



AMERICAN ACADEMY *of* ACTUARIES

Report of the Life Liquidity Work Group of the American Academy of Actuaries to the NAIC's Life Liquidity Working Group Boston, MA - December 2, 2000

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BACKGROUND AND ACKNOWLEDGEMENTS

In 1999, two events occurred that raised the visibility of liquidity risk in the eyes of the insurance industry, regulators and public. Early in the year a question was raised regarding the acceptability and reserving standards for "downgrade put" provisions in Guaranteed Investment Contracts (GICs) sold to municipalities. The question was referred to the NAIC's Life and Health Actuarial Task Force who, after extensive discussions with the life insurance industry, sent state insurance departments a letter outlining the unique risks inherent in the provision. In August, General American Life Insurance Company voluntarily sought state insurance department supervision when the demand for cash, under funding agreements with unconditional/unrestricted "7 day put" provisions, exceeded the amount that could be raised quickly. As a result, the NAIC recognized the need to have a better understanding of potential liquidity risks and appointed a Life Liquidity Risk Working Group to examine the issue.

The Life Practice Council of the American Academy of Actuaries made risk management issues such as liquidity risk management one of its major topics for 2000. The Academy subsequently formed the Life Liquidity Work Group to respond to the needs of actuaries who are concerned about liquidity risk and may be working on liquidity plans, policies, procedures and/or models, as well as to assist the regulators who are examining this risk. It is the Life Liquidity Work Group who developed this report and who would also like to thank the interested parties that participated in this project, particularly Douglas W. Barnert and John Cockerham.

REPORT OF THE AMERICAN ACADEMY OF ACTUARIES' LIFE LIQUIDITY WORK GROUP

EXECUTIVE OVERVIEW

Liquidity is the ability to meet expected and unexpected demands for cash. Specifically, it is a company's ability to meet the cash demands of its policy and contract holders without suffering any (or a very minimal) loss. The liquidity profile of a company is a function of both its assets and liabilities. Liquidity risk is inherent in the financial services industry and one must understand, measure, monitor and manage this risk.

There are different levels of liquidity management. There is day-to-day cash management, which is commonly a treasury function within a company. There is ongoing cash flow management, which typically monitors cash needs for the next six to twenty-four months. The third category of liquidity management addresses the stress liquidity risk, which is focused on the catastrophic risk.

It is important to recognize that stress liquidity risk management is distinct from asset/liability management and capital management issues. It is therefore not generally covered by actuarial opinions and is not included in risk based capital; rather, it is a separate and fundamental area of financial risk management.

This report briefly covers all three types of liquidity management, but focuses primarily on stress liquidity risk. It identifies some embedded liquidity options and sources of liquidity, and it offers some suggestions regarding management and measurement of liquidity risk. It is meant to serve as an educational tool for actuaries and regulators considering liquidity risk and not an Actuarial Standard of Practice (ASOP).

LIQUIDITY RISK AND ITS CAUSES

What is Liquidity Risk?

Again, liquidity is the ability to meet expected and unexpected demands for cash through ongoing cash flow or the sale of an asset at fair market value. Liquidity risk is the risk that at some time an entity will not have enough cash or liquid assets to meet its cash obligations. The most striking example of loss due to this risk is a run-on-the-bank event that causes an institution to fail. This type of event hit banks during the Depression when too many customers demanded to have their money paid immediately in cash and that demand exceeded cash reserves. Less dramatically, smaller losses can occur when a company has to borrow unexpectedly or sell assets for an unanticipated low price.

Possible Sources of Liquidity Risk

Unexpected demand for liquidity may be triggered by:

- A credit rating downgrade,
- Negative publicity (whether justified or not),
- Deterioration of the economy, or
- Reports of problems of other companies in the same or similar lines of business.

Other random fluctuations in demand for liquidity and certain company-specific characteristics can amplify liquidity risk. However, these characteristics by themselves may or may not cause liquidity failure and good liquidity management can significantly reduce that risk. Examples of company-specific characteristics that can contribute to liquidity risk exposure include:

- A single or a few contractholders control large sums of money (policies or contracts). Institutional-type products are the biggest risk in this respect, although in retail lines a small group of agents and/or brokers may control large blocks of business, which poses a similar risk.
- The size of the company may limit access to capital markets. If a company is too small, it may not have the funding choices available to larger companies. On the other hand, if a large company is forced to liquidate billions of dollars of assets at once, the marketplace may not be able to absorb the volume without a discount from normal fair value.
- Immediate demands on cash. Any immediate demand for a cash payment can be a risk if cash is in short supply. An unpredictable cash demand is a larger risk. If a funding agreement has a 7-day put option, the issuer has only one week to collect the cash needed to satisfy the obligation. A predictable cash demand is less of a risk. A well-managed company can structure its assets in such a way so that it has enough cash to cover the known obligation. For example, large GICs with fully predictable

payout dates and no surrender provision should have minimal liquidity risk in a well-managed company because the cash flows are predictable and can be planned for.

- Unpredictable deferred or deferrable demands on cash. Any unpredictability of cash demands increases liquidity risk. However, the longer the deferral period, the smaller the risk. For example, a surrenderable GIC contract may have a 90-day delay provision, which under normal circumstances, gives the company a reasonable amount of time to access its liquidity sources. The liquidity risk in any product cannot be determined by the product name alone – a liquidity analysis must look to the specific features of each company's products.
- Insufficient ability to borrow short-term through bank lines of credit, commercial paper, etc.
- Lack of diversity in either the liability or the asset portfolio when analyzed by product, region, industry, creditor, etc. An over-concentration of illiquid assets such as real estate or thinly traded securities may be especially risky.

