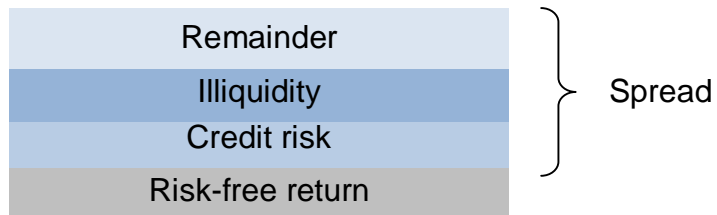


## Some comments on the illiquidity premium

March 2010, Philipp Keller, Swiss Actuarial Association

Investors buying illiquid financial instruments, e.g. certain corporate bonds, assign a lower value to such instruments than to identical but liquid ones. This is expressed in a higher spread used for the pricing and valuation of illiquid instruments. A part of the spread above risk-free corresponds to the compensation for credit risk, another component corresponds to the compensation for illiquidity, and the remainder is a required compensation due to other properties of the investment.



The remainder contains likely a number of different components that are difficult to quantify and disentangle: Uncertainty with respect to the market prices, market sentiments concerning risk, expense risk associated with holding the instrument, etc. Some argue that holding illiquid instruments together with an associated CDS takes away the credit risk component, leaving the illiquidity premium and the remainder. Stripping out then the illiquidity premium is very complex because the remainder is ill-specified and uncertain.

During the credit crunch in 2008, insurers holding corporate bonds experienced a material drop in asset values due to widening spreads. Investors were fleeing corporate bonds and many other credit risky investments and were mainly looking to invest in government bonds. This led to a drop in the risk free interest rate and to a large rise in spreads. This combination led to a drop in the value of assets with a credit spread and to an increase in the value of liabilities which were valued with respect to the risk free rate.

Some insurers writing life annuities used the concept of illiquidity premiums for pricing and valuing their liabilities. In particular in the UK, the life annuity market is highly competitive. Life annuity writers invest in illiquid corporate bonds and use the spread (the liquidity premium) to charge lower rates to annuitants and have a competitive advantage.

Since the credit crunch, some insurers and other organizations have been looking for a sound theoretical framework for the use of an illiquidity premium for the valuation of liabilities.

In this short paper, we will not discuss whether an illiquidity premium exists for assets, since this is not disputed. We are rather concerned with the use of an illiquidity premium for the market consistent valuation of liabilities, as has been proposed by the industry and others bodies (e.g. the CRO Forum and the CFO Forum).

We argue against the use of an illiquidity premium based on our understanding of market consistent valuation.

### Market Consistent Valuation

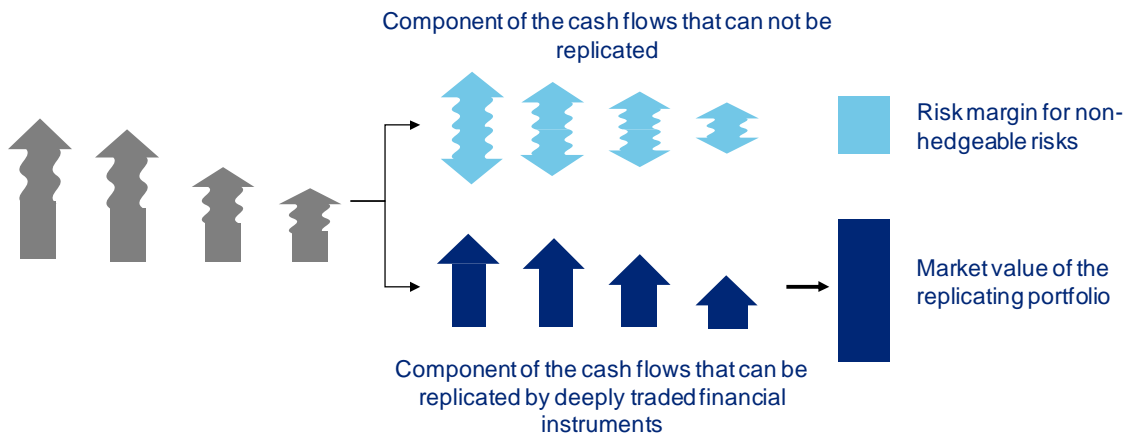
In the following, we outline the central idea of market consistent valuation of insurance liabilities (MCVL).

