The group is working toward a 2001 deliverable. At a meeting in New Orleans just a couple of weeks ago, nothing materially different than that last comment was said. The group seems to be favoring disclosure and certification from a senior officer as opposed to prohibition, capital, etc. The Academy liquidity working group assembled a team to provide some education into the NAIC group. We put a paper out fairly quickly, and I think it served its purpose. It headed people in the right direction. It talked about many of the concepts that are influencing the direction and conclusions that the NAIC group is now coming to. It is ready for publication, and I assume it is on the Web site.

FROM THE FLOOR: Yes.

MR. BUTTON: It's New York Circular 33, at www.actuary.org. Mark Green from the New York Insurance Department was here yesterday and talked exclusively about the development of New York Circular 33, how it evolved from the original Circular 35, and where they're going with it. The relevance here is that the NAIC group is also looking at something very similar. Part of that increased disclosure is an interrogatory-based disclosure very similar to New York Circular 33.

There are a couple of other references that you might want to look back to: a paper in '96 by the Canadian Institute of Actuaries which was quite a good one actually, *Liquidity Risk Measurement*; and a Basel Committee report, released in February 2000, *Sound Practices for Managing Liquidity in Banking Organizations*. I'll turn it over to Craig Fowler now.

MR. FOWLER: I'm going to give you a little of the meat of the presentation, and Charles will give you a little more. I hope, from Darryl's discussion, you have a good overview of liquidity risk. I'm going to cover some developments in the capital markets and insurance markets, and a couple of ideas on ways to manage liquidity risk. I'll walk through published reports on General American and talk about what happened there. I'll discuss some ways to price up the liability risk that General American was taking on in its funding agreement business, and then give you some conclusions that bring it all together.

Liquidity risk is becoming more of a concern because many of us are probably under a lot more pressure now to deliver higher and more sustainable earnings to shareholders through demutualizations and through more aggressive capital market focus on the insurance industry. Companies are being asked to stretch more than they were in the past. The flip side of that is that you could run no liquidity risk by having very basic products and investing in Treasury Bills and Treasury Bonds or Government of Canada bonds. The downside is that you're not going to be in business very long with that strategy. So you have to find some sort of middle ground. As Darryl said, we're in the business of taking risk. We need to make sure we're willing to take those risks, but we want to make sure that we're able to price and manage those risks well so that the people who put their trust in our companies are ultimately paid back.

One of the other things you're seeing now is that policyholders are becoming more sophisticated. They're definitely following the interest rates paid more closely, so they have a better understanding of what's going on in the bond markets. I think because more and different distribution channels have opened up, you're seeing a lot more hot money and products, and if you can offer somebody a bit higher rate, they'll move their money fairly quickly. That's adding to some of the stress with liquidity-type risks.

The Internet is a great thing. The Internet is a horrible thing. You definitely see bad news traveling a lot quicker than you ever did before. It takes a matter of minutes now for people to announce that they're going to have bad earnings, there's some

problems in their accounting, etc., and that information is quickly disseminated through the markets. That leads to more volatility in the asset market. You're seeing some of that driven by structured-type products, but I think more of it is probably just how quickly information moves around and how quickly bad news travels. If you miss your earnings by a penny a share, your stock is quickly cut 20-30%. Or in the case of owning bonds, take Xerox in the year 2000 for an example. With the announcement that its business model didn't work, downgrades from Moody's and things like that, over a period of a couple of months, its spreads blew out about 10%. So, if you're holding those bonds, they're very liquid. They're a good name. Within a couple months, you quickly see that you can't get very much value from that bond, and that kind of comes back to another thing Darryl said about haircuts. What are you really going to get for that bond in what timeframe? I think that's changing. A couple of years ago, if you asked people about a company like Xerox, they would say it is a very good, stable company that's going to be around for the long haul. But now you start to see things breaking down a bit.

Unfortunately, the failures in the past decade or so have predominantly been caused by liquidity-type risks. The interesting thing to note when looking through the list of company names is that if the companies would have been able to work their way through the situations and hold the assets and liabilities to maturity, they would have been fine. It's the immediate liquidity as a risk that can hit you very quickly and be very painful over a very short time period. What you do over that short time period, I think, drives what can happen to your company longer term. So if these companies would have been able to work it out, holding the liabilities and letting everything mature off the books, the assets eventually, except for defaults, would have matured at PAR, and they should have been in good shape. But that's not something you can assume when you're looking at liquidity risk. You need to assume that there could be a catastrophic type of a event and determine what could happen to your company when that occurs.

Here are just a few ways to manage liquidity risk. This is not meant to be an all-encompassing list. There are dozens more out there, but this is just to stimulate some thought and discussion about ways to manage this risk. The first thing is to be proactive, to be on top of this risk, not to be blindsided by things, not to be forced to sell assets or to try to raise liabilities in large amounts very quickly. The first sort of macro view, among a variety of techniques, is that you need a disciplined asset/liability management (ALM) approach; to be honest, if you don't have a disciplined ALM approach, I wouldn't worry that much about liquidity risk. I'd worry much more about that first, because that could definitely get you in trouble and lead to a liquidity problem. In an order of magnitude, that would be something to take care of beforehand.

And within, looking at a disciplined ALM approach, one way to manage liquidity risk would be to cash-flow match everything that you have — all your assets and liabilities — under any scenario, whatever could happen to you, but I don't think that's very realistic. Again, we're in the business to take risk. The key is to make sure that you're diversifying those risks so that you're being paid fairly for the risk you're taking, and you're not putting your company at undue solvency risk.

Another technique is to securitize off assets. Selling off residential or commercial mortgages to raise cash is an obvious way to generate cash flow that you may not have anticipated before. I think the key with this and other techniques like it is to have the process in place, but don't overlook the fact that if something negative happens, such as people losing confidence in your company overall, it could hurt your ability to even securitize assets. People may be concerned whether or not you're going to be there to service these assets going forward, and while that may not make it impossible to sell or securitize assets, it may definitely impair the price at which you're able to sell off those assets.