With regards to the liquidity crisis of General American, the event was triggered by a downgrade. The contributing factors to liquidity risk were large funding agreement contracts held by relatively few, sophisticated customers; and these funding agreements had 7-day put options in them, (i.e., the cash out flows had short time horizons).

MANAGEMENT OF LIQUIDITY RISK

Levels of Liquidity Management

Given that financial institutions are willing to accept some amount of liquidity risk, that risk must be managed appropriately. Liquidity risk management can be broken into three levels:

A. Day-to-day cash management - this type of liquidity management involves controlling day-to-day cash flow variability by balancing cash positions and lines of credit. It is important to monitor short-term liquidity needs so that unforeseen events do not require actions that may be detrimental to ongoing cash management and adequate cash or borrowing capability is available in the event of a large, unpredicted cash demand.

B. Ongoing/intermediate term cash flow management - this type of liquidity management involves ongoing cash needs over the next six to twenty-four months. It involves analysis of cash inflows and outflows. If the analysis indicates a high risk of future cash needs exceeding future available cash, this type of management would include a plan to restore liquidity. Ongoing liquidity management tools can include restructuring or fine-tuning the portfolio (e.g., renegotiating the terms of large liabilities or assets), selling more or fewer of selected products, diversifying where possible, and changing the investment strategy if needed (e.g., increasing high quality public securities and reducing commercial mortgage acquisitions).

C. Stress liquidity risk management – this type of liquidity management involves the ability of the company to meet the demands of many policy/contractholders for cash over a short period. Although such an event may never occur, it is essential that the cash demand be met if it does.

Good liquidity management requires a strategic management plan, possible action plans, and ongoing analysis and monitoring at all three levels. While the focus of this report is stress liquidity risk management, all three levels are important and interrelated.

The three levels of liquidity management should be designed to provide required cash at the appropriate time, while, at the same time, allowing for investment policies that maximize returns on investments. In order to achieve the proper balance between cash availability and maximum return, it is necessary to examine a broad range of economic scenarios and stress events. Day-to-day and ongoing intermediate term cash management plans can provide for lower levels of adversity than stress liquidity cash management. Both day-to-day cash management and ongoing/intermediate term cash flow management, generally involve cash management and cash lines. While stress liquidity risk management, will almost certainly involve liquidation.

Since the stress liquidity risk is always present, however, the cash requirements dictated by this risk will dominate asset portfolio management policies unless contingency plans are in place.. Including payment deferral or market value adjustment provisions in policies can also mitigate the stress liquidity risk.

The appraisal of the amount of cash required, once the triggering event has occurred, is based on the exposure to demand. Institutional contractholders are more likely to obtain immediate knowledge of adverse events than retail contractholders. The number of contractholders affected by the event also affects the risk.

The liquidity profile of a company is determined by obtaining a total enterprise perspective. The rating and financial strength (mainly the capital position) of a company are not the only indicators of a company's ability to meet the stress liquidity risk, although the strength of the company may provide more time to react to demands for liquidity caused by changes in the economic environment. A company could have highly liquid liabilities, but if its assets are totally invested in Treasury bonds with similar market/book characteristics to those of the liabilities, then liquidity is not an issue. Similarly, having a portfolio of very illiquid assets is not material if asset and liability maturities are well matched and there are few or no instances in which clients can demand cash before the assets mature.

Liquidity risk should therefore be managed by evaluating cash needs under possible scenarios. The goal is to ensure that cash will be available when needed to pay benefits under any reasonably foreseeable set of circumstances. Some companies may require less sophisticated analysis of liquidity risk. For example, for a company with 100% traditional whole life insurance business sold by captive agents, backed by highly rated,

publicly traded corporate bonds with laddered maturities, the liquidity risk may be small. Other companies may need to look at a variety of stress scenarios and company specific situations and determine what assets could be liquidated in a timely, and cost effective, manner.

The Stress Liquidity Risk Management Process

The keys to managing the stress liquidity risk are product design, portfolio strategy, systematic monitoring, and preparedness to act. Communication and coordination through a strong corporate oversight function are vital in a multi-line environment. It is essential to monitor the asset/liability liquidity risk continuously and to have the mechanisms for action (e.g., deferral rights) aligned closely with the liquidity needs time frames.

To minimize the likelihood of exercising deferral rights or selling less liquid assets, a company should match its asset portfolio management strategy with its product features. First, this means identifying and understanding the embedded liquidity options in its portfolio. Second, steps must be taken to acquire appropriate investments, set appropriate limits on the risk that the company is willing to take and develop the means to manage the risk whenever possible. The next sections of this report describe various embedded options and some possible risk reduction techniques.

For multi-line companies with segregated asset portfolios, there are merits to examining the liquidity risk of each business unit (BU) before analyzing the results for the total company. While it is the profile and strength of the total company that matters, difficulties can occur when a particular BU is overly aggressive in managing its assets without appropriate attention to liquidity risk or to the additional embedded liquidity options that it may be selling. By evaluating each BU on a “stand alone” basis, it is easier to isolate potential problems before they occur. If one BU is issuing very liquid liabilities, the corporation may require that BU to invest in more liquid assets than is traditional. Alternatively, once the company has is aware of the liquidity needs for each BU, it can identify synergies between product lines. Complementary businesses can be managed together to increase yields while still managing liquidity risk. For the BU that is issuing very liquid liabilities, it may be able to invest in less liquid assets if another BU with less liquid liabilities invests in more liquid assets to ensure that the combined asset portfolio supporting the combined liabilities reflects liquidity needs of the enterprise. The company’s understanding of the liquidity risk in all its business lines enables it to manage the whole corporation effectively within agreed upon risk levels.

Liquidity risk management at both the BU and corporate levels requires regular monitoring of current and projected positions. Several different analytical tools exist which can assist the company in locating potential problems before they become real ones. These tools are described later in this document and are not intended to be an exhaustive list, since some companies may issue special products or have an investment style that merits development of a monitoring tool that is unique to that institution.

