Liquidity Working Party

How Valuable is Liquidity?
Working Paper

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Synopsis

The paper attempts to assess how liquidity is valued across the main UK institutional investors: banks, defined benefit pension schemes and life insurance companies. It reviews the hypothesis that in addition to an institution's theoretical liquidity requirements, external pressures drive liquidity preference through a combination of regulation, accounting, performance measurement and the history of the industry. It provides a qualitative scale to compare the asset and liability liquidity of institutions. It finds defined benefit pension schemes and life insurers typically have more liquidity than their liabilities theoretically demand, and banks less. In particular, long term institutional investors that are able to invest in less liquid assets may be able to benefit from liquidity premiums to increase the expected returns on their assets.

Liquidity is not fixed and can vary sharply over time, declining very rapidly and unexpectedly in times of financial market stress. The crisis of 2007/08 demonstrates that a crisis in liquidity can become self-reinforcing, with the impact of the falling liquidity causing further forced sales of assets and hence further falls in liquidity. The paper concludes that the variability of liquidity makes it difficult to measure and manage. However this provides both opportunities and threats to financial institutions which are outlined in the conclusion.

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1. Introduction

1.1. Since mid 2007, turmoil in the capital markets has drawn the issue of liquidity requirements into sharp focus. We have witnessed the credit downgrade of investment banks unable to offload sub-prime mortgage exposure; the significant increase in interbank borrowing rates as bank charge penal rates for borrowing; and intervention by central banks to provide liquidity via secured lending into the global banking system.

1.2. In response, this paper has been produced with the objective of assessing in a systematic way the liquidity of the main UK institutional investors: banks, defined benefit pension schemes and life insurance companies. We consider the overall liquidity of assets typically held by each type of institution versus the liquidity requirements of their liabilities.

1.3. The paper separates liquidity preference that is purely driven from an institution's liability profile, and that from external pressures. In particular, the external pressures we focus on are regulation, accounting, performance measurement and the history of the industry. We also briefly consider two case studies from outside the UK legislative framework that are arguably less constrained by external drivers, and comment on how this affects their liquidity preference. We conclude from our high level analysis that there are some apparent irregularities in approach and potential distortionary effects. Finally where possible we suggest changes in working practice.

1.4. In summary, we aim to conclude how valuable liquidity is to each type of investor.

2. External drivers of liquidity

2.1. In addition to the liability profile of an institution, there are external pressures that may drive the liquidity preference of the institution.

2.2. We start by considering how liquidity is driven through a combination of regulation, accounting and performance measurement. Furthermore, the history of an industry drives much of what happens currently as industries tend to evolve rather than change behaviour rapidly.

2.3. We provide a brief summary of these external liquidity drivers in this section. A more detailed study of these factors is included in Appendix B.

2.4. **Banks**

Banks typically have a culture of holding illiquid assets with no significant regulatory impediment to an illiquid investment strategy.

- Regulation in banking effectively values assets and liabilities on a book value basis and does not allow capitalisation of future illiquidity premiums. An exception to this is trading assets which are mark-to-market. This means there is no real regulatory impetus for banks to take illiquidity risk. Regulation does supervise liquidity levels, however this

appears to be done in a weak form, setting levels which can be surpassed in a crisis.

- Central banks act as a lender of last resort to banks, providing liquidity in emergencies. This is a source of moral hazard if banks take on more illiquid assets than would otherwise be prudent, in the knowledge that support from the central bank is likely to emerge in a crisis.

- Banks assess the performance of their investments based on return over expected loss effectively over the life of the investment, leading to medium term time horizons for performance assessment (for example 5-7 years). Overall this encourages banks to take on illiquidity premiums.

- Finally, banks have come from a culture of holding illiquid investments to back liquid liabilities, albeit with a trend towards equalising the imbalance through regulation.

2.5. Defined benefit pension schemes

Pension schemes typically take a 'traditional' liquid approach to investments, influenced by regulation and widespread use of traditional asset classification. More recently we have seen larger pension schemes moving away from this traditional approach, however the pensions industry has generally been slower to change investment strategy than a typical bank or life insurance company.

- Regulation for UK defined benefit pension schemes requires trustees to invest predominately in regulated markets, restricting investment in less traditional assets. The requirement for appropriate diversification means larger, less liquid investments (e.g. capital projects) are often out of reach of smaller pension schemes.

- Both the visibility of asset performance in the accounts of the sponsoring employers, and the direct impact on costs though the PPF Levy, places additional onus on the short term performance of the scheme assets. This in turn creates an impetus for liquid investments.

- To the extent that a pension scheme has a deficit on a full buy-out basis, the scheme arguably already holds significant illiquid 'assets' in the form of future contributions due from the sponsoring employers.

- Although larger pension schemes are now adopting less traditional investment approaches, widespread use of traditional classifications (namely an equity / bond split) may have deterred changes in investment practices.

- Trustees are investing money for the benefit of the scheme beneficiaries. Regulation exists to help protect the beneficiaries – for example limiting scheme investment in the sponsoring employer and requiring trustees to establish a Statement of Investment Principles. Although necessary, this legislation can help slow down the ability of pension schemes to respond to changes in the market compared to a typical bank or life insurer.

- The impact of investments on scheme benefits is asymmetric: scheme beneficiaries do not necessarily benefit directly from good investment performance; however poor investment can easily lead to benefit reductions if the employer becomes insolvent. This can deter trustees from investing in more illiquid investments. Trustees are unlikely to be criticised for taking a conventional approach, but an innovative approach that is unsuccessful may leave them vulnerable.

- Trustees have conflicting objectives when setting the investment strategy. The first objective is to invest for an ongoing scheme, in which case liquidity needs are defined by the balance of contributions and benefit profile year on year. The second is to invest for a sponsor insolvency event in which case significant liquidity may be required. A dilemma for trustees is the extent to which they allow for the possibility of a insolvency event.

2.6. **Life Insurers**

Life insurers seem to have a balanced approach to liquidity, with some regulatory benefit of taking on illiquidity in annuity funds (Muir et al, Dyer et al 2007).

- Liquidity has not been a key focus in the past for life insurers as regulation does not focus on liquidity in as much detail as for banks. There is still some regulatory advantage to investing in illiquid assets in certain circumstances (e.g. for annuity funds). New developments in regulation under Solvency II are likely to create a greater need for liquidity.

- Public information on investment performance for with-profits and unitised funds means life insurers are influenced by relative performance when choosing investments.

- Liquidity has not been a problem historically but is becoming more of an issue on the liability side as exit penalties reduce due to pressure from negative publicity. Assets have coincidentally become more liquid due to changes in performance based investment fees.

- Liquidity of investments varies according to insurance product type.

2.7. In summary, each type of institutional investor has a different perspective on liquidity which leads to different views on the value of liquidity. Over the next four sections we define liquidity in more detail and compare the liquidity of assets typically held by each type of institution with the theoretical liquidity requirements of their liabilities.

3. Liquidity Defined

3.1. Liquidity is a difficult concept to universally define and harder to measure. It is also subject to constant change.

3.2. Liquidity of an **asset** is often considered as the ease with which an investment can be converted to cash. This is the approach adopted for this study. Amongst other factors, the inputs into asset liquidity include:

- Friction costs
- Market size
- Size of the holding relative to the market
- Processing time
- Number of market entrants

3.3. Whilst these factors are measurable in theory, the actual liquidity depends on willing buyers and sellers in the market, together with the willingness of intermediaries ('market makers') to hold assets over short periods.

3.4. Similarly, the liquidity of a **liability** can be considered as the ease with which a product owner (policyholder for life insurance contracts, depositors for banks etc.) can convert their product into cash. This can usually be split first into contingent events (e.g. payout on death) which will have some potential predictable characteristics and secondly optionality (e.g. withdrawing deposits) which can have 'stable' predictable characteristics – but the chance of 'unstable' characteristics with low probability. A clear example of this is a run on a bank, where under normal conditions a bank can estimate the amount of withdrawals, but a panic over the bank's creditworthiness may increase these withdrawals to multiple standard deviations of normal behaviour.

3.5. In the next section we assess the theoretical liability liquidity of each type of institutional investor.

4. Liquidity of liabilities

4.1. In considering the relative liquidity requirements of institutions, we have devised a simple liquidity scale under which liquidity is defined as high, moderate or poor. The working party acknowledges that the scale is both blunt and subjective; however it provides sufficient information for the purposes of this study. We have separated the application of the scale from our conclusions to allow the reader to apply their own liquidity scale or metric if they wish.

4.2. In this section we apply our scale for each of the main UK institutional investors: banks, defined benefit pension schemes and life insurers. For life insurers, we consider unit-linked funds, with-profits funds and annuity funds separately as each class of business has distinct characteristics.

4.3. The potential liquidity requirements of a liability are considered high if there is a high chance of payment being called earlier than expected (a 'liquidity event'). If a liquidity event also results in a higher payment than expected (for example death of a life insurance policyholder), this further increases the liquidity requirements.

4.4. For each type of financial institution, we compare the 'standard payment' to the options and contingent events that might affect the timing and amount of payment. The following table shows typical options and contingent events for each type of institutional investor.