Potential asset sales, again, gets back to Darryl's point on the haircut. How quickly can you sell these assets? What is the value you expect to realize? How volatile is that instrument? What could happen to a five-year Government of Canada bond over the period of a month? You can quantify that. That price can move a dollar or two over that time period. What could happen to a Xerox-type bond if things got really bad? Well, that can be five or ten times the movement in the Canada bond. I think the key is to look at some techniques that are used in the repo and repurchase obligation market and try to quantify what your haircut may be. When Charles walks through the S&P liquidity model, I think you start to see some numbers around that and just how, at a very high level, S&P has tried to get toward that concept.

One thing to do — and I think this is probably quite apparent and obvious to everyone in this room — is to try to diversify your assets and liabilities across many dimensions. That way, you don't have a concentration of risk in one area that, even though it's going quite well right now and making you a lot of money, could come back to haunt you later on if something goes wrong there. On the repurchase (repo) side, it's just a short-term stop-gap where you're lending out fairly liquid securities to a counter-party. They're giving you cash. You're agreeing to rebuy or repurchase that asset in 60 or 90 days. That's not a foolproof way of managing liquidity risk. It's not going to get you out of horrible situations, but it may buy you enough time and allow you to get through the crisis. And if you have assets that can be repurchased, that can help you a lot when you get into liquidity situations.

On the liability side, there are ways of mitigating liquidity-type risk. Issuing commercial paper (CP) and debt — CP just being more of a shorter term debt — can obviously be helpful. If you haven't already been issuing in the capital markets, you are a well-known name, and you get into a liquidity crisis, don't bother trying to set up this type of program. You're not going to get the capabilities at a price you're willing to pay. But if you have those things in place, you can definitely raise a few hundred million dollars in those markets fairly quickly before things get too bad, and that may help you just ride out the storm of some things on liquidity risk.

Laddering your liability maturities so you don't have everything maturing at one point in time is obviously a good way to ensure that you don't have a cash need surge in the company. Very similar to issuing CP and debt, you can sell more liabilities, but, again, if things are going bad, are people going to trust you enough to

buy an annuity or life policy from you so that you can raise sufficient funds at that point in time? Or, if they are willing to do that, is it going to be at a price that you're willing to pay to the market?

Here's more on looking at things off the balance sheet. You can just be selling bonds and receiving fixed interest rate swaps. The key here is that you're not altering your interest rate mismatch or your ALM risk. You're really just replacing a liquid instrument with cash and using that cash to then pay off liabilities if need be.

With a durable line of credit, the key word is durable. You want to make sure that if you need to go back to somebody, and you've had a run-on-the-bank type of a situation, they will actually give you the money that they've agreed to give you. You need to ensure there is no way for a counterparty to get out of those agreements.

Something else that's becoming more used in the reinsurance market is contingent capital. With this, you may have a trigger event level of defaults on your portfolio or some other macroeconomic indicators, and if those things occur, you have the ability to raise half a billion or a billion dollars from a counterparty in very short order at agreed-upon terms.

Now I'll walk you through published public information on the things that occurred at General American. I'm not proposing to be an expert on what happened at General American. I'm using it more as an example of what can happen on liquidity risk. So, if there are things in here that are erroneous, please let me know.

Starting from the bottom level, General American was very aggressive in the funding agreement market, which is a subset of the GIC market. The GIC industry has taken on more importance over the past three to five years. A GIC is a short-term insurance contract, much like commercial paper, sold to institutional clients. Usually the term is out to about a year, and usually a put provision is embedded in those contracts. They usually pay a floating rate of interest, so, if you're matched up against floating rate assets, there's really not a lot of interest rate risk. What you really have is liquidity risk in these types of products.

General American had about $5 billion of seven-day-put paper on their books. This gave the institutional clients the ability to put back that paper within a seven-day time period. The firm also had a very aggressive stance on how it was pricing that seven-day-put paper, which was part of the overall macro business plan. It was paying up for those liabilities in the hopes that if one of its counterparties needed money, they wouldn't come back to General American first. They would more likely go to somebody else because the purchaser of General American funding agreements would not want to give up a very high yielding asset to an institutional client. They would want to liquidate something else.

General American was doing that on the liability side — very aggressive liability business planning. On the asset side, the company was investing in higher-yielding, less-liquid investments. It wasn't running a tremendous ALM risk or anything like

that. The durations were not five or 10 years mismatched. But what they were trying to do was to ensure that those liabilities would stay on the books for the long term, buying high yielding illiquid assets and trying to ensure the liabilities stayed on the books long enough to earn the needed spread. At its core, it feels like it's a good business strategy, but, unfortunately, it didn't pay off, and when things started to go bad for liquidity risk, things went bad very quickly.

General American had been downgraded a couple times by Moody's before things got really bad, and basically this whole $5 billion of seven-day-put paper was put back to the company. General American was then forced into trying to raise $5 billion in cash over a very short time period. The seven days in the funding agreement is based on business days, so right away you lose a weekend. When you're then trying to sell bonds or anything else in the capital markets, you're usually dealing with a three-day settlement. So the company really only had a couple of days to generate sufficient asset sales to pay off this $5 billion. Rippling on top of that was the fact that once the capital markets — the assets markets — got word of this, the prices they were willing to pay for these assets that General American was trying to sell dropped tremendously. Unfortunately, within the investment banking bond sales type of arena, when people smell blood, they definitely want their pound or two or three of flesh. That really was occurring at the same time. That is broad overview of some of the published information on General American.