Monitoring liquidity risk without an appropriate action plan is incomplete risk management. When the liquidity risk level is too great, corporate management must be aware of the tools that it has available with which to lessen the risk, and it must be willing to use them when necessary. For example, many policies and contracts have deferral provisions (either in the documents themselves or under statutory provisions) which allow an insurer to take extra time to fulfill the cash obligation. Deferral rights only work if they are exercised. Assets that take six months to sell are available to meet cash needs six months from now only if the sales process is initiated promptly. Otherwise, the deferral rights may not be invoked soon enough and the sale of assets may not be initiated with enough lead-time to maintain the appropriate liquidity.

In summary, once a company has a portfolio strategy in place and issues products with appropriate designs, it must routinely monitor the liquidity risk and be prepared to act if necessary. All of these components can apply to the BU level and to the total company, and it is up to the company's management to select the level, the timing, and the tools that fit its business model.

Possible Sources of Liquidity Risk: Embedded Liquidity Options

There are many liquidity options within insurance companies' portfolios. It is up to the appropriate manager to identify what the risks are in the business and to assess the amount of liquidity risk that each option contributes to the company's liquidity profile. Risk assessment requires complete knowledge of all product designs and, for each product, determines whether the potential cash demand is predictable, whether the size of that demand is significant and whether the payout is due immediately or can be deferred.

Note that the following list of embedded options does not include the normal cash demands of the insurance business (i.e., claims for the lines of businesses being sold). It is assumed that the company knows its expected claim distribution and can manage the resulting liquidity demands using appropriate retention limits, cash flows, etc. While it is true that random events can cause the incidence of claims to exacerbate liquidity risk, that is not the focus of this paper.

The following list highlights embedded liquidity options that are relatively common among insurers:

Put options in funding agreements: A put option grants the customer or contractholder the right to surrender the associated policy or contract at any time in exchange for its book value. This option is often attached to institutional products called funding agreements. Funding agreements are often issued to money market funds, short term investment funds in pension plans (STIFs), security lending arrangements, and other institutional investment vehicles that have their own requirements for high liquidity. While the put option itself is a liquidity risk, the severity of the risk is dependent on the length of time that the issuer has to pay out cash. Once the put option has been exercised by the contractholder, payment can be required within 7, 30 or 90 days. Clearly, the 7-day requirement is the most risky, with the liquidity risk dropping as the payment date is

deferred. Many funding agreements involve floating rate interest credits and are backed by floating rate securities and some funding agreements have no put options.

Some funding agreements and GICs allow the contractholder to surrender at book value if the credit ratings of the insurance company drop below a certain level. Again, the contract must be analyzed to determine how long the issuer has to return the money. A more detailed discussion of this topic can be found in the Preliminary Report of the GIC with Credit Rating Downgrade Provisions Work Group of the American Academy of Actuaries to the Innovative Products Working Group of the Life and Health Actuarial Task Force of the NAIC in October 1999. A copy of the report is available on the Academy's website at www.actuary.org.

Market value adjustment provisions: A market value adjustment provision is similar to a put option in that it gives the customer the right to surrender the associated policy or contract at any time. However, the surrender amount is not necessarily equal to the book value. Instead, it is an amount that fluctuates with the market value of the underlying assets. The issuing company usually has a formula (that may or may not be written in the policy or contract), which allows it to take its cost of liquidating assets into account. Depending on interest rate levels and other market conditions, the surrender value may be either less than or greater than book value, although some contracts may only pay the lesser of book or market value.

Market value adjustment provisions can be found in both retail products and in institutional products, such as GICs. In analyzing the contribution of these provisions to liquidity risk, it is important to know if the adjusted funds must be paid out immediately or whether there are deferral rights available. As in other instances, the longer the deferral period, the lower the liquidity risk. Market value adjustments by themselves are a liquidity risk reduction technique because under normal circumstances, most customers are unwilling to accept less than book value at surrender. If the surrender value is actually greater than book, the market value adjustment is not a deterrent to withdrawal, but the market value adjustment formulas will reduce the risk of economic loss. However, for liquidity risk under a stress situation, there is nothing in a contract of this type to prevent surrender, so large cash demands could occur.

Surrender charge provisions: Like market value adjustment provisions, surrender charges are considered to be a liquidity risk reduction technique under normal circumstances. Policies with these provisions allow for surrender at any time at a surrender value that is always less than or equal to book. Surrender charges are usually found in retail products. Commonly, the charge during the first year after issue is a fairly high percentage of the book value (e.g., 7%). The intent is to discourage quick surrenders. The charge then grades down over time, so that after a given number of years, there is no surrender charge at all. In analyzing the liquidity risk of products with this feature, one should consider the size of the surrender charge and also whether deferral rights apply. Retail products may be covered by standard nonforfeiture laws, which allow insurers to defer cash surrender payments for a six-month period. The six-month deferral provision was added to the laws of the various states following a time of

financial stress in the early 1930s when the primary business of most life insurance companies consisted of the issuance of individual life insurance policies. However, under a stress situation there is nothing in a contract of this type to prevent surrender, so large cash demands could occur.

Loan provisions: Many retail products with cash values allow the policyholders to borrow against their policies. This feature can cause liquidity concerns because even though the amounts associated with individual loans may be small, under a stress scenario many knowledgeable policyholders will borrow as much as they can against their policies. In some cases, loans may be more valuable to the customer than surrender because the cash can be obtained without losing benefit protection or creating a taxable event. Loan provisions are also found in 401(k) pension plans, so products that are issued to these plans (e.g., GICs) may be affected by loan activity. This risk is covered in the section on benefit responsive options on GICs.