In general, there are no (or no reliable) market prices for insurance liabilities available. The MCVL is based on the requirement that similar or identical cash flows lead to similar or identical values. For this reason, the concept of valuation by replication is central to the MCVL approach. The idea of valuation by replication is that the value of a liability can be set in relation to the value of a "replicating portfolio", which is a portfolio of instruments which perfectly or approximately replicates the cash flows of the liability. If this replicating portfolio consists of instruments with reliable market prices, then market-consistency implies that its value is equal to the sum of the market prices of the replicating instruments. In this way, the value of an insurance liability can be set in relation to the market prices of liquid instruments. As a special case, if the replication is perfect, then the liability value has to be equal to the market price of the replicating portfolio.

Insurance liabilities are typically neither traded in a deep and liquid market (i.e. they have no reliable market prices), nor can their cash flows be perfectly replicated by financial instruments which are traded in a deep and liquid market. The main reason for this is insurance risk, i.e. mortality, non-finance rational policyholder behaviour etc, which cannot be replicated perfectly using financial instruments.

The basic idea of market consistency then is to decompose the cash flows of insurance liabilities into two components:

- A component that can be replicated using financial instruments for which there is a deep and liquid market and
- A component that cannot be replicated (giving rise to a risk margin)



The market consistent value of insurance liabilities is then the sum of the **market price of the replicating portfolio**, composed of financial instruments for which there is a deep and liquid market, plus the **risk margin**, defined as the expected cost to buffer the risks of the component of the cash flows which cannot be replicated.

Expressed differently, market consistent valuation transfers the problem of valuing insurance liabilities for which there are no (or no reliable) market prices to a situation in which reliable market prices are available.

It is important to emphasize that, for valuation purposes, it is essential that the replication uses only financial instruments which are traded in deep and liquid markets. If replication were done with illiquid corporate bonds, for example, then illiquid insurance liabilities would be valued using illiquid financial instruments. In essence, then the problem of valuing insurance liabilities is transferred to a problem in which similarly illiquid financial instruments are used for the comparison and where market prices are not reliable.

In the discussion about the illiquidity premium, arguments revolve around the appropriate discount rate to be used for the best estimate. Using a given discount rate is however equivalent to making assumptions on the financial instruments which can be used for replication. The discount rate is a derived parameter from the more fundamental approach of dynamic replication.

### Illiquidity Premium

The argument for the use of an illiquidity premium goes as follows:

- Some insurance liabilities are illiquid. By this, it is meant that policyholders cannot lapse on their policies. This is then related to the predictability of the cash flows (i.e. how likely are forced liquidations).
- For this reason, it is argued, the cash flows of these liabilities are highly predictable, and can thus be matched well by illiquid long-dated corporate bonds.
- The spread of these illiquid long-dated bonds contains a component for credit risk, a component for lack of liquidity, and a remaining component.
- Since insurers do not need to sell these bonds, the component for illiquidity does not matter to the insurers since they can replicate the cash flows with illiquid corporate bonds.
- Therefore, only the component for credit risk and the remaining component should be deducted from the spread. Hence, for the discounting of the insurance liability cash flows, the illiquidity premium can be used in addition to the risk free rate.

- Different types of insurance liabilities can use different levels of illiquidity premium, depending on the predictability of their cash flows and a number of other requirements.

### What are the problems with this approach from an actuarial perspective?

Obviously, if policyholders cannot lapse on an insurance policy, the liability cash flows from that policy will differ from an identical policy that includes the option to lapse. A policyholder will pay less (all other things being equal) for a policy lacking the lapse option. In a market consistent valuation, all embedded options and guarantees should – at least in theory – be quantified by the insurer. Thus, the market consistent value of an illiquid insurance liability (i.e. one in which policyholders cannot lapse) will be lower than that of an insurance liability containing the lapse option. This argument assumes that the policyholders are reasonably rational in exercising their options, however. If policyholders exercise their option to their disadvantage, then the value of the option for the insurer is actually negative, meaning that it reduces its expected liabilities. In normal cases, when policyholders are reasonably rational then if the value of the liability could additionally be reduced by using an illiquidity premium, this would be a double counting of the absence of the lapse option.

