



AMERICAN ACADEMY *of* ACTUARIES

**Report of the Life Liquidity Work Group
of the American Academy of Actuaries
to the Life Liquidity Risk Working Group of the NAIC
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REPORT OF THE AMERICAN ACADEMY OF ACTUARIES' LIFE LIQUIDITY WORK GROUP

OVERVIEW

Liquidity is the ability to meet expected and unexpected demands for cash. 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 and monitor this risk.

The profile of many life insurance companies' businesses has changed over the years, in that investment oriented business has generally become more important. Due to recent problems in the industry, such as the failure of General American, liquidity risk has again been emphasized. Many companies have now begun to pay more attention to this risk.

The American Academy of Actuaries' Life Practice Council has made risk management issues such as liquidity risk management one of its major topics for this year. In addition, the NAIC appointed a Life Liquidity Risk Working Group to examine this issue. 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, the Academy formed the Life Liquidity Work Group, who developed this report. The Academy work group would like to thank the interested parties that participated in this project, particularly Douglas W. Barnert.

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 on-going cash flow management, which typically looks at 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 will briefly cover all three types of liquidity, but will focus on stress liquidity risk. It will identify some fundamental issues, with some suggestions on how to manage these risks. It is meant to serve as an educational tool for actuaries and regulators considering liquidity risk.

BACKGROUND

Liquidity Management

There are different types of liquidity management concerns:

- a) **Day-to-day cash management** - this type of liquidity involves handling day-to-day cash flow variability through a combination of cash positions and lines of credit. It is important to keep on top of short-term liquidity needs so that unforeseen events do not cause a company to take actions that may be detrimental to their earnings.
- b) **Ongoing/ intermediate term cash flow management** - this type of liquidity looks at on-going liquidity needs over the next six to twenty-four months. It involves analysis on cash inflows and outflows. If there is an evolving pattern that reduces liquidity ratios (cash inflows over cash outflows), this type of management would involve a plan as to how liquidity will be restored. 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).
- b) **Stress liquidity risk** – this type of liquidity involves the ability of the company to meet the demands of contractholders should many termination provisions be invoked. Although the occurrence of this event may never take place, it is essential that the cash demand be met if it does. This situation can lead to insolvency. This is a catastrophe situation. Surviving this may not mean that the company is unscathed; for example, the company may have to exit certain types of institutional businesses. Survival does mean that the company would be able to stay in business and be solvent on a statutory basis, including consideration of risk-based capital requirements.

Good liquidity management involves a plan and ongoing monitoring at all three levels. The focus of this report is on the third level of risk.

At the heart of liquidity risk is the fact that liquidity is something that is not asset or liability specific, but is driven from a total enterprise perspective and the liquidity profile of the assets and liabilities. It is not true that the rating and financial strength (mainly the capital position) of a company are the only indicators of a company's stress liquidity risk, although the strength of the company may give it more time to react to demands for liquidity caused by changes in the economic environment. A company could have highly liquid liabilities, but if they are totally invested in Treasury bonds then liquidity is not an issue (remaining in business due to a lack of profitability is the real issue in this example). Likewise, having a portfolio of very illiquid assets is not material if there are few/no instances where clients can take their money before the assets mature and the company has adequate asset/liability management.

Liquidity risk should therefore be managed by evaluating what might happen in the future from a standpoint of liquidity needs on the liability side and available liquidity on the asset side. The goal is to ensure that cash will be available when needed to pay benefits under any reasonably foreseeable set of circumstances. Some companies require less sophisticated liquidity risk management. For example, if a company had all 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, so sophisticated modeling would not be required. Other companies may need to look at a variety of scenarios of what could occur on the liability side under various economic and company specific instances and determine what assets could be liquidated in a timely, and cost effective, manner.

Liability Issues

Liquidity has always been a concern for life insurance companies. This concern was reflected by providing in the ordinary life standard nonforfeiture laws of the various states that life insurance companies could 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 thirties when the primary business of most life insurance companies consisted of the issuance of individual life insurance policies.