	Banks	**UK Defined Benefit Pension Schemes**	**Life Insurance Companies** [1]
Main Liabilities	Deposits and term funding in the bond markets (e.g. using floating rate notes, fixed rate bonds or securitisation)	Pensions payable to scheme members and their dependants	Benefits payable on death or disability, surrender, and maturity.
Options	Withdrawal of funds by depositors	Withdrawal Early retirement Lump Sum Commutation Trivial Commutation Other Options	Surrenders / lapses Full / partial withdrawals Commutation of annuities Switches (for unit linked) Other Options
Contingent Events	Redemption of term funding	Death Ill-health retirement Redundancy Bulk Transfer Restructuring	Death Critical illness Disability Reinsurer default

[1] *The options and contingent events applicable for life insurance companies will depend on the product terms and conditions*

4.5. The impact of each option and contingent event on overall liquidity will depend on:

- the proportion of individuals eligible or potentially affected;
- predictability; and
- the impact on cashflow.

4.6. For each option, the impact on overall liquidity will also depend on the penalty for exercising, as a high penalty will deter individuals from exercising the option. Moreover, the desire to exercise the option in times of liquidity crisis will impact on the predictability of the option. For example, in banking the cause of illiquidity is precisely the reason why banking is so much less predictable in times of crisis than pension schemes and life insurers. For the latter two, overriding factors such as long term retirement plans and longevity dampen the effect of a crisis.

4.7. The overall liquidity of the liabilities is subjectively judged by considering the combined effect of each option and contingent event, together with the run off of the liabilities.

4.8. Further details of the how the liquidity scale is applied are provided in Appendix A, however the precise details of the scale are not directly relevant to our conclusions.

4.9. Typical Large Bank

Option / Contingent Event	LIQUIDITY FACTORS				Overall Contribution to Liquidity
	Impact on Cashflow [1]	Eligibility [1]	Penalty [2]	Predictability [2]	
Withdrawal of funds	High	High	Nil	Moderate (normally)	**High**
Redemption of Term Funding	High	High	Nil	High	**Moderate to High**

Based on this analysis the implied liquidity of a typical UK Bank's liabilities is Moderate to High.

4.10. Typical Large Defined Benefit Pension Scheme (of average maturity)

Option / Contingent Event	LIQUIDITY FACTORS				Overall Contribution to Liquidity
	Impact on Cashflow [1]	Eligibility [1]	Penalty [2]	Predictability [2]	
Withdrawal	High	High	High	Moderate	**Moderate**
Early Retirement	Moderate	Moderate	Low	Moderate	**Moderate**
Lump Sum Commutation	High	Moderate	Moderate	High	**Low**
Death Before Retirement	Low	High	n/a	High	**Low**
Death After Retirement	Low	High	n/a	High	**Low**
Ill-health retirement	Low	High	n/a	High	**Low**

Based on this analysis the implied liquidity of a typical UK final salary scheme of average maturity is Low to Moderate.

[1] *Higher impact on cashflow and eligibility correspond to an increase in overall liquidity*
[2] *Higher penalty and predictability correspond to a reduction in overall liquidity*

4.11. Typical Unit Linked Fund of Life Insurance Company

Option / Contingent Event	LIQUIDITY FACTORS				Overall Contribution to Liquidity
	Impact on Cashflow [1]	Eligibility [1]	Penalty [2]	Predictability [2]	
Withdrawal / Full surrender	High	High	Low	Moderate	**High**
Switches	High	High	Low	Low	**High**
Death	Low	High	n/a	High	**Low**

Based on this analysis the implied liquidity of a typical UK unit linked life fund is Moderate to High.

4.12. Typical Immediate Annuity Fund of Life Insurance Company

Option / Contingent Event	LIQUIDITY FACTORS				Overall Contribution to Liquidity
	Impact on Cashflow [1]	Eligibility [1]	Penalty [2]	Predictability [2]	
Withdrawal / Surrender	Nil	Nil	Nil	Nil	**Nil**
Death	Moderate	High	n/a	High	**Low**

Based on this analysis the implied liquidity of a typical immediate annuity fund is Low.

4.13. Typical Conventional With-Profit Fund of Life Insurance Company

Option / Contingent Event	LIQUIDITY FACTORS				Overall Contribution to Liquidity
	Impact on Cashflow [1]	Eligibility [1]	Penalty [2]	Predictability [2]	
Withdrawal / Surrender / Lapse	High	High	Moderate	Moderate	**Moderate**
Exercise options	Low	Moderate	Nil	Moderate	**Low**
Death	High	High	n/a	High	**Moderate/High**

Based on this analysis the implied liquidity of a typical UK conventional with-profit fund is Moderate.

[1] *Higher impact on cashflow and eligibility correspond to an increase in overall liquidity*
[2] *Higher penalty and predictability correspond to a reduction in overall liquidity*

5. Liquidity of assets

5.1. The other side of the balance sheet for financial institutions is the liquidity of the assets.

5.2. For liabilities we have considered the potential source of liquidity demands arising from the occurrence of liquidity events. If such events occur, then assets will need to be realised to meet the unexpected cash outflows. The ability of the financial institution to do this will depend on the liquidity of their assets, i.e. the ease with which an investment can be converted to cash and the cost for doing so, in terms of the gap between the fundamental value of the assets and the price at which it can be traded. This cost is referred to as the 'price of immediacy' by Chacko, Jurek and Stafford (2007).

5.3. We consider the potential liquidity of different asset classes below, and the composition of assets typically held by the different types of financial institution. This provides us with an overall view of each institution's liquidity profile, however one should also note that:

- Market liquidity can itself vary over time. This is discussed in section 7.
- Feedback loops exist and can exacerbate reductions in liquidity. This is considered in section 9.
- Asset liquidity will vary with the size of the position held. For example a large financial institution with a significant holding in an asset (even in a FTSE-100 equity) may find that its holding is less liquid than an institution with a smaller holding in the same asset.
- Financial institutions can dampen the impact of liquidity events by disposing of their most liquid assets first, rather than needing to dispose of a proportion of all assets.
- Some assets may have an inherent liquidity option. For example bonds may be callable / extendible at the issuer's discretion, and mortgage assets or loans can be prepaid by the borrower. These options exacerbate the impact of a liquidity crisis.

  One effect of the 2007 credit crunch has been an increase in credit spreads which has led to a reduction in the refinancing of loans and mortgages. For example, the expected average life of issued loans is estimated to have extended from 2 years to 4 years (Source: UBS research).
- Complexity can lead to illiquidity, but illiquidity does not mean complexity. For example collateralised debt obligations have become illiquid due to the complexity of the product, however Fine Art is a simple product – but due to the idiosyncratic nature of the product and trading method would be viewed as illiquid.

5.4. Typical liquidity of different asset classes

Asset class	Liquidity	Comments
Traded equities	High	The exceptions would be small cap and emerging market equities
Traded bonds – government	High	
Traded bonds – corporate	Moderate	Corporate bond markets are noticeably less liquid than the equivalent equity markets
Property	Low	Property assets can be very illiquid. It also can be difficult to sell a proportion, rather than 100%, of a specific property
Private equity	Low	In some cases there may be lock-ins or significant penalties on exit
Private debt / loans	Low to moderate	Traded loan markets
Mortgages	Low	Mortgages are typically liquidated by securitisation, but this is not a quick process and the securitisation markets dried up in the 2007 credit crunch
Structured investments	Low to moderate	Typically these can be illiquid due to the opacity of the exposures
Commodities	Moderate	
FX	High	Vanilla FX futures are extremely liquid
Derivatives	Variable	Interest rate swaps and equity futures are in many cases as or more liquid than the underlying asset markets. More structured OTC derivatives can be much less liquid

5.5. Many of the asset classes discussed above are not traded on regulated markets, for example hedge funds, private equity and over-the-counter (OTC) derivatives. UCITS (Undertakings for Collective Investment in Transferable Securities), an EU framework for investment funds, can be used to ease access for new investment classes for both institutional and retail investors. For example, for life companies, investments in UCITS funds are deemed admissible without the need to look through to the underlying investments.

5.6. Assets traded on regulated markets are particularly important for pension schemes as, under the Occupational Pension Schemes (Investment) Regulations 2005, trustees must invest scheme assets predominately in regulated markets. For life companies, admissibility rules and large exposure limits under INSPRU lead to a preference for assets traded on regulated markets.

5.7. By reviewing the typical asset allocation held by each type of institutions, the overall average asset liquidity can be determined. This is shown on the following page.

5.8. Typical composition of assets held by banks, UK defined benefit pension schemes and life insurers, together with an indication of the overall average liquidity of these typical assets.

	Banks	**UK Defined Benefit Pension Schemes**	**Life Insurers (Unit Linked)**	**Life Insurers (Annuities)**	**Life-Insurers (With-Profits)**
Traded Equities	Very low	High	High	Very Low	High
Traded Bonds	High	Moderate	High	High	High
Property	Moderate	Low	High	Very Low	High
Private Equity	High	Low	None	None	Low
Private Debt / loans	Very high	Low	None	Very Low	Very Low
Mortgages	Very high	Low	None	Very Low	None
Structured Investments	High	Very low	Low	Very low	Very low
Commodities	Low	Low	Low	None	Very Low
FX	High	Low	Low	None	Low
Derivatives	Very high	Low	Low	Low	Moderate
Cash	High	Low	Low	Low	Low
Average Liquidity	**Low**	**Moderate to high**	**High**	**Moderate to high**	**Moderate to high**

5.9. For life insurers, investment for unit linked funds varies depending on the investment fund and the choices made by clients. Average assets across the industry broadly reflect a managed or balanced fund. For annuities a typical fund holds predominantly long dated gilts and investment grade bonds. There may also be some holdings of property and indexed bonds. The investments of a with-profit fund vary with the fund's investment policy, past practice, and current financial position. A strong fund can invest more aggressively, but overall is likely to remain less aggressive than a unit linked fund. Some funds are hedged which alters their effective exposure.