It is argued that an insurance liability is illiquid if the cash flows of the liability are predictable. There is, however, no definite link between the absence of a lapse option for policyholders and the predictability of the cash flows. In other words, the cash flows can be unpredictable for other reasons than the absence of a lapse option. Predictability should take into account all sources of possible deviation not just the lapse option. This is somewhat of a technical point, but predictability has to be clearly defined, otherwise the application becomes quite arbitrary. For example, every insurance liability cash flow can be decomposed in a perfectly predictable component (i.e. the expected cash flow) and the remaining cash flow that is stochastic and deviates around the expected. Using the illiquidity premium argument, the first component can be discounted with the risk-free rate plus the illiquidity premium, the second component gives rise to the risk margin. This means that all insurance liabilities, life and P&C, can be argued to be partially perfectly predictable and be allowed to be valued using an illiquidity premium. This follows logically from the definition of illiquidity but is likely not what is intended. As we have argued above, market consistent valuation relies on comparing insurance liability cash flows with cash flows from financial instruments with reliable market prices. The component that cannot be hedged gives rise to an explicit risk margin. The underlying idea of market consistent valuation is to transfer the problem of valuing insurance liabilities for which there is no market price to a setting in which reliable market prices exist.

There are some problems with the approach and the line of argument:

- The illiquidity premium approach – in final consequence – intends to transfer the problem of valuing insurance liabilities to a setting in which illiquid corporate bonds are used, for which there are no reliable market prices. Proponents of the illiquidity premium argue that this is acceptable since insurers do not need to sell these bonds.

If a company actually holds these corporate bonds as assets, market prices could deteriorate easily. It would then not help to argue that it doesn't matter because these assets hedge the liability cash flows. This is purely a hold to maturity argument that has no place in a market consistent framework. The argument would be correct, if Solvency II would not require market prices for corporate bonds that hedge the illiquid insurance liabilities. Such a solvency system that would be based on hold-to-maturity would however be very far from market consistent. It would require a different valuation standard also for assets and a different definition of the SCR.

- How to determine the illiquidity premium? The current approaches seem extremely ad-hoc; quite apart from the fact that it should not be used for the valuation of insurance liabilities.
- The illiquidity premium approach – as outlined above – uses illiquid corporate bonds as replicating instruments. The risk of these corporate bonds should be captured in the risk margin. This includes the credit risk as well as the remaining component of the spread (which is likely a spread for the uncertainty of the market price). This is not reflected sufficiently in the discussions of the illiquidity premium.
- The assignment of illiquidity premiums to different insurance liabilities seems arbitrary. The discussed approaches rely on the predictability of the cash flows, the resilience to forced sales of illiquid assets

covering the insurance liabilities etc. In particular, the last criterion shows that the illiquidity premium approach in the end relies on hold-to-maturity arguments, which are completely inconsistent with a market consistent valuation approach.

- It is confusing to relate the liquidity (or illiquidity) of financial instruments to the predictability of their cash flows of insurance liabilities.

**In conclusion, given the assumption that market consistent valuation relies on the replication by financial instruments which are traded in deep and liquid markets, the entire concept of an illiquidity premium does not make sense. The definition of illiquidity of insurance liabilities is confusing and inconsistent. The illiquidity premium approach relies on hold-to-maturity arguments that are inconsistent with a market consistent valuation standard.**