Over time, policyholder demographics have changed as markets served by life insurance companies have changed. Although many individual insurance contracts still contain the six-month provision, other contract types, because the standard nonforfeiture law does not cover them, do not. For example, most group life and group annuity contracts, which were exempt from the standard nonforfeiture law, do not involve the six-month rule. Funding agreements, which are a relatively recent development, are not required to have a deferral provision. Many of these newer types actually do have deferral provisions, although seldom of six months in length. More recent contracts are often issued in larger amounts or to contract holders that can exercise options for a large number of policyholders. By excluding the six-month rule, many believe that they create a preferred class of contractholders.

As clients have become more sophisticated, the demands on insurance companies increased. For example:

- Some funding agreements issued to entities other than pension plans have offered institutions the ability to surrender their contracts at book value with short notice (7, 30 or 90 days) or on downgrade of the insurer by one or more rating agencies.
- In Guaranteed Investment Contracts (GICs) used for defined contribution pension plans, a common provision is to allow payments at book value for individual plan participants (called benefit-responsive GICs). This provision

has also been made available to large numbers of participants when a company has a large layoff or early retirement program.

- In the individual and group businesses, there are contracts with general account guarantees on separate account products (e.g., a minimum return guarantee, variable annuities with guaranteed living benefits, etc.).
- Off-balance sheet guarantees, such as guarantees provided for synthetic GICs.

Asset Issues

Historically, the provisions in life insurance policies allowing for the deferral of surrender payments enabled life insurance companies to invest in illiquid assets such as real estate, commercial mortgages and non-144A private placement bonds. More recently insurance companies have availed themselves of further investment opportunities providing enhanced income that impose additional liquidity contingencies. These new investments include:

- commercial investment pools that, depending on the tranche, may provide high credit rating and higher yields at the expense of liquidity,
- swaps and other derivatives with downgrade or put provisions that are tailored to the specific needs of the insurance company at the expense of liquidity,
- agreements to provide letters of credit that may require cash payments on short notice.

The assets mentioned above may increase stress liquidity risk.

Summary

Both assets and liabilities can contain options that increase liquidity exposures. A high surplus position does not mitigate liquidity problems that may face an insurance company under stress. It is the interplay of the combination of liquidity risks in the assets and liabilities that determines the exposure. The lack of liquidity in a stress scenario has been a contributor to some recent insolvencies and should be a major concern of insurance company management. The liquidity risk is an inherent risk of insurance companies. The challenge is to understand the risk and to monitor, measure and manage that risk.

LIQUIDITY

Possible Causes of Stress Liquidity Risk

Stress (run-on-the-bank) scenarios may be triggered by a credit rating downgrade. They may also be triggered by such events as negative publicity, where the media may find a real or assumed problem, and the resulting bad press causes a run on the bank. Any run may be exacerbated by more sophisticated contractholders who can act extremely quickly to demand their money subject to contractual limitations. Companies without well-diversified product lines are particularly susceptible.

Another cause of a potential “out of the ordinary” scenario is an event within the industry. If one company has a bad experience and another company happens to have a similar composition of products, the result may be that the second company may also experience substantial problems.

Key contributors to failure with respect to stress liquidity risks include size of contractholders, size of the company, predictability and experience:

- The amount of money controlled by a single contractholder is very important. Large sums of money under the control of only a few outside contractholders are the biggest risk.
- The size of the company can influence the access to capital markets. If a company is too small, they may not have the wherewithal to 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 at a fair value.
- Predictability is a major driver of liquidity risk. A large cash demand that can appear suddenly is a risk; if a large cash payout is known to be required on a given date, the company can arrange to have enough cash on hand to make the payment. Knowing the required amount and date ahead of time neutralizes liquidity risk. So, for example, GICs that have no surrender provisions have minimal liquidity risk because the cash flows are predictable.
- Timing is essential. If an unpredictable liability causes an unplanned cash need two years from now, that risk is minimal. If the cash demand is due tomorrow, there is a potential problem (again, if the size is significant). A GIC contract may have a 90-day delay provision - or none at all. The risk cannot be determined by the product name – a liquidity analysis must look to the specific features of each company’s products.