Group surrender options in COLI business: Corporate-Owned Life Insurance (COLI) is a funding vehicle used by large corporations to fund employee benefit plans and other liabilities. There are a number of other similar types of contracts, such as Bank Owned Life Insurance (BOLI). These contracts are typically a collection of many traditional or universal life policies written on individuals. However, since all the policies are controlled by a single organization, COLI agreements have a potential for entire groups of individual policies surrendering at the same time. While the underlying COLI contracts are usually individual policies that include a six-month deferral option, some companies may have side agreements that allow the contractholder to surrender funds at book value without surrender penalties in certain circumstances, such as a credit rating downgrade of the insurer. There are tax consequences associated with withdrawals that may reduce the likelihood of mass withdrawals of COLI business. However, despite some limitations on withdrawals, the funds are not locked in place and most cash values can be transferred out without penalty via 1035 exchange (a tax-free exchange to another life insurance company). Often times, the amount of work required to install the COLI program in the first place, provides an additional disincentive to terminate.

Benefit responsive options in GICs: GICs that are issued to defined contribution pension plans often include a benefit responsive option (i.e., a provision which allows participant-directed payments at book value for individual plan participants). Most GICs with this feature are sold to 401(k) pension plans. There can be many restrictions on participant withdrawals under 401(k) plans because these plans are intended to provide retirement income, not general asset accumulation. Plan participants can only withdraw their money when they terminate employment or prove severe personal financial hardship. While participants can take loans, the 401(k) plans have restrictions regarding amounts available for loans and they also have certain repayment requirements. The biggest benefit-responsive option liquidity risk for GICs may be that participants are allowed to move their money from one investment vehicle to another within the 401(k) plan. The size of this risk depends on the attractiveness of the other investments and the individual plan rules governing the timing of investment switches. Under normal circumstances and with proper underwriting, the benefit responsive option does not

present a major liquidity risk. Participants have control only over their own funds, which are small in size compared to the GIC itself. They also act independently, often in response to personal needs rather than the level of interest rates or other broad economic factors. However, large layoffs or early retirement programs initiated by plan sponsors of large plans (historically uncorrelated to stress events) could add to the liquidity risk in some stress scenarios. In addition, GIC contracts may include clauses applicable to these circumstances that limit the available book value withdrawals up to a certain percentage (e.g., 20%) of the GIC fund balance with only market value adjusted withdrawals allowed over that limit. These provisions reduce risk in a way similar to other market value adjustment provisions.

Separate account products: It is important to note that some or all of the liquidity options described in the preceding paragraphs may be found in separate account products as well. Sometimes the contractholder bears the risk for these options while other contracts may include guarantees from the general account. These guarantees must be understood and the underlying assets must be evaluated and managed to control the liquidity risk. Under normal circumstances, the assets in the separate account should be more than adequate to cover any guarantees, but stress testing could reveal potential cash demands on the general account.

Off-balance sheet guarantees: Comments regarding the risks in these guarantees (such as synthetic GICs) echo those under separate account products.

Provisions in reinsurance treaties: There may be provisions in reinsurance contracts that allow the ceding company to cancel the reinsurance contract with no penalty if the credit ratings of the assuming reinsurer drops below a certain level. Therefore, for the assuming reinsurer there may be additional cash demands in the event of a downgrade.

Derivative investments: Some swap agreements and other over-the-counter derivative instruments allow the owner to unwind the derivative at current fair value if one of the counter-parties' ratings drops below a certain level. Depending on the interest rates (or currencies or spreads) at the time of the unwinding, this may result in a cash demand.

Liquidity backstops: Insurance companies may act as liquidity backstops in a number of ways. For example, insurance companies may provide guarantees against asset default or they may provide guaranteed lines of credit to other companies (especially affiliated companies), which might result in a call to provide cash with very short notice. These guarantees will increase the liquidity exposure of an insurance company.

Possible Sources of Liquidity

Just as it is important to understand the sources of liquidity risk, corporate management needs to know the possible sources of cash if the need arises. Under a stress situation, neither the liabilities nor the assets are exactly equal to their book values. Therefore, a high surplus position does not necessarily eliminate liquidity problems that may face an

insurance company under stress. It is the interplay of liquidity risks in the assets and liabilities that determines the exposure.

Assets have different degrees of liquidity. Custom designed assets and assets such as limited partnerships may not be readily marketable. Even assets that are technically liquid, such as corporate bonds, may not be immediately liquid when one is trying to sell billions of dollars of assets within a few days. Further, due to interest rate increases or credit deterioration of the bond issuer, assets may have to be sold at less than book value or what in normal circumstances would be fair value. Some assets that appear on the balance sheet are not even available for sale. For example, the CARVM allowance for some separate account contracts is accounted for as general account negative liabilities, so they effectively become a general account assets. This may be an issue in a stress scenario, since this "asset" could not be accessed for cash, other than through reinsurance.

Before a stress situation strikes, a company should take an inventory of its potential sources for liquidity, both with regard to how much liquidity each source provides and what the numerous considerations exist for using that particular source. The following list represents various liquidity sources that are common in the insurance industry:

Asset sales: Since assets are not all equally liquid, when assets must be sold the company should have a priority order of sales. Lower quality publics and non-144A private issues can be liquidated, but they typically take longer to sell and the cash that they bring in will probably be somewhat below their fair value. Fair value may be above or below book value, which may be a concern for portfolios backing products that allow a book value option. The difference between the fair value and the estimated amount of cash that can be raised by a sale is often called a "haircut" in liquidity assessment. The size of a "haircut" on any particular asset or group of assets should be evaluated by investment managers who are closest to the particular deals.