### An Alternative Proposal

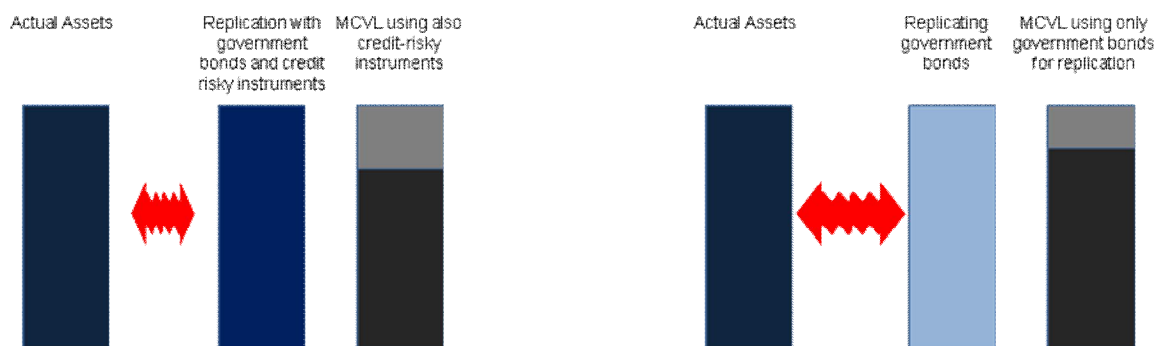
The industry in 2008 experienced financial strain because of the spreads widening on the asset side and a decrease of the risk free rate used for the valuation of liabilities.

As described above, the discount rate to be used is in the end an assumption on the financial instruments that can be used for replicating the insurance liability cash flows for the purpose of valuation. For our alternative proposal, we base our approach on a discussion of acceptable financial instruments for replication and the properties of the risk margin. The alternative approach would be consistent with the methodology of Solvency II and would not require the use of illiquidity premiums while still mitigating the effects of short term spread movements.

The alternative approach in our opinion can still be considered market consistent and there is no need to estimate the illiquidity premium, however the risk margin calculation becomes more complex.

The use of a risk-free discount rate is equivalent to the assumption that the valuation can be done only using governments bonds for the replication. However, there might exist other financial instruments which are traded in deep and financial markets, e.g. some corporate bonds. Such corporate bonds could be used in the context of market consistent valuation to replicate the insurance liability cash flows. Since these corporate bonds contain a credit risk component, this non-hedgeable financial risk would have to be included in the risk margin. If such corporate bonds are used for the replication, then the implied discount rate is higher than risk free.

The market consistent value of insurance liabilities derived in this way would be – at least in a first approximation – identical to the value obtained if only government bonds were used for the replication. The market price of the replicating portfolio would be lower (due to the spread contained in the corporate bonds), but the risk margin would be higher due to the credit risk component.



However, if liquid corporate bonds are used for the replication, and if corporate bonds are held as assets, then, in times of market stress, the implied discount rate will increase and the value of insurance liabilities will reduce,

thereby reducing the asset-liability mismatch between the lower asset values due to market stress and the market consistent value of insurance liabilities.

In the following, we consider in more detail the proposed approach to valuation of using liquid corporate bonds in the replication of the insurance liabilities instead of government bonds. We argue that this approach leads to less valuation volatility due to the fact that the risk margin relies not only on the current financial market parameters but also on long-term averages. In our proposed approach, in case of changes in spreads, the market consistent value would move similarly to the market value of corporate bonds. Additional risk has to be captured in the risk margin and in times of increased market volatility the risk margin would increase too. But the risk margin would increase less than the market value of the replicating portfolio would decrease due to increased spreads since the risk margin depends to a larger degree on long-term averages of financial market parameters.

Assume that the value of an insurance liability is given as the sum of the market price of a replicating portfolio consisting of liquid corporate bonds plus the risk margin. In times of stress, the spread of corporate bonds increases due to a higher credit risk as well as for other reasons (e.g. a lower risk appetite of investors). This will increase the risk margin and will partially compensate the reduced market price of the replicating portfolio.

However, the risk margin depends not solely on the financial market risk parameters that are prevalent now. Rather, the risk margin contains assumptions on the financial market during the entire life time of the insurance liabilities. To argue this point, consider the (somewhat simplified) formula for the risk margin given by

$$RM = \sum_{t \geq 0} CoC \cdot SCR(t)$$

where  $SCR(t)$  is the expected capital needed to buffer non-hedgeable risks during year  $t$ .