6. Liquidity of liabilities vs. assets

6.1. We now bring together the liquidity analyses for liabilities and assets set out in Sections 4 and 5 to summarise where the main UK institutional investors are on a relative scale. This is depicted in figure 6.1.

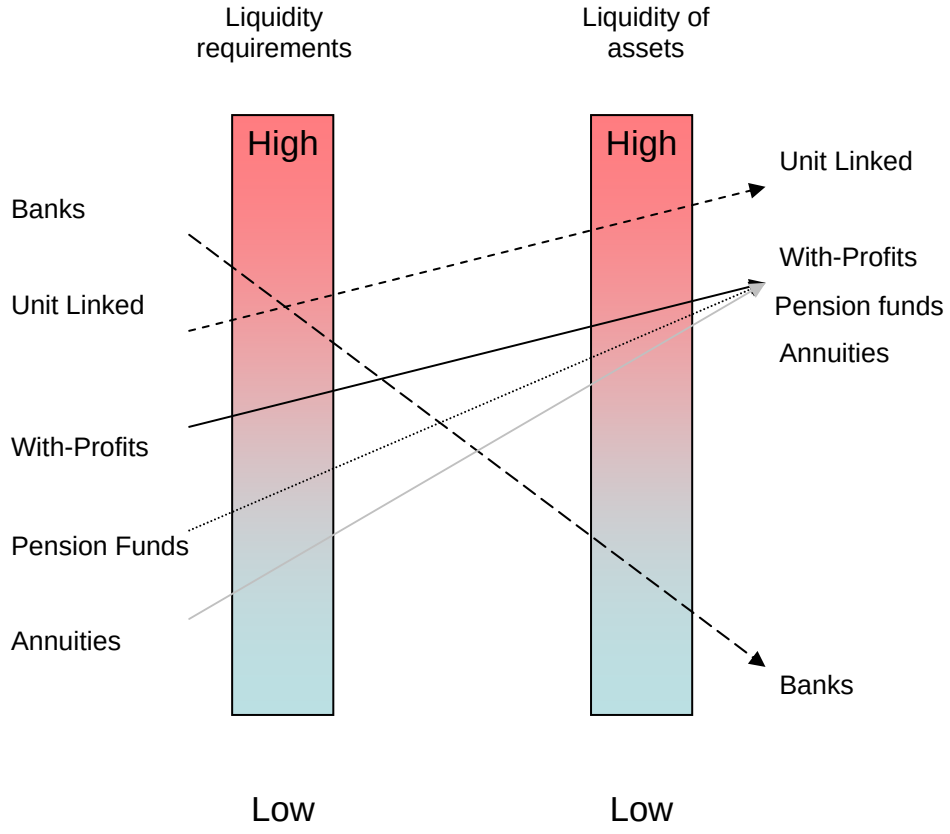


figure 6.1

6.2. We observe that UK defined benefit pension schemes and life insurers typically hold assets with relatively higher liquidity than their liabilities theoretically demand. In particular pension schemes and annuity funds appear to have assets with significantly more liquidity than their liabilities. Some scope may therefore exist for these long-term institutional investors to reduce the liquidity of their investments and enjoy higher expected returns.

6.3. Conversely, banks have relatively far less liquidity than they may need.

6.4. These observations are interesting in the debate over what an appropriate level of liquidity is for a financial institution. However before that is considered, we look at how liquidity can change over time and the impact of the liquidity crisis of 2007/08.

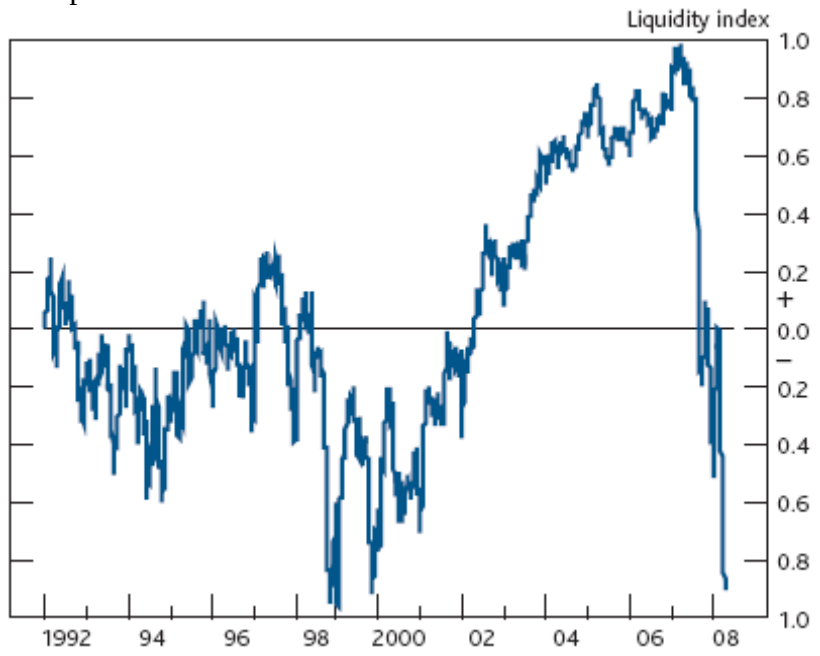
7. Liquidity varies over time

7.1. The level of liquidity available in asset markets is not fixed but can vary sharply over time. In particular, market liquidity can decline very rapidly and unexpectedly in times of financial market stress.

7.2. The Bank of England monitors and publishes an index of overall market liquidity as part of its twice yearly Financial Stability Report. This is based on three factors – see Bank of England (2007a) for details:

- Tightness – based on bid/offer spreads for gilts, FX and FTSE 100 equities.
- Depth – based on a measure of the volume of trades possible without impacting market prices, and the speed at which price fluctuations resulting from trades are dissipated, again based on gilts, FX and FTSE 100 equities.
- Premium – a measure of the prospective premium in the corporate bond market as a compensation for liquidity risk (see below).

7.3. From the following graph, we can see that market liquidity was at historical highs in early 2007, but then declined very sharply around August 2007. Initially liquidity in the 2007 credit crunch did not fall to levels seen in previous stress events such as that arising from LTCM and the Russian debt crisis, but further falls in early 2008 took liquidity down to levels similar to these periods.



Source: Bank of England (2008)

7.4. The price, or premium, required in asset prices to compensate for liquidity risk varies over time. The quantification of this liquidity premium is a matter of some academic controversy. This was discussed in detail in the actuarial literature in Muir et al (2007) and in a presentation given at the 2007 FIRM

Conference [Fulcher (2007a)]. However, for the purpose of this discussion, we are more concerned with the change in the liquidity premium over time, rather than the absolute level.

7.5. Liquidity premia can mostly easily be measured for bonds since the payoffs (other than default risk) are known. In particular, for government bonds, where default risk is low, there is a spread between on-the-run (i.e. recently issued) and off-the-run Treasury bonds.

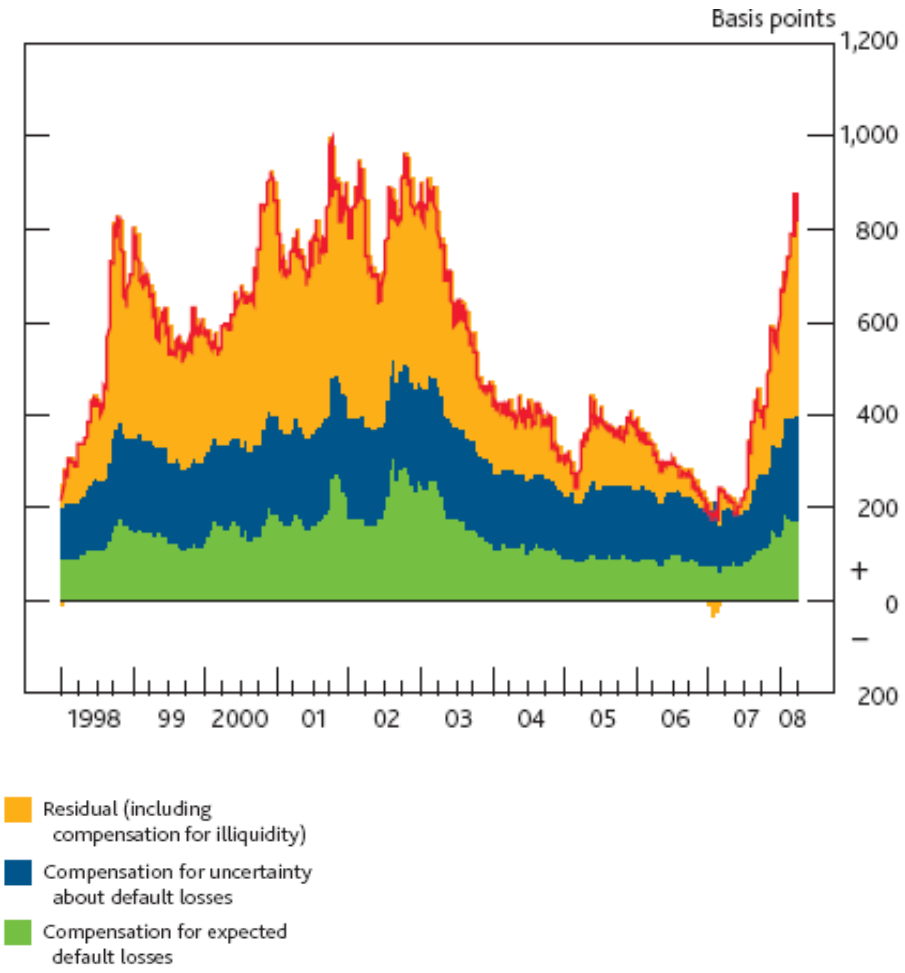
7.6. Longstaff (2001) compares the prices of US Treasury bonds to those issued by Refcorp, a US Government Agency, which are effectively guaranteed by the US Treasury but are less liquid. He finds significant evidence of a 'flight to liquidity' effect, whereby US Treasuries command a premium, particularly in times of uncertainty in the financial markets such as the Russian default in 1998. The premium averages around 10 basis points p.a. but has risen as high as 30-50 basis points p.a in times of stress.