Prior Liquidity Problems

Liquidity, or the lack thereof, caused General American in 1999 to voluntarily seek state insurance department supervision when the demand for cash exceeded the readily available supply. This company had over \$6 billion of floating rate funding agreements with “7 day puts,” which allowed the funding agreement contractholders to demand their

money with 7 days notice to the insurance company. These puts were not limited to downgrade, but could be executed for any reason. Nevertheless, when General American was downgraded by Moody's Investor Services to a rating of A3, many contractholders demanded their money. Although General American had assets, they were quite illiquid, forcing them to ask for state supervision.

Liquidity in Other Financial Institutions

Liquidity concerns are not limited to insurance companies. For example, the phrase "run on the bank" was developed when banks, which had assets but not those that could be readily converted to cash, had large demands from their customers for cash – e.g., during the Depression. If a bank had trouble meeting a cash demand, customers panicked and asked for all their money, precipitating a crisis.

Long Term Capital Management, a highly leveraged investment firm, is another example of a more recent liquidity crisis. When the market turned against them and others became aware of the acute problems this was causing, they did not have enough cash to cover all the demands. This resulted in investment banks contributing hundreds of millions of dollars to cover the outstanding liabilities.

Review of Embedded Liquidity Options in Liabilities and Assets

There are many liquidity options within the liabilities issued and the assets bought by insurance companies. For example:

Institutional products

Funding agreements with put options: This type of contract is issued to money market funds that have their own requirements for high liquidity. The particular option allows the contractholder to put back the contract to the insurance company at book value with notice that can be as short as 7, 30 or 90 days. Due to the severe concentration of this risk for General American and the lack of liquidity on the asset side, this became overwhelming for the company. Other GICs and funding agreements allow the contractholder to surrender at book value if the credit ratings of the insurance company drop below a certain level. A more detailed discussion on this topic can be found in the Preliminary Report of the GIC with Credit Rating Downgrade Provisions Working 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.

Standard GIC contracts: A number of GIC contracts do not allow for premature surrender, or, if allowed, there would be a market value adjustment. However, GIC contracts issued to defined contribution pension plans allow for benefit responsive withdrawals as provided by the pension plan. This could include large payments during

layoffs, early retirement programs, etc. Unlike most individual contracts, surrender of the entire contract by the plan (usually to transfer the plan funds to another funding vehicle) is typically subject to a market value surrender penalty. However, this may not prevent large cash demands in the event of a stress situation.

COLI: Corporate-Owned Life Insurance (COLI) is a funding vehicle used by large corporations for decades to fund employee benefit plans and other liabilities. There are a number of other similar types of contracts, such as BOLI (Bank Owned Life Insurance). For the purposes of this document, COLI will be used as a generic term for contracts issued on individuals, but controlled by a single organization. These contracts are written as traditional or universal life policies on individuals. COLI agreements have a potential for entire groups of individual policies surrendering at the same time. The COLI underlying contracts are typically individual contracts and may have a six-month deferral option. Some companies may have into side agreements that allow the contractholder to surrender without penalty in certain circumstances, such as a credit rating downgrade of the insurer. However, the tax consequences of withdrawal may reduce the likelihood of mass withdrawals of COLI business.

Retail Products

Individual Contracts: There are provisions within individual contracts that may raise liquidity concerns also, due to the ability of policyholder to surrender the policy without penalty. For example, if surrender charges drop over time (i.e., 7% scaling to 0% over 7 years), then liquidity risk increases as this charge drops. The ability of the policyholder to borrow against their policies can also cause liquidity concerns, since, in a stress scenario, we assume many knowledgeable people will borrow as much as they can against their policy.

Market Value Adjusted Contracts: If a product has a full market value adjustment (MVA), it will probably lessen the risk to a degree under normal circumstances. However, under a stress scenario an MVA with a fixed adjustment formula is not going to be as effective.

Separate Account Products: Separate account products have become very important to a number of companies. The CARVM allowance for these contracts is accounted for as a general account negative liability, so it effectively becomes a general account asset. This may be an issue in a stress scenario, since this “asset” could not be accessed for cash.

Reinsurance Treaties: There are provisions in more recent 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.