Asset securitizations: As an alternative to selling assets (such as commercial mortgages), consideration may be given to securitizing assets. When determining the values to be assigned to assets, consideration is given to the cost (and time) to securitize an asset or asset class. The cost will depend upon the general appetite of the capital markets for such instruments, the amount an investment bank (or reinsurer) would charge to do the work to securitize the assets, legal costs, etc. One item to keep in mind is that if a company needs to securitize assets to raise cash quickly, then the cost to do so may be more than has historically been observed in the capital markets. Although the underlying assets owned by the company may still be of excellent quality, there may be a stigma associated with the company at that time leading to a widening of required spreads.

Borrowing: While a company is in good financial shape, it may wish to establish durable, ever-green (i.e., always available) liquidity lines of credit. The credit issuer should have an appropriately high credit rating to increase the chances that the resources will be there when needed. Attention is needed regarding the terms of the line of credit

to ensure that the loans would be available during a stress scenario with little or no negative repercussions.

Selling additional business: If a company is in a severe stress situation, selling additional business is probably not a viable option. However, if the company needs cash in less stressful circumstances but does not want to sell assets or to borrow, an additional sales push may be considered.

Risk Reduction Techniques

Once liquidity risk has been adequately assessed at all levels, management may decide to take appropriate steps toward minimizing its exposure to liquidity risk. This section lists some possible actions that a company can take while it is operating normally in order to reduce the liquidity risk.

Cash flow match: Ladder asset maturities to closely match liability maturities and expected payments. This increases the chances that there will be cash on hand to meet cash demand.

Diversify assets: An asset portfolio that is well diversified from all perspectives is less susceptible to a stress situation. Assets can be diversified by issuer, industry, region and asset class (e.g., having a large amount of real estate exposure can cause a lot of problems in a stress scenario).

Diversify liabilities: Diversification on the liability side by market, product, channel, etc. can also reduce exposure to liquidity risk.

Ladder liability maturities: With liabilities maturing at staggered dates, the company is not forced to “flood” the market with new sales to maintain the level of in-force business. During a “run-on-the-bank,” a company may be unable to issue new contracts or, if they can, only on unfavorable terms.

Back surplus/capital with liquid assets: Set aside capital/surplus backed with liquid assets to be available for extreme events such as a stress liquidity risk scenario. These assets would cover the difference between the stress scenario asset value and the liability value realizable over an intermediate term period such as three months. However, there is a price tag involved in back surplus (e.g., when investing in treasuries, you get less return). Reserves generally do not cover this extreme, tail type, event.

Establish a durable line of credit: This is discussed in the previous section.

Issue commercial paper: Under normal operations, a company can access short-term markets through issuance of commercial paper.

Use repurchase agreements : Use repurchase agreements (repos) to mitigate short-term cash needs. The use of repos may allow the company to hold onto liquid assets that are

needed for duration matching purposes and thus allow for the orderly liquidation of less liquid assets over a longer time period. The disadvantage to this in a stress liquidity risk scenario is that the repos typically tie up assets that are relatively liquid, so it is usually not a viable long-term solution to solve stress liquidity risk.

Purchase liquidity options from an investment dealer: It may be worthwhile to investigate the various derivative options that are available in the market.

Some Tools to Measure Stress Liquidity Risk Exposure

In order to determine a company's exposure to liquidity risk, a set of measurement tools should be selected and then applied to the company's portfolio. There are no simple formulas that work for all companies, but the basic tools that the industry uses can be classified into two groups: cash flow modeling and liquidity ratios. The following section presents an overview of these tools. It should be kept in mind that these tools are the monitors of a company's risk profile. They should be kept current (modified as the business changes) and re-run periodically and can be used for a BU or an entire company.

Cash flow modeling: While cash flow projections are often used for asset/liability matching and surplus testing (e.g., for the Actuarial Opinion and Memorandum), the projection mechanisms can be modified to examine liquidity exposure as well.

Cash flow modeling starts with projecting all known cash flows, such as asset maturities, interest payments, and liability payments (including expected benefit payments and contractual GIC and funding agreement maturities). These cash flows can be projected for a short or intermediate length of time, depending on how they are to be used. New business flows can be estimated and added if desired.

A sophisticated model can then undergo various shocks to see where the largest cash mismatches may occur. The modeler can assume that various options will be exercised at various times on both the asset and liability flows. Using appropriate option models can be helpful in this exercise.

Results of these tests can warn management of potential cash shortfalls. Management can then put an action plan in place to reduce the risk, depending on its likelihood and its proximity in time.

Liquidity ratios: Liquidity ratios are a commonly used tool to assess a company's liquidity risk. The concept itself is fairly simple. For a given point in time, liquidity-adjusted assets are divided by liquidity-adjusted liabilities. If the resulting ratio is greater than some target number (>1), then the company can feel fairly confident that its exposure to liquidity risk is acceptable. If the resulting ratio is too small, the company will want to take steps to reduce the risk. For example, the assets or the liability mix may need to be restructured.

In order to determine the value of the liquidity-adjusted assets and liquidity-adjusted liabilities, appropriate “haircuts” must be developed and applied to the book values or fair values of assets and liabilities. When developing a “haircut” for book values, consider the “haircut” as being comprised of two components: one to reflect the difference between book value and fair value and a second to reflect estimated liquidation costs or effects. The intent of liquidity “haircuts” is to help approximate potential cash demands and potential cash available. These “haircuts” should be left to the discretion of the company and should reflect company specific sales (and redemption) practices as well as levels of liability risk with relevant experience if possible. However, it is important to understand the assumptions underlying the “haircuts” in order to correctly interpret the result.

As an example, consider the development of “haircuts” for assets. The first step is to group existing assets into categories with similar liquidity profiles, such as all NAIC Class 1 private placement non-144A bonds. The number of distinct asset categories is dependent on the asset portfolio of each company, although distinctions between bonds and equities, public and private issues, and NAIC credit quality ratings are logical choices.