The non-hedgeable risk during year  $t$  relevant for  $SCR(t)$  is defined by the mismatch between the insurance liabilities still in the books at year  $t$  and the replicating portfolio of financial instruments that are traded in a deep and liquid market at year  $t$ . For this reason, the risk margin requires assumptions on the universe of financial instruments traded in a deep and liquid market in all future years during the entire life time of the insurance liabilities. For example, required capital to buffer non-hedgeable risks that emanate in 10 year's time requires assumptions on the situation 10 years from now regarding:

- Which financial instruments will be traded in a deep and liquid financial market
- The interest rates and spreads
- The volatilities
- Default rates
- Etc.

In practice, a pragmatic calculation of the risk margin will often rely on long-term averages for a number of assumptions. Especially for insurance liabilities, the risk margin depends less on the current financial market parameters (spreads, interest rates etc.) but on the long-term averages. In Solvency II and the Swiss Solvency Test, this is taken into account in the Cost of Capital rate (which is set to a fixed rate that represents a long-term average), but could equally be taken into account for other parameters.

The risk that, at future times, the financial market might become less deep and liquid could be taken into account by an additional risk charge in the risk margin. This component would be relevant regardless of whether replication were done by government bonds only or also by corporate bonds. Government bonds, for instance, can become illiquid in case of sovereign default, and some members of the EU have actually a higher probability of default and are more illiquid than some highly rated and deeply traded corporate bonds.

This implies that the risk margin depends less on the current financial market environment than on the financial parameters in future years. The required capital to buffer non-hedgeable financial market risks during year 0 ( $SCR(0)$ ) depends fully on the current financial market situation, but  $SCR(1)$  and subsequent  $SCR$  depend increasingly on the long-term average rather than on the current situation.

To recapitulate, we propose the following approach for market consistent valuation:

- Allow for the replication all financial instruments which are traded in deep and liquid financial markets; this results in a higher than risk-free discount rate for the insurance liability cash flows. However, the discount rate is then not fixed but depends on the composition of the replicating portfolio and therefore on the insurance liabilities.
- Requires capturing all non-hedgeable financial market risks in the risk margin; this includes credit risk and other risks of the replicating instruments.
- In the calculation of the risk margin, take into account that it depends more on the long-term average than solely on the current financial market parameters
- The total market consistent value of liabilities (the sum of the market price of the replicating portfolio and the risk margin) depends - via the risk margin – on the long term average of financial market parameters, and on the current financial market parameters via the discount rate used for the replicating portfolio and the SCR(0) in the risk margin.
- In times of extreme liquidity crunches, the set of financial instruments that are traded in deep and liquid markets will be reduced and might possibly consist only of government bonds. In financial market crunches, the discount rate then will be the risk free rate, but the risk margin will still depend on the long-term average of financial market parameters. We consider time of extreme liquidity crunches as fundamentally different from short term movements in corporate spreads. These constitute extreme cases where many assumptions break down. It is probably better to use supervisory measures within Solvency II (e.g., a short term lowering of capital requirements) to deal with these situations rather than to make the market consistent valuation inconsistent and intransparent.

In our proposal, there is no need for an illiquidity premium. The strain between the valuation of assets and liabilities will be lower due to the use credit risky financial instruments for the replication. The credit risk and other risks of the replicating instruments have to be reflected in the risk margin, but the risk margin will depend on the long-term average of financial market parameters and will not be fully affected by short-term market movements.

The advantages of the alternative proposal compared to the illiquidity premium approach are:

- There is no reliance on a hypothetical illiquidity premium in the insurance liabilities.
- It is fully consistent with the ideas of market consistent valuation.
- It makes the assumptions transparent.
- It allows for a transparent and clear assignment of insurance liabilities according to the degree to which the long-term average of financial market parameters can be taken into account. It depends on the pattern of future SCR required to buffer non-hedgeable risks and the life-time of the liabilities. It reduces therefore also the arbitrariness of the illiquidity premium approach in the assignment of the illiquidity premium to different type of insurance liabilities.