Assets

Derivative Investments: Some swap agreements and other over-the-counter derivative instruments have the ability to unwind 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 payment at the time of a credit rating downgrade.

Liquidity Back-stops: Insurance companies may act as liquidity back-stops in a number of ways. For example, insurance companies may provide guarantees against asset default or guarantees that pension plan benefit payments will be made at book value under synthetic GICs. They may provide guaranteed lines of credit to other companies, which means that the issuing insurance companies may be called upon to provide cash with very short notice. These guarantees will increase the liquidity exposure of an insurance company. This can cause great difficulty if this back-stop is provided to other companies, especially affiliated companies, in the life insurance industry that develop a liquidity crisis, which can lead to stress liquidity risk.

Other Asset Concerns Regarding Liquidity

Assets have different degrees of liquidity. Custom designed assets and assets such as limited partnerships may not be readily marketable. Also, 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.

WAYS TO MANAGE STRESS LIQUIDITY RISK

Discussion of the Stress Liquidity Risk Management Process

The keys to reducing stress liquidity risk are product design, portfolio strategy, systematic monitoring, and preparedness to act. Communications and coordination through a strong corporate oversight function are essential in a multi-line environment. The key is to have potential contractual payment obligations (including deferral rights) aligned with the liquidity timeframes of the asset classes in the portfolio and to maintain a proper asset/liability liquidity profile at all times. One tool for doing this is to build a grid showing demand funds by timeframe and to add known significant scheduled payments (debt repayment, product maturities, etc.), comparing this potential demand to asset categories, using an estimated timeframe for liquidation for the class. For each timeframe, the sum of the assets that can be liquidated close to fair value should at least equal a reasonably foreseeable worst case demand. (Note: "fair value" is usually close to market value, but may not be close to book value for some assets.) Durable credit lines should also be considered in this test.

There are merits of looking at the liquidity risk of a business unit (BU) first, before the results of the total company are analyzed if the company has segregated asset portfolios. While it is the profile and strength of the total company that matters the most, any “problems” usually begin to occur when a particular line of business is being more aggressive in the management of its liquidity risk than others in the company. By evaluating each BU on a “stand alone” basis from the sense of its liquidity, one typically would be able to spot potential problems before they occur. Complementary businesses would also typically mean that the company as a whole has less risk. For example, if business unit issues very liquid liabilities, it may be important to ensure that the asset portfolio supporting those liabilities reflects a more liquid asset mix than would be considered traditional. By looking at the stress liquidity risk of the BU in this way, one can ensure that the risks being taken by that BU are reflected in its asset mix. The BU is then free to more optimally manage its risk and return such that it understands the “cost” of giving clients more liquidity on its products. Once a company has a good feel for the liquidity needs at a BU level, it can then roll up these results, identify synergies between product lines and manage the whole corporation effectively within agreed-upon risk levels.

Liquidity management for the run-on-the-bank scenario is an enterprise wide concern. Some product lines may naturally create more excess liquidity and others less. If the overall liquidity profile comes out desirable in combination, the result can be truly synergistic.

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. This is why regular monitoring of the liquidity grid and of cash flows at both the BU and company levels is needed. Otherwise, the protective clauses may not be invoked soon enough and the sales of assets not initiated with enough lead-time to maintain the appropriate liquidity relationships going forward.

In summary, an asset portfolio with liquidity characteristics that match well against the liquidity provisions of the products, combined with a well disciplined enterprise-level process for monitoring the liquidity grid and cash flows and initiating action in the rare event that it becomes necessary, are usually the keys to preventing a liquidity crisis.

Ways to “Manage” Stress Liquidity Risk

The objective of managing liquidity risk is to ensure that sufficient cash can be raised in a timely manner to meet all foreseeable demands for payment under insurance contracts and other obligations of the company.

Items to consider include:

- Ladder liability maturities so the company isn't 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.