Once a category is selected, there are two dimensions to consider in choosing a “haircut.” The first dimension is the time frame. Over a long enough period of time, liquidity risk is mitigated as most assets mature or can be sold and funds are made available to pay policyholder demands. The main subsets of time will vary by company based on the contractual demands of its liabilities, but generally will include short-term and intermediate term periods such as seven days, one month, three months, and one year.

For example, in defining a “haircut” factor for NAIC Class 1 private placement non-144A bonds, one needs to know whether the starting point will be fair value or book value and whether one is looking at a short or long-term time horizon. If only book values are available for this asset class, a first step might be to assess the underlying yields and durations of the bonds to estimate their fair value. If the “haircut” is for an immediate-time horizon, current yield curves and spreads may be used in its development. Suppose current interest rates have gone up relative to the underlying yields so that fair value is only about 95% of book. This 5% “haircut” can be considered the C-3 component in the development of a liquidity analysis. If fair value for the portfolio is available to start with, this component is not necessary in a short-term analysis.

The fair value of the asset class is then compared to a best estimate of the cash these assets would bring at sale. Private placement non-144A bonds are more difficult to sell than publicly traded bonds, so if a company had to sell a large number of them in a short period of time, the resulting cash may only be 97% of their fair value. In this example, a short-term “haircut” might be 3%, resulting in a liquidity adjustment factor ($1 - \text{“haircut”}$) of 97% for factors applied to fair value. For factors to be used against book value, the “haircut” would be 8% (liquidity adjustment factor of 92%) with the 5% C-3 component included.

For “haircuts” to be used in longer-term analyses, both components of the “haircuts” would have to be reevaluated. The liquidity component would probably drop because the chances are greater of selling assets at fair value over a longer period of time. The C-3 component may or may not change, depending on assumptions made about future interest rates.

The second dimension to consider in choosing a “haircut” is the scenario that is being tested. Possible scenarios could include business as usual, extreme economic stress, or increasing/decreasing interest rates by X%. Companies may also choose to test several levels of assumed liability withdrawals.

If we assume that the factors in the preceding example are intended to be used for a short-term, non-stress situation, then it also might be useful to develop short-term stress factors as well. While the C-3 component might remain unchanged (depending on the assumptions triggering the stress), the liquidity component of the “haircut” would probably increase. A fair value “haircut” might jump to 6%, with a resulting liquidity adjustment factor of 94%, depending on the details of the portfolio and knowledge of existing markets. Alternatively, “haircuts” could be developed for different interest rate levels, which may keep the liquidity component unchanged but which would affect the fair value or C-3 component.

Total liquidity-adjusted assets for a single time frame and a single economic scenario should include all assets after the “haircuts” plus any other liquidity resources, such as a line of credit. They may be reduced by known liability maturities that will occur in the time-frame being tested, although doing this requires attention in constructing the liquidity-adjusted liabilities to avoid possible double counting.

While the preceding example has focussed on the assets, similar “haircuts” need to be developed for the liabilities. Again, time frame and economic scenarios must be considered in choosing the factors, understanding how those assumptions will affect the exercise of any embedded options. It is important that the factors used on the assets and liabilities are consistent with each other, since liquidity measurement cannot be successful if it analyzes only one side of the balance sheet by itself. The riskiest liabilities (in a stress type scenario) are usually those where knowledgeable policyholders can get their money quickly and easily without penalty.

The first step in developing “haircuts” for funding agreements or GICs is to separate the total liability for these products by surrender provision. “Haircuts” can then be applied to either the book or surrender value. Products with few surrender penalties (such as funding agreements with 30-day puts) should have little or no “haircut” and a liquidity adjustment factor close to or equal to 1. Products with deferral rights may have factors that reflect the use of those rights, depending on the scenario being tested. Funding agreements and GICs with no surrender options and distant maturity dates should have a liquidity adjustment factor of close to zero (a “haircut” close to 1).

If a company develops factors for several time frames and test scenarios, it might end up with a matrix similar to the following:

**Sample Liquidity Analysis Assessment
Based on Liquidity Ratios**

	Seven days	One month	Three months	One year
Base Case (Business as Usual)				
Liquidity-Adjusted Assets				
Liquidity-Adjusted Liabilities				
Base Case Liquidity Ratios				
Base Case Risk Targets				
Base Case Risk Assessment				
Stress Case				
Liquidity-Adjusted Assets				
Liquidity-Adjusted Liabilities				
Stress Case Liquidity Ratios				
Stress Case Risk Targets				
Stress Case Risk Assessment				
Sensitivity Test Scenario A				
Liquidity-Adjusted Assets				
Liquidity-Adjusted Liabilities				
Liquidity Ratio under Test A				
Risk Targets under Test A				
Risk Assessment under Test A				
Etc.				

An example of complete sets of book value adjustment factors for liquidity ratios under two time frames can be found in the Standard and Poor's "Insurance Liquidity Model" listed in the Appendix.

CONSIDERATIONS OUTSIDE INSURANCE COMPANIES

Rating Agencies

Rating agencies regularly examine liquidity risks in insurance companies. In general, well-run insurance companies consider the rating liquidity guidelines in their work, but may set up their own standards specifically relating to their own company's asset and liability structure.

Some rating agencies currently use a liquidity ratio approach to measuring stress liquidity risk. As described in the preceding section, various types of assets and liabilities are assigned different factors. Higher factors are given to more liquid items. These are then multiplied against the in-force assets and liabilities by category, and the resulting liquidity ratio is considered when deriving a credit rating.

Rating agencies have published several articles on the subject of liquidity. They have examined certain liabilities (e.g., funding agreements) that impose a greater possibility of liquidity risk. These articles may be available on the rating agencies' website.