Now I'm going to try to give a little more detail on funding agreements and a way of trying to price or manage up that risk a little bit. Usually you have two things you're worried about in the funding agreement market. First, you're worried that something is going to happen — that there will be a credit event on your name or on your company's name, or there will be a credit event on a name of a company that does similar business to yours. For example, when the General American situation occurred, there was a ripple effect throughout the whole industry. ING is a large, multinational company with substantial levels of capital and substantial levels of assets around the world, but we are not immune to what happened with General American. That rippled through us. We did have some business put back to us just because of a general overall fear of this market. That's just something you need to keep in mind. And obviously, in the General American example, you see that if your company is downgraded a couple of notches, if people start to lose confidence in your ability to repay those obligations, that can definitely trigger some events you may not be too happy about.

The second concern with the funding agreement market is whether or not you can buy an asset more cheaply in the market. And that's what the institutional clients are looking at. If your funding agreement is paying x, and somebody else is paying x plus 50 basis points, that institutional client is going to jump out of your asset-liability on your side of the balance sheet very quickly and move into something else. The unknown in all this is that just one of your clients may have cash needs, and you may not be able to predict those needs.

So a way of looking at pricing up this risk and trying to quantify what you should be charging for it is to use some of the Moody's information and Moody's transition matrix on credit downgrades and default. What you're really trying to do is determine the possible cost of being downgraded by a couple notches. If you're an AAA company and you become AA mid or AA low over a year, for example, that may not be a big impact, but if you're an AA low company and become A low, BBB high that's going to have a much bigger impact on people's comfort level with keeping your assets in their portfolio. So you're trying to take some of the Moody's information and assimilate out what may happen on a monthly basis, and then you want to be stress-testing what may happen during events. That's kind of the idea in a nutshell.

A factor you need to keep in mind here is that the ability or the tendency for people to put back contracts is not one-for-one economically driven. They may look at it and say, "Well, if I put this contract back, we're not going to be able to do business in this market going forward. Insurance companies may not sell me this paper anymore. So, if I'm only going to save myself a few thousand dollars by putting back a contract versus just waiting for this contract to mature, I'll just wait." Within this, you're going to be calculating the cumulative probability of having these contracts put back to you. You're looking at the tendency or possibility of downgrades to occur on your name or on your rating. At the same time, you're also looking at the probability of spreads really blowing out on, say, an AA type of a name, and, therefore, people putting back contracts to yourself and buying another cheaper asset.

And then what you're trying to look at is the haircut or cost of liquidity. As Darryl mentioned, you can look at the expected cost of that. The expected cost is not going to be that high. The cost will come in more on the tail part of the distribution. You should be setting aside some economic capital because of this risk you're running; therefore, you just need to make sure you're generating an adequate return on that tail risk in your pricing.

In conclusion, walking through a variety of things in this presentation, and also building upon what Darryl said, liquidity risk is not something that's caused by one side of the balance sheet or the other. You can be running a tremendous amount of liquidity risk on one side of the balance sheet, but if you have very liquid Treasury bonds or Government of Canada bonds, it's not going to be that big of an issue. Profitability will be, but the liquidity risk will not necessarily be that big of an issue. You need to look at both sides of the balance sheet.

Again, liquidity is a risk that we should be taking — we're paid to take it. We just need to make sure we're pricing for it and actively managing it. If you don't think about it and act proactively, liquidity risk can be your worst enemy. The key is to be proactive and to be out ahead of any liquidity-type situations. If you do that, then you shouldn't need to worry about it, which is probably the best thing for all of us.

With that, I'll turn it over now to Charles.

MR. CHARLES FREDERICK HILL: I'm going to talk about liquidity risk in a more general context. What is profound about liquidity risk? In other words, what is interesting or exciting about liquidity risk? Hopefully, at the end of my presentation, you'll think it's a little more profound than it seems on the surface.

Secondly, I'm going to give some different perspectives. You always have to, when you're talking about liquidity risk, remember who your audience is. So I've got three different perspectives on liquidity risk:

1. Personal net worth, which might be your own financial situation as you discuss it with your wife or your mother-in-law.

2. Capital markets, or sort of an asset-only perspective, which is how you might talk to the investment guys.

3. Insurance ALM, which we've been mostly focusing on here, and that might be how you talk to the CEO of your organization.

I will spend a little bit of time going through the S&P insurance liquidity model. I think it's a good example of a macro view of the entire insurance company. Finally, just in a search for where the next potential problem is, I'm going to talk a little bit about the liquidity of derivatives and use a simple equity-indexed annuity example.

Whenever I'm doing a presentation I like to look at what else is on the program and see what's hot, what the buzzwords are, and try to think about how the topic I'm going to be talking about fits into all that. Some of the things I pulled out of the program that I thought were more profound or more exciting include:

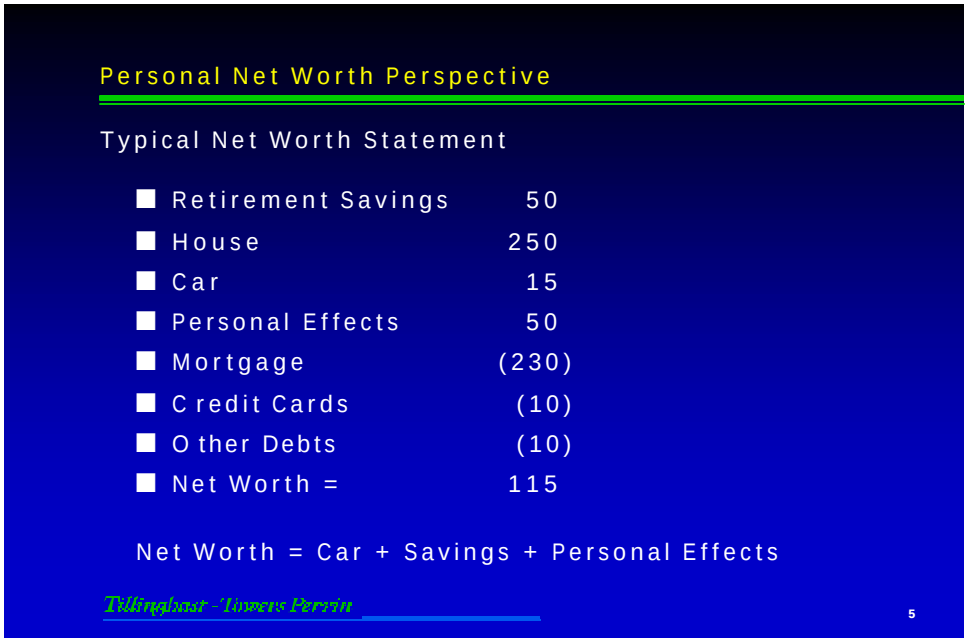
- XXX Reserves - I'm sure in five years, as you fly over the ocean, you'll see these out the window of the plane if you look down.
- Life Settlements - I think this is an exciting area. It's really the secondary market for insurance policies, and it's perhaps profound to think about changes in estate taxes and what that might do to the secondary market in the U.S. in particular.
- Stochastic Modeling - Everything's going stochastic now. We hear it all the time. I recently bought a new Dell 1.5 gigahertz Pentium IV computer, and, let me tell you, it opens my e-mail really fast. So I'm excited to see what it can do with the billions of scenarios we're going to be running as everything moves stochastic. It's quite exciting.