7.7. For corporate bonds, spreads over risk-free are observable directly from market prices, and these can be decomposed into three components:

- Compensation for expected defaults – for example based on historic default data.
- A risk premium – compensating for the risk of higher than expected defaults (similar to the beta on equities).
- A residual component – representing compensation for liquidity and other risks.

7.8. Webber and Churm (2008) discuss one method for quantifying these three components, and apply this consistently using data over the last ten years.

For example, their decomposition of the spread on high-yield sterling corporate bonds is as follows, as reported in the April 2008 Financial Stability Report:



Source: Bank of England (2008)

7.9. The graphs above illustrate that breakdown in liquidity tends to happen rapidly, however the return to normal levels is usually a more gradual process. Credit spreads, and hence asset prices, are subject to similar sharp movements in liquidity crises.

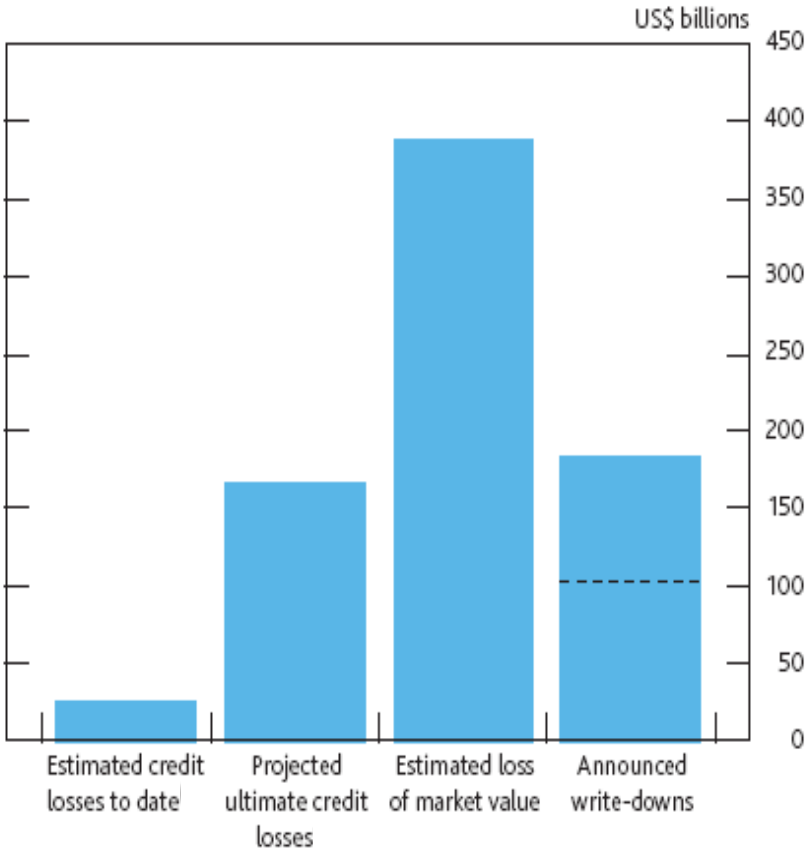
7.10. Further, we can see evidence of a "bubble" in credit prior to the liquidity crisis in 2007, as evidenced by the negative liquidity premia per the Webber and Churm model in late 2006. Asset bubbles tend to occur when increases in market value are bought about by speculative buyers chasing capital gains and essentially buying assets because their price has risen, which means the asset is relative more expensive, rather than because of perceived improvements in fundamental underlying value. Such market bubbles may act as early warning of a coming liquidity crisis.

7.11. In contrast, in times of liquidity crisis and market uncertainty market values may fall below fundamental value. The Bank of England (2008) suggests that this may have happened in the first quarter of 2008 with respect to losses on sub-prime securities. They state that "credit losses from the turmoil are unlikely to ever rise to levels implied by current market prices unless there is a significant deterioration in fundamentals, well beyond the slowdown currently anticipated. That is because prices are likely to reflect substantial discounts

for illiquidity and uncertainty that have emerged as markets have adjusted but which should ease over time. While market-based estimates and the write-downs announced by firms may be unduly pessimistic, if such concerns persist there is a risk they could become self-fulfilling."

7.12. This highlights the risk that capital requirements based on market values can lead to a pro-cyclical effect and ultimately to adverse feedback loops on market liquidity.

7.13. The Bank of England's estimates of projected ultimate losses vs. mark to market losses on sub-prime securities is shown below.



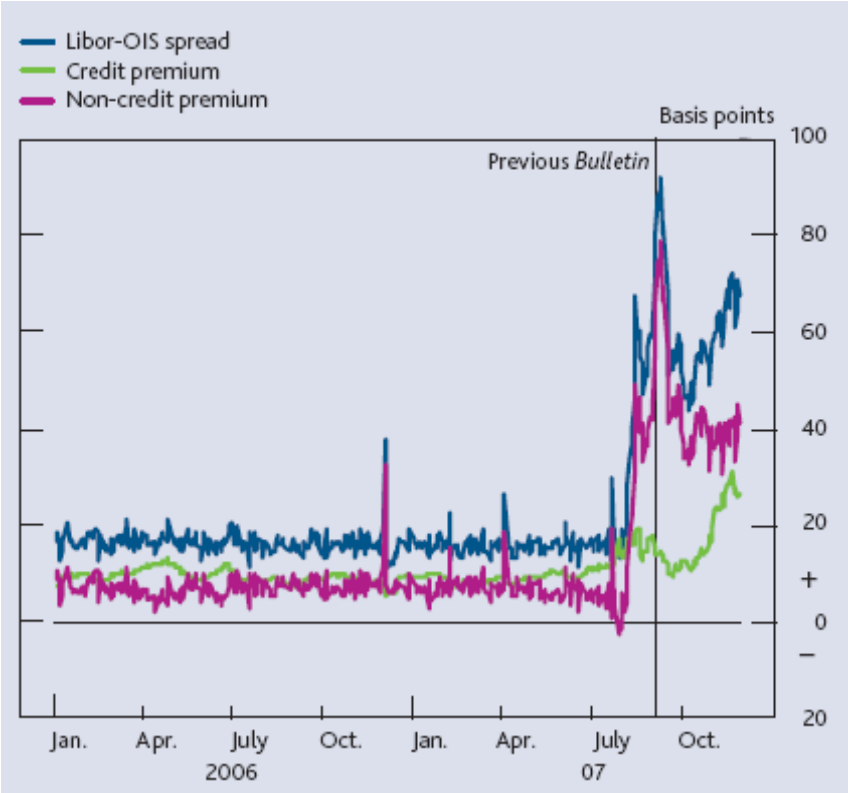
Source: Bank of England (2008)

7.14. The Bank of England on (2007b) has also undertaken an analysis of liquidity premia for money markets, looking at the spread between twelve month LIBOR rates, and equivalent maturity overnight interest rate swap rates. These are split into:

- A credit premium – inferred from Credit Default Swap prices on the panel of banks representing the LIBOR rate.
- A residual non-credit premium – assumed to reflect liquidity and other factors.

The results are below. These indicate that the 2007 credit crunch was initially driven by a fall in liquidity, and hence a sharp rise in liquidity premia in

money markets, and only in the second phase of the crisis did this lead to a rise in credit risk premia, as markets became concerned as to the impact of the liquidity crisis on banks' balance sheets.



Source: Bank of England (2007c)

7.15. Cochrane (2005) presents a survey of the literature on liquidity premia, and refers to papers that also suggest evidence of a 'liquidity beta' in the returns on stocks, and in particular that expected returns are higher on stocks which become more illiquid as markets fall and/or overall market liquidity declines.

7.16. In summary, liquidity changes over time - sometimes dramatically. However, in times of stress the premium earned through supplying liquidity can increase significantly to the detriment of the firms that require it.