- Ladder asset maturities to closely match liability maturities and expected payments.
- Do not have a large percentage of securitized assets that the company issues maturing at the same time (since a company may need to buy those back at maturity, and cash for this would not be available in the event of a stress liquidity risk scenario).
- 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.
- Have back-stop liquidity lines:
 - Be able to draw millions of dollars at a short-term notice, with a guaranteed price; this can be very helpful in difficult times.
 - It is typically best to have these outside of the “family” (i.e., having support from a parent company, even if in another country, while valuable may not matter much if the whole organization is in trouble).
 - The key here will be to set up liquidity lines that are durable. If the counterparty can get out of lending to a company when it needs it most (e.g., by insisting that the company maintain a credit rating of a certain quality), the counterparty’s promises may not be very valuable in the event of a stress liquidity risk scenario.
- Purchase credit derivatives that will pay in the event of a downgrade (or spread widening) of the company, or the sector of the financial services industry the company is in.
- Similar to the above, own equity puts that would theoretically pay off in a company, or industry, specific stress scenario.
- Purchase liquidity options from an investment dealer (relatively new item).
- Assets are well diversified from both a name standpoint and also an asset class standpoint (e.g., having a large amount of Real Estate exposure can cause a lot of problems in a stress scenario).

- Set aside capital/surplus backed with liquid assets to be available for extreme events such as a stress liquidity risk scenario. (This capital would cover the difference between the stress scenario asset value and liability value realizable over an intermediate term period such as a three months time period.) Reserves generally do not cover this extreme, tail type, event.
- Assume premiums and deposits from policyholders will decrease or cease.
- Consider asset extension risk.

MEASUREMENT OF LIQUIDITY RISK

Detailed Look at Managing Stress Liquidity Risk

The following presents one way to manage liquidity risk. It is a process for assessing the underlying level of liquidity risk in a BU or an entire company, and some suggestions how to manage that risk.

Timeframe: It is important to understand that liquidity has several dimensions to it. One of the key elements is time – over a long enough period of time, liquidity risk goes away as most assets mature or can be sold and funds are made available to pay policyholder claims. The main subsets of time will vary by company based on the contractual demands of their liabilities, but generally will include short-term, and intermediate term periods such as seven days, one month, three months, and one year.

Liability Liquidity: The considerations for projecting demands for payments are:

- Project on-going cash flows, such as known future contractual liability maturities and interest payments (this includes all known liabilities, including health claim liabilities).
- On top of the on-going cash flows, project possible future liability withdrawals caused by stress liquidity risk scenarios.
- In considering cash flows, include any ability of policyholders to surrender the policy without penalty (stresses here will be caused by more company specific or industry situations):
 - If surrender charges drop over time (i.e., 7% scaling to 0% over 7 years) then liquidity risk increases as this charge drops.
 - If a product has a full market value adjustment, it will probably lessen the risk to a degree under normal circumstances. However, under a stress scenario, an MVA based on a fixed formula may require a greater payout than is obtainable from the

immediate sale of the assets backing the product, so it may not reduce the negative cash outflow from these products as much.

- Book value “put” provisions and other provisions that permit surrender without penalties. These are in essence free withdrawals.
- These above items will contribute differently to the liquidity risk but obviously knowledgeable institutional contractholders with free puts could create dramatic drains on a company’s liquidity in a stress scenario.
- Consider any ability of the policyholder to borrow against the policies (in a stress scenario, assume most people will borrow as much as they can against their policies).
- Letters of Credit (LOC) – if the Life Company is backstopping others’ liquidity by issuing LOCs to companies, then the other company may draw down more if the issuing company had credit problems. These may take the form of reinsurance agreements vs. pure letters of credit.
- If the company is writing/selling any option agreements, swaps or futures contracts that depend on the underlying level of an index (i.e., S&P index), this may cause a material cash outflow. Although these options may be hedging options embedded in product liabilities, a cash flow strain may occur due to less than perfect timing of the payments.

For each of the considerations above, different factors (i.e., 50%, 75%, etc) should be assigned under the various timeframes (base case versus stress scenarios) to reflect the relative potential demands for payment. These factors should reflect company specific sales (and redemption) practices with relevant experience if possible. The riskiest liabilities (in a stress type scenario) are usually those where knowledgeable policyholders can get their money quickly and easily without penalty.