There are many other hot topics out there. Just considering them and thinking about liquidity risk I initially asked myself, is it really that complicated? Is it on the program? Is it a hot topic just because of General American? Is it just so entirely obvious? And you could probably throw long-term capital management in there and say, we need to start talking about this.

From an asset-only perspective, as you're talking to the investment people, I think it's important to realize that volatility and liquidity risk are the key dimensions of asset risk. (I'll go through these in more detail later). Volatility gets all of the

attention, but liquidity really is equally important, and I'll discuss why. Again, from an asset-only perspective, the characteristics of liquidity risk have three elements. The biggest one is volume, the depth of markets, but there are other very important features of an asset that will help you understand its liquidity, and those are control and information. And, finally, from an ALM perspective, there could be hidden exposures.

Table 1



From time to time, if you're filling out some forms at the bank or with the mutual fund company, people ask you to fill out a net worth statement. I'll use Table 1 as an example. You might have some assets. You have your retirement savings; call that $50,000. You have a house; $250. You have a car and your personal effects. This is my favorite thing on these statements: personal effects. You just make up whatever number you want, and you throw it down there. Then you have a big mortgage. You have your credit cards and some other debts, like your dues to the SOA. You end up with this net worth number that shows what you're worth at the end of the day. I've got a car. I have managed to put some money aside for my retirement. And then I have all my stuff. Really, that's what I have.

So you think about the liquidity of yourself as a person, and I'm sure we're all sort of risk-oriented people because we're in this session. You think about your own risk, like what if I lost my job and nobody anywhere would ever want to hire me, or what if I had a medical emergency, or what if I just want to run away from society, go to Colombia or somewhere like that? What am I really worth? So if I had to liquidate my net worth, what have I got? Well, you need your car. No one's going to live without a car. That's obvious. And your savings, well, there are tax implications. You'd rather not. So invariably it comes down to the liquidity of these personal effects, and this is what it looks like. You got that garage sale out there, and you're selling the mountain bike you bought when you thought you were going

to actually get in shape. It's probably worth $2,000. You've got it out there for maybe a couple hundred bucks. The lawnmower, the clothes, all the old computers that you have because you just got a Dell 1.5 gigahertz machine. Maybe this is liquidity risk in a nutshell — really just talking about what that garage sale looks like. It may not be that profound.

So now let me turn to the asset-only, or what I like to call the capital markets' perspective on liquidity risk. Here you just think that you have some cash and need to invest it or you run a balanced mutual fund. You're just going along. You're going to be investing in whatever you want. As you look through the various finance and investment textbooks, you see plenty of definitions of liquidity risk, and most of the emphasis is on the notion of volume. What is the depth of a market? How much will you affect the market itself by trying to transact large volumes in a hurry? But that really is an incomplete characterization of liquidity risk. The best thing that I found was actually in the November/December edition of *Contingencies*. It was an article by Peter Bernstein, a well-known author in the finance area. He wrote the book called *Against the Gods: The Remarkable Story of Risk.* The title of the article in *Contingencies* was "Hidden Linkages: Risk Management, Financial Markets, and Insurance." I'd encourage you to have a look at that. I think he did a very good job of characterizing liquidity risk and tying that into how the rest of the capital markets worked. He builds a very strong case for liquidity risk as being sort of an equal dimension to volatility risk in terms of the riskiness of assets themselves. He also makes the point that the important thing about liquidity risk is its reversibility. We really need the ability to change our minds about an investment. For example, one textbook I saw said that liquidity risk of a 10-year bond is zero if it's held to maturity. So it's easy to define where there is no liquidity risk. You just hold the thing to maturity, and if it's a government bond, and there's no default risk, there's no liquidity risk because you don't want to ever change your mind if you're just going to hold it to maturity.

Volatility has received all of the attention ever since 1952, when Harry Markowitz first identified that the volatility of an asset's price was good proxy for risk. This is consistent with our gut feel for the risk of an asset. The more its price jumps around, the more uneasy we feel about it, and this is also true of macroeconomic variables such as inflation in interest rates. This jumpiness causes us some concern. What's nice about volatility is its objectiveness. It's measurable. It's very conducive to manpower and production projections and all the modeling, etc. More importantly, starting with Markowitz, that led to the whole efficient frontier and the identification of an individual securities volatility versus the volatility of a whole portfolio, and that led to diversification, which is really the central tenet of modern portfolio management theory. But that's all theory, and I think maybe a nice way to characterize liquidity risk is it deals with the practical aspects of how assets will actually trade outside of the theory. So it's the dimension that takes us from theory into practice.

In characterizing liquidity risk there is, as I mentioned, obviously the volume issue, and I won't say much about that. The other two important characteristics that Bernstein highlights or clarifies are control and value. Any asset represents a claim

on certain cash flows, and to the extent you can control those cash flows, you can affect the value of the asset. The more control the issuer has over those underlying cash flows, the less liquidity the asset itself will have to the buyer.