8. Liquidity Crisis 2007/08

8.1. During the 2007/08 credit crunch, the financial press has been dominated by institutions experiencing asset value swings in the billions of dollars. The failure of Northern Rock in the UK to finance its assets and Bear sterns in the US to source liquidity in the inter-banks market were high profile casualties. The early events of the credit crunch were discussed in a plenary session at the 2007 Life Conference [Fulcher (2007b)]. However behind the scenes the liquidity has had knock-on effects with all financial institutions being touched by the crisis via:

- Market consistent valuations affected by anything from widening credit spreads reducing IAS19/FRS19 based pension liabilities, to increased market volatilities increasing the value of life insurance guarantees.
- Reductions in refinancing opportunities in the capital markets.
- The closure of the asset backed markets, leading to the stalling of capital markets to fund risk transfers (from mortgages to value in force securitisations).
- Significant falls in banking capitalisations leading to the withdrawal of lending facilities from banks, significant reduction in position taking by market makers, and a de facto reduction in the liquidity of insurance and pension fund assets.
- In many cases, asset losses in the structured credit space including collateralised debt obligations.

8.2. The crisis served as a stark reminder that the liquidity environment is subject to rapid change and, whilst predictable to some extent in stable (and usually in optimistic or 'bullish' markets), the population of buyers and sellers, together with willing market makers can erode and sometimes evaporate in a very short period of time. Often the fall in liquidity is associated with a desire by market participants to convert their assets into cash ('safe haven' behaviour) and therefore reductions in liquidity are normally correlated with falls in asset prices.

8.3. At the start of 2007, prior to the credit crunch, the liquidity premium on high yield corporate bonds appeared to be close to zero, or even negative. The premium rose very sharply in mid 2007. There is evidence of a flight to liquidity effect, where the liquidity premium increases sharply in times of financial stress, such as the sub-prime crisis.

8.4. A key problem that arose during this time was the lack of reliable valuation information regarding investments which has made risk management decisions difficult to make. For instance, when assigning collateral against borrowing, reductions in the liquidity of assets and an increase in the difficulty of asset valuation can lead to over-collateralisation which in turn leads to further falls in liquidity of the financial system.

8.5. The prevalence of 'automatic trading' existed, particularly for hedge funds, which implement trades based on limits. This served to amplify the crisis. As market volatility increased, these trades were executed and created large counter-directional trades, thereby increasing volatility further. This made valuation of less liquid trades, or those where liquidity had declined very difficult to establish.

8.6. The recent report from the Senior Supervisors Group (2008) highlighted that the quality of firms' assessment of liquidity needs and their interaction with business units varied considerably between institutions, leading to a variation in liquidity needs. The more advanced had fewer requirements for liquidity in the market during the events of a market downturn/fall in liquidity. Furthermore, those institutions which relied on quantitative 'mechanical' risk management systems tended to have more 'unexpected losses' than those that also used other methods (e.g. scenario testing, behavioural models etc.).

8.7. Injections of liquidity into the financial system were considerable from August 2007 to date, but insufficient as many banks overlooked the liquidity impact of 'off-balance sheet' lending which became on balance sheet due to market closure and rating linked trigger events. Furthermore, the recent failures of Northern Rock and Bear Stearns were triggered by a closure of public and inter-bank markets to fund their balance sheet assets.

8.8. The report also found that financial institutions with long term commitments (e.g. policyholders, long term investors etc.) had a greater chance of survival than those relying on short term funding/liquid liabilities (e.g. SIV's, hedge funds, unit trusts).

8.9. Finally the report makes reference to the particular market stress experienced by the securitisation market (including Asset backed Securities and CDO's). It highlights how the lack of understanding and clarity of these instruments caused the market to "shun" them causing the collapse in secondary market liquidity for these instruments.

8.10. In summary, the crisis touched markets globally and has significant knock-on effects.

9. Feedback loops

9.1. The crisis of 2007/2008 also demonstrated that in practice a crisis in liquidity can become self reinforcing, with the impact of falling liquidity causing further forced sales of assets, and hence further falls in liquidity. This was due to:

- Customer and investor behaviour, where perceived issues in particular asset classes and institutions lead to further withdrawals of funds and selling of assets.

  Runs on a bank are a classic example here, such as the Northern Rock situation in 2007. Banks rely on the perception that they can meet depositors' liquidity demands but in practice hold only a small proportion of liquid assets.

- Stress test applied to portfolios, which created pro-cyclical behaviour.

9.2. We have considered these and further examples where such 'feedback loops' may exist and have listed these below.

9.3. **Regulatory Solvency tests**

FSA models

Current Pillar 1, Peak 2 tests have a credit capital requirement such that, as spreads widen, the stress tests to apply will worsen. This is further exacerbated by the implicit assumption that the longer the duration of the asset, the greater the stress. In times of credit crisis, this can lead to selling by insurers as the capital charges increase, further weakening the market and so on.

Similar issues apply to the resilience and risk capital margin stresses applied to equities. The FSA has relaxed the resilience reserve requirements, and introduced some market-value adjustments to the stress tests. Furthermore some with-profits funds have equity backing ratios (EBRs) which are driven by strength of the fund. Generally the larger the margin between the asset shares of the fund and its guaranteed benefits, the more aggressive the strategy. When markets fall then funds will reduce EBRs by switching back to fixed interest and cash in falling markets (as witnessed in 2001 to 2003).

Basel 2 Models

Under the new Basel 2 regime, the capital required to be held against investments is moving to the following:

Basel II

External Rating	Standardised Approach	External Rating	Internal Rating Based
AA- or above	20%	AA- or above	14% to 24%
A	50%	A	24% to 28%
BBB+ to BB-	100%	BBB	38% to 68%
Below BB-	150%	BB+ to B-	100% to 197%
Unrated	100%	Below B-	226%
		Unrated	NA

Much like the FSA credit test above, the 2007/2008 crisis has shown banks needing to liquidate large portfolios when downgrades start occurring. This in turn lead to increases in spreads in declining markets – precipitating further sales.

9.4. Value at risk based models for fixed risk budgets

Many asset managers are using value at risk (VaR) based models to budget risk. Typically, this VaR would be measured from recent history (e.g. last 12 months etc.). Against this the expected returns can be compared to form an 'expected' Sharpe Ratio.

However, as markets become 'bullish', there is a tendency for the VaR to fall, i.e. the pattern in market volatility is that it generally falls in a steady rising market (by definition). Therefore, as the markets rise, they seem less risky and the relative 'bets' that may be taken for a given risk budget will rise, hence buying increases as markets rise. Conversely, as markets fall, VaR tends to increase, leading to increased sales in a falling market, thereby increasing volatility further. The recent credit crunch from June 2007 onwards is an example of this, since it followed a period of sustained low volatility in credit spreads.

9.5. Implied default as a measure of risk

Before the 2007/2008 crisis, collateralised debt obligations (CDOs) became very popular. Their models generally using implied default rates calculated from market yields to calibrate risk which (in theory) followed from the efficient market hypothesis.

However, within CDOs it led to a significant reduction in 'perceived' risk as credit margins fell through 2000 to 2007. In turn, this meant that for a fixed level of risk or credit rating, more leverage can be created against a given portfolio as it is thought to be 'less risky'. However the market has shown that as spreads widen and risk is assumed to increase, the high level of leverage

results in significant downgrades of the instruments, forcing foreclosure of the instruments and further spread widening.

9.6. **Credit quality of the institution**

Banks generally invest in credit, lending in the wholesale and retail markets to fund it. As such, they have 'leveraged' exposures into the credit markets. The recent crisis has shown that as the average credit quality of their investments declines, so can their own credit rating. This is turn can lead to forced selling as their capital base declines, putting further losses into their own balance sheet and further downward pressure on both market levels and their rating. To some extent this can affect insurers too, particularly those with high levels of annuity exposure.

9.7. **Funding illiquid asset purchases using unit trusts / mutual funds**

There are many examples where fund managers have unitised the purchase of illiquid assets undertaking to provide liquidity in these units for investors (e.g. high yield, property). In these instances, the unitisation produces an illusion of liquidity as investors who wish to liquidate their holding as the fund is building simply get paid out of new cash coming in. However liquidation tends to become far more difficult when the market becomes negative on the asset class – i.e. when there is a downturn in the market. At this point, incoming cashflow reduces as fewer investors want to invest. Further liquidations will cause the forced selling of the underlying illiquid asset in a falling market. This 'perfect storm' can be witnessed in the property market in 2007/2008 – which led to some institutions stopping the liquidation of units (effectively freezing the liquidity of their liabilities). Whilst allowed, it demonstrates liquidity is often only available in rising markets.

This is an example of how more broadly structuring an asset can change its liquidity. Unitising illiquid assets is potentially a way of improving their liquidity, and has been used by some with-profits funds to manage property assets in a with-profit fund in run-off. However, as above, this does depend on the provision of new money from other investors to enable units to be redeemed without forced sales of assets. Effectively, the liquidity of the assets has been improved, but at the expense of creating more liquid liabilities.

9.8. The list of examples above is not exhaustive. What this section does highlight, however, is that the clinical adherence to 'hard' rules can create a crisis, where 'softening' of these rules may reduce both market volatility and the risk of additional liquidity requirements as market conditions worsen. Furthermore, care must be taken in creating 'liquid' liabilities during bull markets when asset liquidity is high.

10. Conclusions

10.1. We now return to the question originally posed in the title of this paper: "How valuable is liquidity?" We have sought to address this question in a systematic manner for each of the key UK institutional investors. By following a consistent process for each type of institution we have been able to compare the relative value they typically place on liquidity. We have split our conclusions between observations, threats and opportunities.