Asset Liquidity: There are different approaches to determine asset liquidity (and the resulting cost) vs. liability liquidity. Some of the ways to quantify the liquidity of the assets might be to:

- Project out future expected asset principal and interest payments (includes derivative cash payments – usually not very material if just using interest rate swaps with matching accrual periods as net payments with counter-party).
- Project out future unexpected asset principal and interest payments. Some products (e.g., MBS, CMO’s) may have prepayment risk in different interest rate scenarios and so it is important to understand how any slowing in prepayments may affect projected principal and interest payments.

- Determine bid/ask spreads on the assets. By looking at historical relationships between where dealers are willing to buy and sell assets the company can begin to determine the potential cost to sell the asset in a stress scenario (one can consider “extreme” timeframes such as the fall of 1998 to determine the true cost of liquidating an asset in a stress scenario).
- The larger the bid/ask, the more the “haircut” should be on the fair value of the assets. (It is generally important to look at the value that usually will be received for the assets in a stress scenario.)
- The bid/ask spread will depend on the type and quality rating of the asset:
 - public vs. private issues (private issues involve more due diligence, but may have better covenants than public bonds);
 - AAA rated ABS vs. AAA rated corporate bonds (ABS can have more “structural”/liquidity risk than typical corporate bonds);
 - Commercial mortgages – need to determine if the company can sell or securitize;
 - AAA rated corporate bonds vs. BB rated corporate bonds.
- The volatility of fair value returns over a time frame generally needs to be considered. For example, if it is anticipated that an asset will not be sold for six months, the possibility that the interest rate or the sectors spreads will change and, thus, the fair value will change generally enters into the assumed “haircut” for the asset.
- From the above item, a “haircut” will be calculated (similar to the calculation on posting collateral for a repo) to determine the realizable asset value over the time frame contemplated.

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 here 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 such that spreads may widen by more basis points than historical experience has shown.

Capital losses due to credit deterioration and gains and losses due to changes in interest rates are also to be considered.

Matrix of Risk Measurement Scenarios

The following table represents a potential liquidity risk measurement tool to help to assess the risk inherent in a BU:

	Cumulative Results:			
	Seven days	One month	Three months	One year
Base Case				
Market value of liquid assets less specific "haircut" = net assets				
Value of liabilities times specific factor for time frame				
<u>Ratio of Net Assets / Liabilities</u>				
Stress Case				
Market value of liquid assets less specific "haircut" = net assets				
Value of liabilities times specific factor for time frame				
<u>Ratio of Net Assets / Liabilities</u>				
Sensitivity Test A				
Market value of liquid assets less specific "haircut" = net assets				
Value of liabilities times specific factor for time frame				
<u>Ratio of Net Assets / Liabilities</u>				
Sensitivity Test B				
Market value of liquid assets less specific "haircut" = net assets				
Value of liabilities times specific factor for time frame				
<u>Ratio of Net Assets / Liabilities</u>				

Note that the haircuts applied to assets and the timeframe factors applied to liabilities are the key variables in using this tool and assessing liquidity risk. They will vary by asset class and liability type within very small groupings.

The types of sensitivity testing done would depend upon the type of liabilities and assets the company has. For example, one set of sensitivity tests may be the result of increasing or decreasing interest rates by 2%. Other companies may test several different haircut

assumptions for various asset types. Companies may also choose to test several levels of assumed liability withdrawals.

Analysis of Results

If the results of the above analysis are generally poor (e.g., the results of the net asset-to-liability ratio is lower than one), corrective action should be considered. For example, assets or the liability mix may need to be restructured.

Assumptions with respect to the payments on company obligations and asset haircuts under each scenario should be left to the discretion of the company. Guidance could be provided through an Actuarial Standard of Practice (ASOP), or other means if the certification is not provided by an actuary.

RATING AGENCIES

Rating agencies do examine liquidity risks in insurance companies. In general, well-run insurance companies view the rating guidelines as floors, not as targets, in terms of stress liquidity risk.

Some rating agencies currently use a factor approach to measuring stress liquidity risk. Various types of assets and liabilities are assigned different factors. A higher factor is given to more liquid items. These are then multiplied against the in-force business of various categories, and the resulting number for liabilities versus assets is considered when deriving a credit rating.