Let me give you some examples to clarify that. Think about your own house. You can smash out all the windows and do whatever you want to your house. You have complete control over that cash flow. Are houses typically very liquid? In certain hot markets, yes, but generally houses are thought of as kind of an illiquid asset. T-bills on the other hand — do you have any control over the prices of Treasury bills? No, you don't. Alan Greenspan controls that. Think about a loan, a commercial mortgage or a commercial loan that a bank might make to a privately held company. It's all about control. The bank builds all this documentation around a loan, and if you look at what's in the documentation, it's about control. The only way for the bank to effect any control over the management and over what they're doing is in this document.

And there are other examples. Think about, say, a large pension fund that might own a huge block of shares in a public company. Because of the volume issue, that's actually a fairly illiquid block of shares. We see pension plans typically doing that because they recognize the volume they own leads to illiquidity for their block of shares, so they start asking for a seat on the board and other control issues. I think this is important. I'm not going to go into much more detail, but you can think about this. It is a little bit profound. There is really an important characteristic of liquidity risk here. The takeaway message here is — and I don't know if this applies just from an asset-only perspective or to creating insurance products — don't give up control without gaining liquidity.

Finally, the other important characteristic of identifying liquidity risk is all about information and the transparency of information around an asset. Here less information means less liquidity. Think about a very liquid stock that you're just buying in your own portfolio. How often have we bought a stock without really understanding what the company was doing? We use these shortcuts to information. We know that there's an army of securities analysts out there, and there's the media out there, and we know the company's going to file SEC disclosures, and so on. We know if there's a problem with this company, those shortcuts would get us to that. So we don't really need to do the research ourselves. That creates liquidity for that stock because the information that's out there is so well understood and analyzed. On the other hand, if you have a very illiquid stock, some small company's stock, and your buddy calls you on the phone and says, "I want you to buy 500 shares of this gold junior out on the Vancouver Exchange," and you know nothing about the company, what do you do? The first thing you do is get some information on the company. You're concerned, obviously, that it's an illiquid stock because there's not a lot of volume, but you also want to understand what the company's doing.

Some of the other shortcuts up there are the rating agencies for a bond, which I should mention as well. What becomes clear is that assets that are illiquid typically involve very customized documentation and disclosure requirements. Again,

thinking back to a commercial mortgage or shares in a very privately held company, you're typically looking for some very customized legal documents, and in there you'll specify some very explicit information disclosures, and that adds to the liquidity of your investment. Overall, from a capital markets perspective, I've tried to illustrate that, yes, there's volatility risk, but liquidity risk is the other dimension. There are these interesting characteristics to think about other than just what's the typical volume that's transacted.

The final perspective I want to cover is the ALM. Everything I have said so far is really about your cash. You're talking to your CEO. You're going along in something, but it becomes completely different when you borrow the money — when you use other people's money to invest. The investing side of the equation is exactly the same. But when you use somebody else's money to do that investing, it's completely different, and this is really what ALM is about. It introduces a whole new weirdness to liquidity risk. We, of course, as insurance companies have to put up, rather our shareholders have to put up, capital to cover situations where there are various risks, including liquidity risk. But where the liquidity risk comes in an ALM context is where the borrowing and investing activities are uncorrelated. That's a very general definition, but you could translate that into the liability product. That's where the money and the asset — the investment strategy — are not well correlated. They're out of sync, and that's what ALM is all about.

These guys have covered a lot of the detail on ALM. I'm just really trying to cover some sort of high-level, more conceptual issues, here. I did want to point out that, as an insurance industry, there is an opportunity and a way to turn liquidity risk into a positive thing. We have a unique ability perhaps, especially at longer durations, to invest in illiquid assets where we have illiquid liabilities. This is something we should be proactive about. To the extent you have annuities or other things that really are not surrenderable, that's an opportunity to invest in illiquid assets and get the borrowing and the investing correlated. That's an opportunity. If your investment strategy for illiquid liabilities is to invest in very liquid bonds, I'd say you've got a problem. You're missing an opportunity there.

Insurance companies operate as going concerns. What I mean is, we look at ALM and liquidity risk. It's all driven from a regulatory or rating agency perspective because no one wants to see our insurance companies go out of business. When you talk to the CEO of an organization, he couldn't care less about liquidity risk. He is operating the company as a going concern. He is not going to worry about what happens if there's a run on a bank because he's going to move onto the next job, etc., and that's not what it's about. If you went to the CEO to offer him a very unique insurance coverage, so if we ever get into a run-on-the-bank situation, this company over here is going to provide us with whatever cash needs we have for the next 12 months or 24 months to get us through that. We know in the long run we're going to be fine, but we maybe have this temporary borrowing need. So here's this sort of property and casualty (P&C) coverage. You tell the CEO what the premium for that is, and you know he's going to say forget it. He asks, why am I going to forego earnings today for that coverage? What does it get me? If it gets me through a solvency crisis, that's fine, but once through that, what are we trying

to do? We're just trying to make money. Why are we going to forego earnings today just for the same opportunity? So I think this is something that will be driven by regulation, by S&P, by those kinds of things. It's one of our biggest challenges, trying to make it important within senior management.

What about that run on the bank that everyone worries about? The way things seem to be going as per S&P, which I'm going to talk about next, is a very macro view of the company. I'm going to very quickly run through the S&P insurance liquidity model, which was published in August 2000. I'm not endorsing S&P in any way here. This is really just an example of a macro approach to measuring liquidity risk.

S&P identifies two required stress scenarios. One's called immediate stress and one's called ongoing stress. What S&P says is that you must be able to meet your obligations for an additional year beyond each base timeframe. So for the immediate scenario, the base timeframe is one month. You must be able to meet your obligations for another 12. So it's 13 months. And for the ongoing stress scenario, the base timeframe is 12 months. You must be able to survive another 12 months beyond that, or 24 months total. So it's 13 or 24 months. The immediate stress scenario is identified as being a drop-dead situation like Confederation Life, when there's unforeseen stress happening within a month and excessive withdrawals and surrenders. The ongoing just happens more slowly over a 12-month period.