Observations

10.2. Liquidity requirements and asset liquidity are variable between 'normal' and 'stressed' conditions. Liquidity appears to rise and fall in line with bubbles in the market therefore market bubbles may act as an early warning of a liquidity crisis.

10.3. The recent crisis highlighted that reactions in the management of liquidity in a market crisis are crucial to the survival of financial institutions. In particular:

- Prescriptive regulatory capital assessments and a close calibration to current market levels can create a negative reinforcing dynamic. This is highlighted by the Senior Supervisors Group who suggest that following 'hard' risk based rules can lead to undesirable consequences.
- During the crisis, financial institutions with less liquid liabilities have shown a greater resilience than those with more liquid liabilities.
- An automated approach to trading has served to increase volatility and made valuation of less liquid assets (and those where liquidity has declined) very difficult.
- When assigning collateral against borrowing, reductions in the liquidity of assets and the corresponding increase in the difficulty of asset valuation can lead to over-collateralisation exacerbating falls in liquidity further.
- Complex assets have suffered most during the crisis. In particular the liquidity of investments where risk sharing has been involved has reduced sharply.

10.4. Looking at individual sectors, the Bank of England pledges support to UK banks as lender of last resort. Life insurers and defined benefit pension schemes do not have the same support and therefore have less scope for moral hazard. Banks seem to take advantage of this support and take on greater illiquidity in their assets than their liabilities demand.

10.5. Life insurers have to some extent reflected the illiquidity of liabilities in annuity funds by investing in corporate bonds. As a long term investor there may be scope for them to utilise combinations of derivatives and other asset classes to increase their liquidity premium and expected return on assets.

10.6. UK defined benefit pension schemes, like life annuity portfolios, typically invest in more liquid assets than their liabilities theoretically require. They

may also benefit from investing in more illiquid assets to earn illiquidity premiums. However with a deficit on a full buy-out basis, pension schemes arguably already holds significant illiquid 'assets' in the form of future contributions due from the sponsoring employers.

10.7. Finally the UK pensions industry has generally been slower to change investment strategy than a typical bank or life insurance company. This has reduced their ability to take advantage of short term changes in the financial markets. However, on the other hand, this approach has shielded them from the complex instruments that have suffered the most in liquidity terms during the recent crisis.

Threats

10.8. The deterioration of liquidity during the 2007/08 crisis was sudden and apparently unexpected by many investors. Banks in particular have been affected and life insurers to a lesser extent. The standard regulatory liquidity tests failed to pre-empt the size of the crisis and many financial institutions had insufficient provision for it.

10.9. Evidence shows that risk based regulation that is mechanically based on market calibrated factors contributes to market volatility. Regulators need to consider how risk will be measured as the liquidity of financial instruments changes – it may be that liquidating assets into falling markets exacerbates the liquidity problems.

10.10. Whilst it may be tempting to change regulation in direct response to a crisis, 'knee jerk' reactions can further disrupt the financial system and regulators should be careful not to create further unintended consequences.

10.11. The need for liquidity appears to go hand in hand with the quality of the liquidity risk management. Institutions that relied on quantitative 'mechanical' risk management systems tended to have had more 'unexpected losses' in the 2007/08 crisis than institutions that also used other methods (e.g. scenario testing, behavioural models etc.).

10.12. The 2007/08 crisis also highlighted that institutions investing in complex assets were more vulnerable to downturns in market liquidity than those with simpler investments. It may be that higher provisioning charges and more rigorous governance levels are needed where new markets are being entered, particularly during a bull market.

Opportunities

10.13. Some scope exists for long-term institutional investors to reduce the liquidity of their investments and enjoy higher expected returns. Pension schemes in particular could take advantage of illiquidity premiums due to their relatively low liquidity requirements.

10.14. Long term investors may need to improve their performance measurement process to take advantage of illiquid investments. US Endowment funds (outlined in Appendix C) have illustrated that a captive business with performance assessed over a longer term and aligned to its trustee's objectives

can invest in very illiquid assets and provide sustainable high investment returns.

10.15. Defined benefit pension schemes may benefit from a more nimble approach to tactical risk management. This would enable them to more quickly enter and exit tactical investment positions in order to better take advantage of changes in the investment markets, for example recent increases in liquidity premiums. The high number of stakeholders increases the challenge of holistically managing risk. A framework that provides adequate protection to beneficiaries whilst allowing quicker decision making would be ideal. This might include a mechanism to ensure stakeholders' objectives are closely aligned - for example through remuneration or other means.

10.16. Banks may benefit from employing long term assumptions in their risk assessment, not simply using market consistent measures. A longer term view may have helped to avoid taking excessive risks during bubbles in the market. Identification of bubbles may be a pre-emptive sign for risk managers of a potential collapse in market levels and liquidity. It is unclear whether attempts at identifying such patterns are currently built into any financial institutions' risk modelling frameworks.

10.17. In the light of the volatility created through rules based risk management, principle based regulation does appear to be an improvement over prescriptive regulation to help avoid vicious circles in markets. However contingent planning could have a higher profile both by regulators and firms.

10.18. Finally, the use of 'dampeners' in regulatory capital requirements based on longer term outlooks may reduce 'forced trading' – and hence market volatility. Such 'countercyclical' solvency measures would be equivalent to those being proposed under Basel 2 (BoE Stability Report, April 2008).

Concluding Remarks

10.19. How Valuable is liquidity? The answer seems that it may be valuable for different reasons, either because it is needed to support an institution's liabilities, or because it can be supplied at a premium.

10.20. Liquidity changes all the time making it difficult to measure and manage – however it is clear that mismanagement can be terminal for an institution.

10.21. The working party has attempted to answer the question in the paper's title. The topic has proved to be very broad and involved bringing together a large number of key themes.

10.22. The findings suggest there is significant work that could be done in this area, for instance in

- proposing a framework for effective liquidity governance,
- measuring the liquidity of institutions, and
- optimising investment returns to incorporate liquidity risk as a source of returns.

Appendix A – Further Details of the Example Liquidity Scale

Typical Large UK Bank

Option / Contingent Event	LIQUIDITY FACTORS				Overall Contribution to Liquidity
	Impact on Cashflow [1]	Eligibility [1]	Penalty [2]	Predictability [2]	
Withdrawal of funds	**High**	**High** Available to all customers	**Nil** Customers withdraw funds effectively at par	**Moderate (normally)** The recent run on funds at Northern Rock reminds us that there is a low chance of a catastrophic withdrawal rate	**High**
Redemption of Term Funding	**High**	**High** Relates to all financing	**Nil** Bonds redeem at par	**High** Redemptions are known in advance. Key risk however is refinancing risk if the market is disrupted	**Moderate to High**

Based on this analysis, the implied liquidity of a typical UK Bank's liabilities are <u>Moderate to High.</u>

[1] *Higher impact on cashflow and eligibility correspond to an increase in overall liquidity*
[2] *Higher penalty and predictability correspond to a reduction in overall liquidity*

Typical Large UK Defined Benefit Pension Scheme of Average Maturity

Option / Contingent Event	LIQUIDITY FACTORS				Overall Contribution to Liquidity
	Impact on Cashflow [1]	Eligibility [1]	Penalty [2]	Predictability [2]	
Withdrawal	**High**	**High** Available to all active and deferred members	**High** Transfer terms are usually not generous. Significant penalty for active members as salary linkage and future accrual are lost	**Moderate**	**Moderate**
Early Retirement	**Moderate** Main impact is timing of commutation lump sum	**Moderate** Generally available to active and deferred members from age 55	**Low** Terms often close to cost neutral	**Moderate**	**Moderate**
Lump Sum Commutation	**High** An annuity is transferred into a single lump sum payment	**Moderate** Only available on retirement and for a proportion of total benefits	**Moderate** Commutation terms are usually not generous	**High**	**Low**
Death Before Retirement	**Low** Impact will be zero if benefit is fully insured	**High**	**n/a**	**High** Impact generally predictable over short term. Possible concentrations of risk – e.g. a large office building	**Low**
Death After Retirement	**Low**	**High**	**n/a**	**High** Impact generally predictable over short term	**Low**
Ill-health retirement	**Low**	**High**	**n/a**	**High**	**Low**

Based on this analysis, the implied liquidity of a typical UK final salary scheme of average maturity is <u>Low to Moderate</u>.