Possible Regulatory Actions With Regard To Stress Liquidity Risk

There are a number of possible regulatory actions that may be taken in connection with liquidity risk management. For example:

Reliance on corporate governance: A formal plan and a company's procedures for monitoring compliance with that plan may be required for review by regulators. This is being used to a great extent in the banking sector. Reliance on corporate governance of this type may be combined with one or more of the items below.

Certification of liquidity plan: A sign-off on the appropriateness of the liquidity plan, processes and procedures could be required. In order to have the most impact, the sign-off should be by an appropriate senior officer (e.g., the corporate actuary, Chief Financial Officer, or Chief Investment Officer). This individual may be appointed by and/or report to the Board of Directors.

Certification of stress liquidity risk: As with actuarial opinions, there could be a periodic certification that the company has tested the exposure to the stress liquidity risk and that the stress liquidity risk of the company is manageable. An actuary or other qualified officer appointed by, and reporting to, the Board of Directors or a committee thereof could do this certification. It is suggested that actuaries provide this certification, with reliance on other responsible parties. The advantage of a having an actuary provide such certifications is that the actuary is trained to do modeling of the company's business. Actuaries must also comply with Actuarial Standards of Practice (ASOPs) to ensure professionalism. Should actuaries be required to perform stress liquidity risk certification, guidance could be provided through an ASOP written specifically for this role.

Liquidity interrogatories: The New York Department of Insurance has been working on interrogatories to be filed by an insurer presenting a liquidity profile. Depending on the answers to those interrogations, additional questions may be asked. Certain companies may also be invited in to personally discuss their liquidity risk management with department personnel.

Review and pre-approval of certain contractual provisions: States could consider requiring companies to obtain approval of contractual provisions which may be a cause of liquidity concern, such as put or credit-rating downgrade provisions.

Disapproval of certain provisions: States have the authority to disapprove/not permit certain provisions..

Liquidity Risk Management In Banks

Liquidity risk management is important to banks. The Basel Committee on Banking Supervision published a paper on this subject in February 2000. This paper presents a set of 14 principles (some of which are listed below) in the following key areas:

- Developing a structure for managing liquidity
- Measuring and monitoring net funding requirements
- Managing market access
- Contingency planning
- Foreign currency liquidity management
- Internal controls for liquidity risk management
- Role of public disclosure in improving liquidity
- Role of supervisors

This paper can provide insights that are useful to the discussion of liquidity risk management by the life insurance industry. See the Appendix for further details on obtaining this paper.

CONCLUSION AND SAMPLE "BEST PRACTICES"

It is important for companies to focus on liquidity risk management. The risk affects a company's credit worthiness as well as its total balance sheet composition (assets in light of liabilities). The key to managing liquidity risk is to ensure that the company constantly monitors liquidity in an appropriate manner, keeps channels of communication open and acts promptly to avoid situations of extreme liquidity risk.

Since the management of liquidity risk can be complex, it is helpful to get an understanding of how the principles of liquidity management can be used in actual circumstances. The following examples provide three companies' approaches to liquidity risk management. They are provided solely for illustrative purposes and not to suggest that other approaches are unacceptable.

COMPANY A:

Corporate Oversight

The company's organization is based on small corporate departments and operating divisions (life insurance, annuities, group insurance and pension/institutional products) that generally operate independently subject to oversight of policies and results.

Corporate oversight of liquidity is provided by the Chief Financial Officer, an Investment Committee that reviews investment guidelines and a Finance Committee that reviews product design, pricing and product portfolio investment guidelines.

The company has commercial paper, bank lines of credit and repurchase agreements in place. Cash forecasts are updated daily.

Investment Guidelines

Corporate-level general account investment guidelines provide limits on the ratio of marketable securities (including investment grade 144A securities) to surrenderable liabilities. The limits are lower for life insurance and annuities, medium for pension/institutional products and higher for group insurance.

Corporate-level guidelines also establish limits with respect to credit risk and interest rate risk.

Within the divisions, separate portfolios and guidelines are created whenever necessary to properly manage risk and support products. Liquidity guidelines are designed with consideration of expected client behavior and surrender provisions in policies.

Product Design

In product design, special attention is paid to surrender and other liquidity provisions. Some policies provide for delays in providing funds on surrenders (up to 6 months for life insurance and annuities, 30 days for GICs). Pension/institutional products either do not permit early termination provisions or have market value provisions that are designed to prevent loss to the company. Contracts with short-term and downgrade put provisions are limited to a specified percentage of general account assets.

Reporting

Compliance with investment guidelines (including liquidity) is reviewed by the corporate Investment Committee and by the Board of Directors' Investment Committee.

The liquidity status of division portfolios and of the company general account is reported quarterly to the corporate Finance Committee. Particular attention is paid to the ratio of the fair value of assets that could be sold within 30 days (cash, short-term securities, marketable bonds, and 144A private placements, single family residential mortgages that could be securitized and common stock) to the surrender value of liabilities. The comparisons are made at current interest rates and interest rates 2% higher.

Special liquidity ratios are calculated quarterly for GICs issued to 401(k) plans and funding agreements with short term puts and downgrade puts issued to institutions. A "bank run" scenario tests the relationship of cash, public securities, 144A bonds and common stock to the percentages of GICs and funding agreements that might be surrendered. A general "liquidity crunch" test compares the fair values of cash, public bonds and common stock to 100% of funding agreements with short term and downgrade puts.

COMPANY B:

Liquidity is one part of the risk management process and is integrated with pricing, capital management and Asset Liability Management (ALM) practices. Part of the risk management is the ability to meet liquidity needs by managing both the liability side (need to raise cash) and the asset side (ability to raise cash). The liquidity studies range from normal to stress situations.

A cash flow projection process (not to be confused with scenario cash flow testing for the Actuarial Opinion) encompasses daily, monthly and annual projections of contractual and anticipated liability and asset activity. These projections are used to manage the day to day cash flow, and the variance in those cash flows.