I won't talk about this too much, but it's not a cookie cutter kind of exercise. You need to look at the company's investment portfolio and the actual product's surrender features, the distribution channel, etc. You then calculate your liability liquidity exposure. That is comprised of 100 percent of what they call maturing obligations, which is any debt obligation that is coming up or any liability-like deposit kind of feature that is maturing. You've got to meet 100 percent of those. Then there's 70 percent for what they call potential surrender obligations, and those are developed by looking at two factors for each general class of liabilities.

RF is a risk factor that reflects the percentage of policyholders who would remove their funds absent any contractual restrictions. SF, or surrenderability factor, represents the actual product surrender features. You multiply these two to get your potential exposure.

Then there's the surrenderability factor If the product has no surrenders allowed at all, for example, its immediate or paid annuities might be zero. Liability risk factors would have you include 100 percent of immediate annuities, but here you then multiply it by zero, so you wind up with zero. You have to take these two things together. They picked 5% surrender charges as kind of a magical number that might induce behavior differently. It's somewhat arbitrary, but it's trying to capture the fact that surrender charges do scale down over time. That's the liability side.

You apply the allowable asset factor to identify how much liquidity you actually have under scenarios. You have your allowable assets. You first apply those to your

maturing obligations. You've got to meet those first. Then, with the remaining allowable assets, you do a ratio that compares that to what the potential surrender obligations are. Of course, as I said, there are all kinds of qualitative adjustments to reflect the individual company's situation. As an example, if a company is AAA rated for capital adequacy — that's the other main rating — it should have at least an A level of liquidity. That would be a ratio that's 180% or higher.

So that's fine. These macro kinds of things are a worthwhile exercise and do tell you something about your macro liquidity risk. There are all kinds of problems with these formulas, but I think that one in particular is a pretty good start. It's not too complicated. I think for us, though, these top-down approaches really miss the nitty-gritty ALM issues which are perhaps more interesting because they tell us something about the lapse risk that we have in our products and forget about the macro run on the bank. It is important to understand, in the extreme, what your lapse exposure is. I was thinking about General American and how obvious that was and thinking, where are some of the next potential problems?

I'm not sure how real this one is, but I'll throw it out as an example. I was thinking of a company that was selling primarily equity-indexed annuities. What I want to compare here are two different hedging strategies that the company might use and examine the liquidity risk of each of those. This is a very simple example. I'm just going to use a five-year equity-indexed annuity. I'm going to assume one company hedges by rolling one-year, plain vanilla call options. So every year it's going to enter into another one-year call option. The other one is going to hedge just by up-front buying a five-year call option that is more static. The company can just sit on it.

Let's look at time zero when this thing is first written. What is the run on the bank or high lapse exposure? I'm going to assume that 100 percent of the policyholders elect to surrender, and, just for simplicity, I don't have any acquisition costs or commissions in here. I'm just assuming the surrender value is equal to the premium. And I want to examine the exposure under different market conditions for interest rates and call option implied volatility. Initially I'm assuming that interest rates are around 6 percent and call option and implied volatility are at around 20 percent. I'm going to test combinations of higher and lower interest rates and higher and lower volatility. I'm not assuming any shock to the equity markets themselves.

Table 2 covers the hedging strategy where you're just buying a five-year. I call that a customized hedge because, typically, you might do the whole hedge with one counterparty. You have, say, a limited ability to get out of that hedge in a crisis situation. The numbers that go into these here are just plain vanilla, European, five-year calls, but I called it custom because, in reality, it may be difficult to unwind. The middle box in the table shows that if you had $100 initially, you would put $75 of that into a five-year zero coupon bond to provide the guarantee, and then the upside is provided by the call option. So you would spend $25 on that there. And the theory is that you just put it in the drawer and sit on it. But if suddenly interest

rates and implied volatility change, as interest rates go higher, the market value of that bond is decreasing.

Table 2

Derivative Liquidity - EIA Example

5 year custom hedge

Interest Rate	Implied Volatility 10%	20%	30%
3%			
call option	11.8	19.4	27.0
zero	86.0	86.0	86.0
cash	0.0	0.0	0.0
total	97.8	105.4	113.0
6%			
call option	20.2	25.9	32.4
zero	75.0	75.0	75.0
cash	0.0	0.0	0.0
total	95.2	100.9	107.4
9%			
call option	29.3	32.8	38.0
zero	65.0	65.0	65.0
cash	0.0	0.0	0.0
total	94.3	97.8	103.0
Range	94.3	113.0	