[1] *Higher impact on cashflow and eligibility correspond to an increase in overall liquidity*
[2] *Higher penalty and predictability correspond to a reduction in overall liquidity*

Typical Unit Linked Fund of a UK Life Insurance Company

Option / Contingent Event	LIQUIDITY FACTORS				Overall Contribution to Liquidity
	Impact on Cashflow [1]	Eligibility [1]	Penalty [2]	Predictability [2]	
Withdrawal / Full surrender	**High** High withdrawals / surrenders will mean assets will need to be sold to provide payment; unit linked funds will be backed by a range of different assets many of which will be illiquid	**High** Available to all members	**Low** Surrender penalties on newer products are low; penalties are increasingly difficult to implement due to negative publicity	**Moderate** Generally predictable using experience analysis although may be adversely affected by effects such as advisor actions	**High**
Switches	**High** However it is often possible to offset the majority of switches as policyholders generally switch independently between funds	**High** Policyholders will have a number of free switches each year	**Low** Other than a bid offer spread there are generally no penalties	**Low** Switches can be driven by market movements as well as policyholder's risk appetite	**High**
Death	**Low** Deaths are low component of total payouts from a unit linked funds as normally equal to unit value or a small percentage above 100% (e.g. 101%)	**High** All policies generally pay benefits on death	**n/a**	**High** Impact generally predictable over short term	**Low**

Based on this analysis, the implied liquidity of a typical UK unit linked life fund is <u>Moderate to High.</u>

[1] *Higher impact on cashflow and eligibility correspond to an increase in overall liquidity*
[2] *Higher penalty and predictability correspond to a reduction in overall liquidity*

Typical Immediate Annuity Fund of a UK Life Insurance Company

Option / Contingent Event	LIQUIDITY FACTORS				Overall Contribution to Liquidity
	Impact on Cashflow [1]	Eligibility [1]	Penalty [2]	Predictability [2]	
Withdrawal / Surrender	**Nil** Annuities generally cannot be surrendered	**Nil**	**Nil**	**Nil**	**Nil**
Death	**Moderate** Particularly impacts deferred annuities where lump sum would become payable	**High**	**n/a**	**High** Impact generally predictable over short term	**Low**

Based on this analysis, the implied liquidity of a typical immediate annuity fund is <u>Low</u>.

[1] *Higher impact on cashflow and eligibility correspond to an increase in overall liquidity*
[2] *Higher penalty and predictability correspond to a reduction in overall liquidity*

Typical Conventional With-Profit Fund of a UK Life Insurance Company

Option / Contingent Event	LIQUIDITY FACTORS				Overall Contribution to Liquidity
	Impact on Cashflow [1]	Eligibility [1]	Penalty [2]	Predictability [2]	
Withdrawal / Surrender / Lapse	**High** Excessive lapses would require significant cashflows	**High** Available to all members	**Moderate** Some initial surrender penalties for early surrender and generally pay out asset share rather than full sum assured; penalties are increasingly difficult to implement due to negative publicity and PPFMs	**Moderate** Generally predictable using experience analysis although may be adversely affected by effects such as advisor actions	**Moderate**
Exercise options (e.g. GAO)	**Low** Generally options provided can be valuable but affect longer term cashflows rather than short term	**Moderate** Fewer options / guarantees in newer products	**Nil**	**Moderate**	**Low**
Death	**High** Death benefits are generally high	**High** Most contracts provide a death benefit	**n/a**	**High** Impact generally predictable over short term	**Moderate / High**

Based on this analysis, the implied liquidity of a typical UK conventional with-profit fund is <u>Moderate</u>.

[1] *Higher impact on cashflow and eligibility correspond to an increase in overall liquidity*
[2] *Higher penalty and predictability correspond to a reduction in overall liquidity*

Appendix B – External Drivers of Liquidity

Drivers of liquidity for UK banks

Accounting and regulation

B.1. The UK banking industry is regulated by the Financial Services Authority ("FSA"), previously the Bank of England (and Building Societies Commission for Building Societies). The FSA regulates banks and provides the level of capitalisation required based on various inputs including liquidity. Basel 2 (being phased in currently) is altering the requirements for banks to hold capital against investments.

B.2. The Sterling Stock regime applies to some UK retail banks and requires banks to hold Bank of England eligible assets to cover their five-day wholesale net outflow and 5% of retail deposits withdrawable over the same period. The Mismatch regime applies to all other banks and aims to assess whether a bank has enough assets to meet its liabilities in different time-bands on a maturity ladder. The Building Society regime requires societies to hold 3.5% of liabilities in high quality marketable assets, which extend beyond the Bank of England's eligible collateral list.

B.3. The recent turmoil in the markets highlighted the separation between the ultimate provider of liquidity (the Bank of England) and the supervisor (the FSA) exacerbating potential liquidity problems amongst banks. Previously this would have been managed under one roof (i.e. the Bank of England)

B.4. UK balance sheets are calculated effectively discounting at LIBOR (the rate at which banks lend to each other). This manifests itself as assets effectively held at 'book value', with the exception of trading assets which have fixed interest rate risk and are valued at 'mark to market'. Depending on a market existing, assets are valued either mark-to-market or 'mark-to-model'. Mark-to-model is an estimate of a value based on 'observable inputs'. These observable inputs are used when no actual price quotes are available.

B.5. UK Liabilities (deposits and term funding) are valued at par (equivalent to "book value").

B.6. As a consequence of failures such as Enron in the US, the accounting standards board in the US (FASB) is looking more closely at the valuation of illiquid trading assets, proposing (currently, Jan 2008) that 3 levels of liquidity are declared for assets. Level 1 assets are priced using mark-to-market accounting and are based on a real price. Level 2 assets 'mark-to-model'. Finally Level 3 asset values, which are based on 'unobservable' prices and use the banks' own 'assumption' on what the assets are worth. This proposal is drawing closer attention to the liquidity of assets internationally.

Asset performance measurement

B.7. Asset performance has traditionally been assessed based on losses versus those expected over the term of the investment (5 – 7 years).

B.8. Investments are assessed on their expected 'Return-on-Capital', which will be the return, less expected losses and cost of capital. 'Provisions for bad debt' are then made for these losses.

B.9. The final performance is therefore assessed when the actual losses are taken from the Provisions pool.

B.10. Banks are encouraged to take on illiquidity premium as investments are assessed on their return over expected loss. In addition performance is based over the life of the investment leading to medium term time horizons for performance assessment (for example 5-7 years).

History

B.11. Banks traditionally took deposits from individual/corporate customers and provided loans back to the same customer base. This created significant liquidity imbalances as the loans were illiquid, whereas deposits are very liquid. This was alleviated by inter-bank borrowing and, in the UK, banks clear via the LIBOR market.

B.12. The LIBOR rate does vary and banks have increasingly sought the wholesale market (i.e. institutional / retail investors) to provide liquidity to reduce the risk of variation in inter-bank rates. Whilst reducing the risk of a 'run on depositors', it creates refinancing risk.

B.13. However, culturally (non-investment) banks still see their key business as lending bi-laterally and this creates illiquid investments. Whilst the liquidity of these investments is improving via the traded loan market, loans can still be very illiquid for obscure counterparties.

B.14. Banks have come from a culture of illiquid investments and liquid liabilities, albeit with a trend towards equalising the imbalance through regulation.

Drivers of liquidity for UK defined benefit pension schemes

Accounting and regulation

B.15. For UK defined benefits pension schemes that are not wholly insured, setting the investment strategy is the responsibility of the trustees. Trustees do not have to agree with the views of the sponsoring employer or carry out the employer's wishes, in practice however many trustees do have a close working relationship with the employer and will take into account their views. This potentially creates a disconnect between investment decisions and provider of capital. Ultimately the trustees are accountable for investment decisions on behalf of the beneficiaries. Often the beneficiaries will not directly benefit from good investment performance.

B.16. Occupational Pension Schemes (Investment) Regulations 2005 set out how trustees or fund managers must exercise their investment powers, including:

- ensuring the security, quality, liquidity and profitability of the fund in a manner appropriate to the nature and duration of the scheme liabilities;

- appropriate diversification in the choice of scheme investments; and
- predominantly invest scheme assets in regulated markets.

The scheme Trust Deed and Rules may impose additional limitations on investments.

B.17. The Pensions Act 2004 introduced greater responsibility on trustees for setting the Statement of Investment principles in the context of employer covenant (the employer's willingness and ability to provide future support for the scheme). A weak employer covenant is likely to encourage liquid investment except for the largest of schemes. A strong employer covenant may provide some scope for less traditional investment choices. The scheme Trust Deed and Rules may impose additional limitations on investments.

B.18. The requirement to predominately invest in regulated markets restricts investment in less traditional assets. If beneficiaries do not benefit from good investment performance then trustees may be deterred from investing outside traditional asset classes. The requirement for appropriate diversification may mean larger, less liquid investments (e.g. capital projects) are out of reach of smaller pension schemes. These factors lead pension funds to invest in assets with a higher level of liquidity.

Asset Performance Measurement

B.19. Detailed liability and asset measurement is required at least every three years as part of the triennial actuarial valuations. In additional, annual updates are required at least annually.

B.20. Significant movements in assets can occur at short notice due to bulk transfers or merger activity. A scheme wind-up may also require realisation of a significant portion of scheme assets.

B.21. Under both UK GAAP and US GAAP, changes to scheme funding position are reflected immediately in the balance sheet and profit and loss account of the sponsoring employers. Smoothing of actuarial gains and loses is currently still permitted through the profit and loss account under IAS, however there are proposals for this option to be phased out.

B.22. A Pension Protection Fund (PPF) levy is payable annually. The amount of the levy is set for each scheme based, among other things, on the level of scheme assets compared to PPF liabilities.

B.23. Both the visibility of asset performance in the accounts of the sponsoring employers, and the direct impact on costs though the PPF Levy, places additional onus on the short term performance of the scheme assets.

History

B.24. The traditional language of pension fund investments considers equity / bond split. Moreover, the ‘Trustee Toolkit’ published by the Pensions Regulator splits investments into four categories: equity / bonds / property / alternatives (e.g. hedge funds and derivatives).

B.25. Many schemes have traditionally steered away from alternative investments – such as derivatives. This may be due to a traditionally more conservative approach to innovative investments.