Rating agencies have published several articles on the subject of liquidity. They have also looked more extensively at certain liabilities (e.g., funding agreements) where there is a greater possibility of liquidity risks being taken. These articles may be available on the rating agencies' websites.

STRESS LIQUIDITY RISK MANAGEMENT IN BANKS

Stress liquidity risk management is important to banks also. The Basel Committee (Group of 30) published a very good paper on this subject in February of 2000. This paper is organized around a set of 14 principles 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.

SAMPLE “BEST PRACTICES”

The examples below gives 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 (CFO), 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 (includes 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 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 (severe withdrawals over one month) and ongoing (heavy withdrawals over at least a year) scenarios. The assumptions are on an internal and 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 public 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 includes:

(1) "Quantify liquidity needs" in both no crisis and crisis environments (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.

- (2) 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.
- (3) 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.
- (4) Recommend appropriate level of liquidity.
- (5) Determine the company’s tracking and monitoring program (e.g., set of liquidity ratios, reports of available sources, and other non-financial measures).
- (6) A crisis management plan is determined, written, and communicated to senior management.

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: Instead of trying to regulate liquidity, a solution may be to rely on the Board of Directors of a company. This is being used to a great extent in the banking sector. A formal plan and a procedure for monitoring compliance with the plan may be required. This reliance may be combined with one or more of the items below, to give more teeth to this reliance.

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

Certification of Stress Liquidity Risk: As with actuarial opinions, there can be a periodic (e.g., yearly) certification that companies have tested the exposure to stress liquidity risk, and that the signing party can certify that the stress liquidity risk of the company at the time of sign-off is manageable. This certification can be done by an actuary appointed by, and reporting to, the Board of Directors or a committee thereof. It is suggested that this type of certification can be done by actuaries, with reliances on other responsible parties. The advantage of a having an actuary do such certifications is that they are trained to do modeling of the company's business. Actuaries also have Actuarial Standards of Practice to ensure professionalism.

Liquidity Interrogatories: The New York Department of Insurance has been working on interrogatories for all companies to file regarding their liquidity profile. Depending on the answers to these questions, additional questions may be asked. Certain companies may also be invited in to personally discuss their liquidity risk management.

Review and Pre-approval of Certain Contractual Provisions: States may wish to consider requiring companies to have pre-approval of contractual provisions which may be a cause of liquidity concern, such as put or credit-rating downgrade provisions.

Disapproval of certain provisions: Some states may want to consider blanket disapproval of certain provisions. The advantage of blanket disapproval of certain provisions is that the companies are on a level playing field – no one company can claim that another's was approved due to favoritism. The disadvantage to blanket disapprovals is that they can exclude provisions that may be able to be managed at a profit to the insurance industry.

OTHER CONSIDERATIONS

Certain other approaches to liquidity risk management were considered and rejected. For example, a risk based capital approach was determined not to be workable at this time because stress liquidity is not a problem with a specific asset or liability type, but rather with the interaction of assets, liabilities, and company management. Also rejected was a

total proscriptive list of asset and liability options, since a proscriptive list could not react to new and innovative products.

CONCLUSION

It is important for companies to focus on liquidity risk management. The risk is both company credit worthiness specific and also total balance sheet composition (assets in light of liabilities) specific. The key to managing liquidity risk is to ensure that the company stays ahead of situations that could occur and ensure that the company is not put into any situations where the potential downside is too material.

APPENDIX

The documents below give further information on liquidity risk management:

American Academy of Actuaries (available from the website, at www.actuary.org):

“Preliminary Report of the GIC with Credit Rating Downgrade Provisions Working 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”. 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 ordered from the Basel committee website, www.group30.org.

Articles from Moody’s Investors Services: These articles discuss various aspects of liquidity.

“Rating Methodology – Assessing the Strength of a Liquidity Facility”; June 1999

“Alternate Liquidity: Current Topics and Trends”, November 1999

“GICs and Funding Agreements: The Old Dog Continues to Learn New Tricks”
April 2000

“GENERAL AMERICAN: A Case Study in Liquidity Risk”, August 1999

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, www.ins.state.ny.us. The Department is redrafting this 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.