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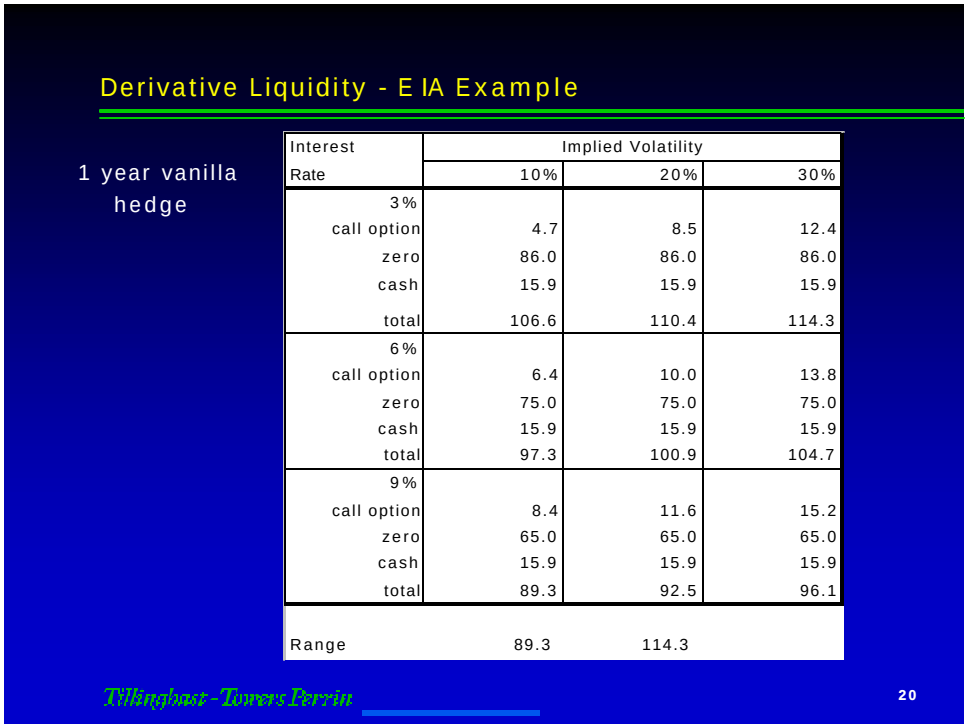
Conversely, at least under a Black-Scholes kind of theory, the value of the option that you have is moving in the other direction. You've got a natural offset on interest rates. As they move higher, the option and the zero are moving in different directions, and the net exposure is — it's kind of difficult to know what's going to happen there. That all assumes that this call option is completely liquid. So what I showed on the bottom of the table is relative to the initial $100. The range is somewhere between $94 and $113. This is going to be the actual liquidation value of your asset portfolio. Looking at the downside risk, 94 percent versus 100 percent, is 6 percent a big deal? You know, maybe it's not that big of a concern, but it does show you that for this hedging strategy, you have an exposure to high surrenders under certain scenarios.

If your company is going to buy a series of one-year call options with a balance of the funds, looking at the middle box in Table 3, you still put $75 into a five-year zero, but you've only spent $10 on that one-year call option. The rest of it you have sitting in T-bills, one-year T-bills, or something. And let's look again at what happens here. Under this hedging strategy, you don't get the offset with the call option. There's very little movement in the pricing of the call option, so you don't get the offset. Under this hedging strategy you've got on the downside of roughly 11 percent kind of exposure, so it starts getting a little bit bigger. This highlights

that this particular hedging strategy is a little more sensitive to high lapse rates under certain conditions.

Table 3



Derivative Liquidity - E IA Example

1 year vanilla hedge

Interest Rate	Implied Volatility 10%	20%	30%
3%			
call option	4.7	8.5	12.4
zero	86.0	86.0	86.0
cash	15.9	15.9	15.9
total	106.6	110.4	114.3
6%			
call option	6.4	10.0	13.8
zero	75.0	75.0	75.0
cash	15.9	15.9	15.9
total	97.3	100.9	104.7
9%			
call option	8.4	11.6	15.2
zero	65.0	65.0	65.0
cash	15.9	15.9	15.9
total	89.3	92.5	96.1
Range	89.3	114.3	

To wrap up, liquidity risk, while perhaps not profound, is interesting. I think it's more than just what happened to General American. It does mean different things to different people. As you talk to the investment people versus the ALM people versus regular people on the street, always remember that you've got to put it in the right context. As ALM practitioners and risk management practitioners, it's important not only to look at the company-wide measures that are going to be driven from the regulatory side, but also at the product level exposures, because it does tell you something about your product and your lapse risk.

MR. FOWLER: Thanks, Charles and Darryl, for your presentations. Hopefully, we've given you some ideas, macro and a couple micro examples, on liquidity risk and what you can do to manage it.

FROM THE FLOOR: I wonder if Moody's has similar models like S&P.

MR. FOWLER: Does anybody know?

FROM THE FLOOR: Nothing explicit.

MR. FOWLER: They don't. Thanks.

MR. PETER D. TILLEY: I'm with Great-West Life and Annuity. One observation I have on the Standard and Poor's formula is that, as Charles pointed out, they have an immediate calculation and an ongoing calculation. When you're looking at the ratios that come out of these, S&P takes the lower of those two, and that's the ratio it uses for you.

MR. BUTTON: I'll just add one thing. I believe Moody's has a liquidity model, but it's not published, and its very much more black box. If you look at some of the more recent surveys that have come out, especially on the institutional side, Moody's has been asking for all the components, the inputs to a liquidity model, but won't show us how it's using them.

FROM THE FLOOR: Just one last little comment. S&P is looking at that liquidity on an annual basis based on year-end, and the information Darryl mentioned that Moody's is asking for is quarterly. So it's asking for a lot of granularity on the information, and more timely information as well.

MR. WILLIAM C. HUFF: I'm with SAFECO Life Insurance Company. Craig, you were talking about a durable line of credit, and I'm just wondering if something like that has been tested in court. If a bank or something is going down the tubes, they're thinking about whether it will cost them more to provide the line of credit to a company that may be going under versus getting sued after they're already gone, and if you were to take them to court, something that you'd need to do right away. Any comments on that?

MR. FOWLER: I don't know for sure whether or not that's been tested. I guess some of the anecdotal information on General American showed that was part of the case, that General American thought it did have a line of credit with one of the investment banks, and when it tried to push the issue, it really didn't. I don't know much more. I don't know if anybody else here in the audience does, but I think that was part of the situation.

MR. MAX J. RUDOLPH: I'm with Mutual of Omaha. Just a comment on the S&P liquidity test. We've spent a lot of time in the last year really diving into it in terms of trying to understand how they were using the numbers. I mean, even for a company of our size, with the number of lines we have, it's really complicated. But when you get into it, it does kind of make sense. You have to be real careful that you're providing the information in the way that they want it, because what we found is that it comes into our accounting department, and then they kind of ship it off to the area that they think makes sense. For instance, the one line up there was maturities. What they meant was, do you have a line of credit that's coming due to mature? Well, our accounting department sent it to the investment department, and they came back with, well, yes, we've got $3 billion maturing this year. So, all of the sudden they were going to send this out. Luckily we reviewed it before it went out, but you have to be careful with some of the data, that it's getting used properly and that you can actually go back and maybe improve your ratio by not double counting things.