B.26. High investment in equities has traditionally been viewed as an approximate match for inflation. This was particularly true prior to the wide-spread introduction of index linked bonds.

B.27. More recently we have seen larger pension schemes moving away from traditional equity/bond splits.

B.28. Widespread use of traditional classifications may deter changes in investment practices. Trustees are unlikely to be criticised for taking a conventional approach – but an innovative approach that is unsuccessful may leave them vulnerable. Trustees are likely to choose more traditional listed assets, which are generally more liquid.

Drivers of liquidity for UK life insurers

Accounting and regulation

B.29. The FSA regulates the life insurance companies and provides the level of capitalisation required based on various inputs including liquidity. However, traditionally the FSA does not see liquidity as such a significant issue for life insurers as for banks; life insurers are exempt from quantitative liquidity risk requirements (See Sec 5.1.7 G of the Integrated Prudential Sourcebook (PSB))

B.30. In some instance (e.g. for annuity funds), illiquidity premia are used to reduce capital requirements as the premia may be capitalised in present value reserving calculations.

B.31. Surrenders and transfers pose the highest liquidity risk for insurers as they are usually at the policyholder's discretion. The Principles and Practices of Financial Management requirements have constrained firms' ability to vary surrender values (SVs). CP207 proposes further constraints – SVs will need to be more consistent with Asset Shares

B.32. The business models of banks and life insurers differ significantly: usually banks will use deposits to sell loans which earn a higher yield than the guarantees given. Whereas insurance companies will invest premiums on the capital market to receive higher returns than the guarantees given.

B.33. Historically, perceived lack of liquidity was a key factor leading to regulatory intervention. Liquidity premia have historically been used in valuation bases to reduce capital requirements. Overall, even considering new developments, there is no real regulatory impetus to focus life insurers on liquidity risk, although there has been an advantage to invest in illiquid assets in some circumstances (e.g. for annuity funds).

Asset Performance Measurements

B.34. The return on funds, bonuses and crediting rates are publicly disclosed and the risk of underperforming relative to peers and benchmarks will influence the investment choices that a company makes.

B.35. Performance measurement and reporting is important. Regularly traded assets are easier to value and report on.

History

B.36. Traditionally life companies have not viewed liquidity as a problem. Liabilities are usually long term, and surrender values are usually not guaranteed for conventional business. For unit linked business any losses can in theory be passed on to the surrendering policies.

B.37. The expansion of the UK Life insurance market over the past two decades meant that premiums and investment income have outweighed claims. However many portfolios are now maturing and many with-profit funds have closed to new business and as a result cashflow is frequently becoming negative.

B.38. Asset performance historically was part of the overall performance of the insurance company. However in the 1990's this asset functions became separate in many firms and run much like pension funds. This led to some short term investment horizons which other similar investors (e.g. US Endowments – see Appendix C) did not develop.

B.39. Liquidity has not been a problem historically but is becoming more of an issue on the liability side, as changes force companies to reduce exit penalties. However assets have also co-incidentally become more liquid due to changes in performance based investment fees

Appendix C – Case Studies

US Endowment Funds

C.1. The US endowment funds of the Yale and Harvard universities give a guide to what an asset allocation might look like if unconstrained by liability and liquidity issues. The funds typically aim to distribute around 5% of their assets each year to university activities or programs, making their cashflow profile similar to an immature pension fund or insurance annuity portfolio.

C.2. Both Yale and Harvard endowment fund have made a significant shift towards alternative, and less liquid, assets over the last 20 years, recognising the value of their liquidity position.

C.3. Yale endowment fund's 2007 report comments that "The heavy allocation to nontraditional asset classes stems from their return potential and diversifying power. Today's actual and target portfolios have significantly higher expected returns and lower volatility than the 1987 portfolio. Alternative assets, by their very nature, tend to be less efficiently priced than traditional marketable securities, providing an opportunity to exploit market inefficiencies through active management. The Endowment's long time horizon is well suited to exploiting illiquid, less efficient markets such as venture capital, leveraged buyouts, oil and gas, timber, and real estate."

C.4. Their current asset allocation is shown in figure C.1 below, where 'real assets' comprise assets such as real estate, oil, gas and timberland. 20 years ago in 1987, nearly 80% of the portfolio was committed to marketable US domestic securities (stocks, bonds and cash) compared to 15% now.

Asset Class	June 2007	Current Target
Absolute Return	23.3%	23.0%
Domestic Equity	11.0	11.0
Fixed Income	4.0	4.0
Foreign Equity	14.1	15.0
Private Equity	18.7	19.0
Real Assets	27.1	28.0
Cash	1.9	0.0

figure C.1

C.5. The Harvard endowment fund's changing asset allocation over the last 30 years is shown in figure C.2 below which again shows a similar strong trend over time to more illiquid and alternative assets and away from liquid domestic securities.

Historical Evolution of the Asset Mix/Policy Portfolio

	1980	1991	1996	2000	2007	2008
Equities						
Domestic Equities	66	40	36	22	12	12
Foreign Equities	-	18	15	15	11	12
Emerging Markets	-	-	9	9	8	10
Private Equities	-	12	15	15	13	11
Total Equities	***66***	***70***	***75***	***61***	***44***	***45***
Fixed Income						
Domestic Bonds	27	15	13	10	7	5
Foreign Bonds	8	5	5	4	3	3
High-Yield	-	2	2	3	3	1
Total Fixed Income	***35***	***22***	***20***	***17***	***13***	***9***
Real Assets						
Commodities	-	6	3	6	16	17
Real Estate	-	7	7	7	10	9
Inflation-indexed Bonds	-	-	-	7	5	7
Total Real Assets	***-***	***13***	***10***	***20***	***31***	***33***
Absolute Return and Special Situations	-	-	-	5	17	18
Cash	(1)	(5)	(5)	(3)	(5)	(5)
TOTAL	**100**	**100**	**100**	**100**	**100**	**100**

figure C.2

References

Bank of England (2007a), "Financial Stability Report", published in April 2007
http://www.bankofengland.co.uk/publications/fsr/2007/index.htm

Bank of England (2008), "Financial Stability Report", published in April 2008
http://www.bankofengland.co.uk/publications/fsr/2008/index.htm

Bank of England (2007b), "Financial Stability Report", published in October 2007
http://www.bankofengland.co.uk/publications/fsr/2007/index.htm

Bank of England (2007c), "Markets and operations", published in the Bank of England Quarterly Bulletin 2007Q3
http://www.bankofengland.co.uk/publications/quarterlybulletin/mo07nov.pdf

Carlson (2007), "Alternatives for Distressed Banks and the Panics of the Great Depression", published in Finance and Economics Discussion Series by Divisions of Research & Statistics and Monetary Affairs, Federal Reserve Board, Washington

Chacko, Jurek and Stafford (2007), "The price of immediacy", HBS Finance Working Paper No. 07-017
http://ssrn.com/abstract=934193

Cochrane (2005), "Asset pricing program review: Liquidity, trading, and asset prices", NBER Reporter, Winter
http://faculty.chicagogsb.edu/john.cochrane/research/Papers/Cochrane_NBER_program_report_winter05.pdf

Dyer, D, Crouch, S, Eason, S, Fulcher, P & Jolly P. (2004). Fixed Interest Investment for Life Insurers - Driven by Investment Principles or Regulation?
http://www.actuaries.org.uk/__data/assets/pdf_file/0007/31030/Eason.pdf

Fulcher (2007a), "The credit spread puzzle", presented to the Institute and Faculty of Actuaries Finance and Risk Management Conference, June 2007
http://www.actuaries.org.uk/files/pdf/proceedings/firm2007/Fulcher1.pdf

Fulcher (2007b), "The credit crunch", presented to the Institute and Faculty of Actuaries Life Convention, November 2007
http://www.actuaries.org.uk/files/pdf/proceedings/life2007/Fulcher_plenary.pdf

Hyman (2005), "New Ways for Managing Global Financial Risks : The Next Generation", **Publisher:** John Wiley and Sons Ltd

Longstaff.(2001), "The flight-to-liquidity premium in US Treasury Bond Prices", Journal of Business, 77, 511-526.
http://repositories.cdlib.org/cgi/viewcontent.cgi?article=1004&context=anderson/fin

Muir, Chase, Coleman, Cooper, Finkelstein, Fulcher, Harvey, Pereira, Shamash and Wilkins (2007) "Credit derivatives"; presented to Faculty of Actuaries, January 2007.
http://www.actuaries.org.uk/files/pdf/life_insurance/credit_derivatives_20060126.pdf

The Pensions Regulator (2007) "The Purple Book – DB Pensions Universe Risk Profile"

Rebonato (2007), “Plight of the fortune tellers”, **Publisher**: Princeton University Press

Soros (2008), “The New Paradigm for Financial Markets: The Credit Crash of 2008 and What It Means” **Publisher**: PublicAffairs, May 2008

Senior Supervisors Group (2008), “Observations on Risk Management Practices during the Recent Market Turbulence”
http://www.occ.treas.gov/ftp/release/2008-29a.pdf

Webber and Churm (2008), “Decomposing corporate bond spreads”, published in the Bank of England Quarterly Bulletin 2007Q4
https://www.bankofengland.co.uk/publications/quarterlybulletin/qb070403.pdf

UBS (2007) “Pension Fund Indicators 2007 – A long-term perspective on pension fund investment”