The scenario cash flow testing for the Actuarial Opinion tests the application of the ALM strategies for the various segments and lines of business over longer periods of time under various scenarios. This scenario testing is for forming an opinion on reserve

adequacy, and, therefore, does not consider stress situations, which are more a function of total company resources.

Liquidity testing under a variety of stress scenarios is done quarterly. Usually, these are on immediate scenarios (severe withdrawals over one month) and ongoing scenarios (heavy withdrawals over at least a year). The assumptions are on an internal and on a rating agency's bases. For liabilities, the assumptions consider the capability and likelihood of withdrawal. For assets, the general marketability and liquidity are considered. For some segments, the company also looks at the specific policy/contract liability outflows and then at the specific assets that would be available to cover the outflow. These studies are done under a variety of scenarios applicable to both the intensity of the liability outflow and the marketability of assets.

COMPANY C:

The understanding of liquidity risk begins with the quantification of general liquidity needs on an operational or going concern basis as well as an understanding of liquidity requirements during a "crisis of confidence." The level of liquidity is defined as the amount of cash or access to cash (at reasonable cost), necessary to meet obligations and commitments on a timely basis, both expected and unexpected, without suffering financial loss. The analysis includes:

- How much liquidity is needed on a going concern basis?
- How much liquidity is needed to prevent substantial loss should there be a "run on the bank?" What is the exposure to sudden withdrawals/surrenders from policy/contractholders?
- What are the sources of liquidity (e.g., committed bank lines, commercial paper, repurchase agreements)?
- Has yield been sacrificed by over-weighting exposure to lower yielding, publicly traded, fixed income assets to a greater extent than necessary?

The focus is on risks associated with having "too little" liquidity and the costs of having too much liquidity. The steps of analysis include:

A. "Quantify liquidity needs" in both a no- crisis and crisis environment (severe increase in interest rates, loss of confidence, concentration of control) first determining the operating cash flow on a going concern basis:

1. premiums and considerations	xxx
2. net investment income	xxx
3. return of principal	xxx
4. benefits, surrenders, policy loans dividends	xxx
5. commissions, expenses & taxes	<u>xxx</u>

6. (1)+(2)+(3)+(4)+(5)

xxx

Then determine what would happen in the event of a business crisis, such as a spike in interest rates of 300 basis points (increased surrenders and withdrawals and decreased return of principal). This would imply, for example, that no new premiums may be received on institutional business.

The exposure to crisis of confidence may be different by distribution channels, clients and consultants and geographic regions.

The company measures exposure to disintermediation, although some of the problems in past years may have lessened, e.g., the fixed policy loan rates that caused a problem in the 1980s may have generally been replaced by variable loan products. In addition, tax arbitrage opportunity may be gone. Also commitments on private placement have generally been reduced to months, not years.

B. Determine the “sources of liquidity” (commercial paper, revolving credit facility and collateralized loans through the repo market) and quantify liquidation of the balance sheet (1 week, 1 month, 6 months.). Consideration should be given to the liquidation of balance sheet assets in quantities that may disrupt the market would carry the most significant cost.

C. Determine whether yield has been sacrificed. To quantify cost of liquidity, the company examines yield premium. To capture the cost of liquidity - look at no crisis scenario, subtract off the bid/offer spread, adjust the bid/offer spread to reflect the widening of spread when selling assets, assign probability weightings to each scenario.

D. Recommend appropriate level of liquidity.

E. Determine the company's tracking and monitoring program (e.g., set of liquidity ratios, reports of available sources, and other non-financial measures).

F. A crisis management plan is determined, written, and communicated to senior management.

APPENDIX: Additional References

The following documents provide further information on liquidity risk management:

American Academy of Actuaries, "Preliminary Report of the GIC with Credit Rating Downgrade Provisions Work Group to the Innovative Products Working Group of the Life and Health Actuarial Task Force of the NAIC," October 1999. This report details the different types of products and features available in the institutional market.

American Academy of Actuaries Valuation Task Force, "Presentation to the Life and Health Actuarial Task Force on Viability Analysis," June 2000. This report looks at reserves from a holistic view and focuses on risk management.

Canadian Institute of Actuaries, "Liquidity Risk Measurement," March 1996. This study note describes the different types of liquidity, and the different testing actuaries should do with regard to liquidity.

Basel Committee on Banking Supervision, "Sound Practices for Managing Liquidity in Banking Organisations," February 2000. This report details the recommendations for banks regarding liquidity. It can be downloaded from the Bank for International Settlements website at www.bis.org/publ/index.htm.

Moody's Investors Services, "Rating Methodology – Assessing the Strength of a Liquidity Facility," June 1999.

Moody's Investors Services, "Alternate Liquidity: Current Topics and Trends," November 1999.

Moody's Investors Services, "Rating Methodology – Moody's Approach to Assessing the Adequacy of 'Liquidity Risk Insurance,'" January 2000.

Moody's Investors Services, "GICs and Funding Agreements: Evolution of a Popular Product," April 2000.

Moody's Investors Services, "GENERAL AMERICAN: A Case Study in Liquidity Risk," August 1999.

Moody's Investors Services, "Alternate Liquidity For Banks' Commercial Paper – Rating Methodology," October 2000.

New York Circular Letter Number 35. This is a letter sent to companies that do business in New York, asking for information regarding liquidity. The 1999 version of this is available from the New York State Insurance Department website at www.ins.state.ny.us. The Department is redrafting the circular letter for year-end 2000.

Standard and Poor's, "Insurance Liquidity Model," February 1999. This report shows factors used by Standard and Poor's when assessing liquidity risk. A number of insurers use these factors as a starting point to assess their own liquidity.