MR. FOWLER: Actually that's a really good point, Max. We had similar situations when we were providing the information and some of the definitions weren't that clear. So we were putting some of our liabilities in a couple of spots, not appreciating the fact that really what S&P was looking for was when you put all the liabilities in, it would add up exactly to your reserves. And we were just thinking, OK, well, this is like this, so we'll put it in here. You need to have conversations with S&P to understand what they're trying to get at with the information, because it is a very important thing. They do use it in their ratings analysis, but we definitely had similar issues with our block.

MR. ALAN BRENDER: I'm with OSFI. I have just a couple comments. Charles, you mentioned this thing about companies thinking of being ongoing concerns. CEOs are interested in paying anything for this kind of protection, and I just sort of cite that as one example of the lack of risk management culture in the insurance industry, because I think the reaction in major banks today would be a little different. But what I want to really talk about is that Craig made a mention that maybe it isn't a matter of capital. If it's a tail event, therefore, it's a matter of capital. And I'd suggest I'm beginning to have doubts. One thing that's interesting is what's happening in the United States as a result of General American and the NAIC. There seems to be a lot of discussion, but a general reluctance to talk about modifying risk-based capital (RBC), I mean specific comments saying that you won't modify RBC. It's worth noting that the Basel Accord and the bankers were very concerned about risk way before insurance companies in some sense. Basel Accord makes no mention of liquidity, certainly not in terms of capital requirements. It's just not in, even in the latest revision, which is talking about operational risk and so on.

And I'd make the point that if it were a matter of capital, then people would be concerned about how capital is invested. The industry looks at capital as a place to invest in all kinds of esoteric stuff. That's where you can buy equities. That's where you can buy airplanes or whatever. And in this industry, the life industry anyhow, I see people talking about having to invest capital in a very liquid way. So we don't think of it that way. And just having capital that's invested in fairly illiquid stuff is not going to help you. So, I think there's a kind of consensus that it's not a capital thing. It's an operational style in some sense. I'd point out that when we modified legislation in Canada to allow for capital requirements, minimum continuing capital and surplus requirements (MCCSR) and all that, the same legislation in the same sentence said, introduce capital requirements and liquidity requirements. Now the Office of the Superintendent of Financial Institutions (OSFI) in Canada never introduced liquidity requirements that most people are aware of. The only thing we really have is a list of 10 standards of sound business practice, which say that companies should have standards of practice for each of 10 risk areas, one of which is liquidity. The way it seems to be handled, in fact, is to say companies should take liquidity into account, but it doesn't say put aside capital for it, because I don't think anyone knows how to do that.

MR. FOWLER: Thanks, Alan. I'll just add a couple comments to that. I think in your initial comment about the insurance companies versus the banks, you are seeing

the banks starting to buy contingent capital products on their portfolios. Royal Bank of Canada entered into a transaction about six months or so ago, I think, with one of the reinsurers, that if things started going bad, it was able to tap into the markets to raise some money. I'm not sure what the situation is with the insurance companies right now, but you are seeing that coming to the banks. They do want to protect themselves for the very punitive scenarios that could occur. As far as the liquidity being a capital issue, or things like that, I think you raised some very good points. I guess I'm trying to look at it as somewhat of a tail event, and I would like a way of looking at it and pricing up different types of liquidity risk that I'm taking. And while putting that information into macro pricing frameworks, you need to be doing this for liquidity risk, and that helps on that. If I'm in the market offering a funding agreement with a seven-day put or a 30-day put or a 90-day put, I have to determine a different price for that. I want to make sure that I'm indifferent to where I'm funding in different markets, and so that's how we've kind of gravitated to more of a capital-type basis on that. But that may be more of a micro kind of a view that you need to take at the product line side. I think while Basel capital rules are not looking at liquidity risk right now, people are still viewing the operational risk as somewhat of a catch-all. Whether or not there's intentional liquidity risk capital buried in there, I don't know, but that's such a big black box right now. I think that practitioners are really struggling with that, and it may be in some people's minds a subset, but I'm just speculating on that.

MR. HILL: I don't think I said this very well in my presentation, but I guess I was trying to imagine a conversation with a CEO where you say, "Let's buy this product. Let's go to this P&C company and buy this coverage to survive the run on the bank," and you think about it. Well, you never have the run on the bank. You're paying that premium every year, so earnings are lower. That's no good. And if you do have the run on the bank, well, you're losing a whole bunch of money anyway. So both of those things are bad. The CEO is not going to be thinking in terms of, "I want to survive a run on the bank." The thing that Craig mentioned, I mean that's just buying protection against defaults on your mortgage portfolio. It is really just an economic decision to try to protect your credit exposure. It's a little different. But I was thinking more in terms of buying protection to survive that run on the bank, and I don't see it being driven by management. It will be regulatory driven more than anything.

MR. BUTTON: Everybody's got something to say on this. Actually, I'll just provide a U.S. perspective, Alan. I actually agree with all your comments. Not that long ago I was thinking that tail risk, it's a capital issue. But I actually agree with your comments. They're in line with where the U.S. is heading right now as well. The NAIC group has dismissed capital and RBC as methods to deal with this risk, and early on we all dismissed reserves as an appropriate way to deal with liquidity risk. I think you're going to see the U.S. moving from a regulatory standpoint toward a banking organization where it's qualitative. It's in looking at risk management. It's in looking at your procedures, your policies, your plans, and doing more of a qualitative assessment and making sure you're taking liquidity risk off the table, taking stress liquidity risk, death risk, off the table, and in an appropriate way. Thus it's not a capital issue, per se. I also agree with Craig from a pricing side. We have

to have a way to make sure that we're economically being rewarded for the liquidity risk that we're disintermediating. I agree with everybody.