



5<sup>th</sup> June 2009

**Position paper  
on Level Two Rules for the Directive on  
Solvency II - a Method Based on Macroeconomic  
Principles for the Valuation of Technical  
Reserves when no True Market Price Exists**

---

Market instruments offering certain or near-certain cash flows do not exist for all future dates relevant for the valuation of insurance liabilities. Even for dates where cash-flows do exist there might be discrepancies between supply and demand, which can cause problems. The problem of 'missing' market prices is not confined to small currency areas nor to risk-free interest rates.

When the insurance sector is using a marked-to-market discount curve based on 'missing' prices, the impact of the sector's trade in fixed rate instruments could result in a vicious circle of falling market rates.

There is need for a macroeconomic method for identifying the point at which market prices are not relevant for valuation of insurance obligations and how to value insurance liabilities where market prices are 'missing'.

The alternative valuation method should be objectively verifiable and anti-cyclical in nature. Furthermore agents should not be locked-in in using the method if true market prices should emerge for relevant durations.

In this paper we will discuss a method based on macroeconomic principles that will avoid pro-cyclicality and handle the problems caused by illiquid and shallow fixed income markets. This is a proposal on how to deal with those problems on principle based level in a level 2 framework within Solvency II. A more detailed method should be constructed at level 3 within the Lamfalussy process.

---

## 1. Risk Based Solvency based on an Economic Approach

The Swedish and Norwegian insurance industries are firm in their support for the framework directive on a new solvency system for solo supervision. The risk based solvency system when based on an economic total balance sheet approach, will safeguard transparency, comparability, efficient use of capital and an efficient level and system of policyholder protection. The system is foremost created to protect the policyholders, but also to raise the level of awareness among company management about risk management.

Objective and verifiable valuations of assets and liabilities are essential means to reach these ambitious ends. Market consistent valuation methods, i.e. market values where available and valuation using marked-to-model approaches where deep and liquid markets do not exist, are objective and verifiable valuations. They are the cornerstones of the proposal. This is generally acclaimed by industry and regulators.

In some jurisdictions models simulating market valuation of insurance liabilities have been introduced pre Solvency II. This puts regulators and industry alike in a position to draw on relevant experience in crafting the method for insurance liability valuation in level 2 of the solvency regulatory process.

Market consistent valuation of liabilities in Sweden was put in place in 2006 through a supervisory tool commonly known as "the traffic light system". The events of 2008 and the impact on the bond markets world wide offers a chance to readdress an issue that was widely debated in the Swedish market upon the introduction of the modelling of market valuation of insurance portfolios in 2006.

Market instruments offering a certain or near-certain cash flow simply does not exist for all relevant future dates. Even for dates where cash-flows do exist there might be discrepancies between supply and demand, which can cause problems. The problem of 'missing' market prices is not confined to small currency areas nor to risk-free interest rates. Pension liabilities are large and long relative to the size and duration of the fixed income market. This is generic, but more pertinent in small currency areas.

## 2. What happens when liabilities are valued at 'missing' market prices?

When the insurance sector is using a marked-to-market discount curve based on 'missing' prices, such as an extrapolated market interest rate curve, the impact of the sectors trade in fixed rate instruments could result in a vicious circle of falling market rates and a risk for undercapitalisation.

In a situation where an insurance company's available capital is approaching SCR<sup>1</sup>, the prudent manager will move to lower the risk in the portfolio. Risk could be lowered by buying fixed income assets with a duration that is relevant to the liabilities the company holds. Since the duration of pension liabilities tend to exceed 20 years, insurers demand will be for long duration instruments. These instruments are generally few and exposed to thin trading.

Thus, the long-term end of the interest market is usually less liquid than the short end. The increased demand in long-term bonds will depress interest rates, creating a vicious circle when insurance companies have to reduce the risk even more as liabilities seem to increase in value, decreasing available capital.

In markets where a single agent is very large relative to the volume of outstanding debt, a trade by such an agent can in itself trigger a downward spiral like the one described above.

A marked-to-market interest rate curve that is linearly extrapolated without considerations to liquidity beyond the last available liquid interest rate will increase this pro-cyclical effect since a downward movement in true market rates will be extrapolated through out the curve, with no knowledge of whether such a downward movement is relevant for long durations.

The above description clearly illustrates the need for a macroeconomic method of identifying the point at which market prices are not relevant for valuation of insurance obligations and how to value insurance liabilities where market prices are 'missing'. The alternative valuation should be objectively verifiable and anti-cyclical in nature. Furthermore agents should not be locked-in in using the method if true market prices should emerge for relevant durations.

### **3. The Normal Interest Rate Method**

In this paper we will discuss a method based on macroeconomic principles that will avoid pro-cyclicality and handle the problems caused by illiquid and shallow fixed income markets. This is a suggestion on how to deal with these problems on principle based level in a level 2 framework within Solvency II. A more detailed method should be constructed at level 3 within the Lamfalussy process.

There are several ways of estimating a macroeconomic based long term interest rate and the method presented here is one of many. However, it is important that the method chosen is tested and calibrated in real market conditions. The method described in this paper has successfully been

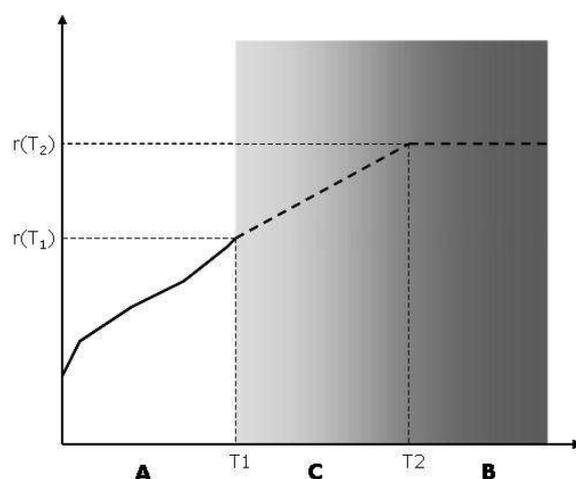
---

<sup>1</sup> SCR is the Standard Capital Requirement within the Solvency II framework.

tested in an insurance company and used in the financial statement for 2008.

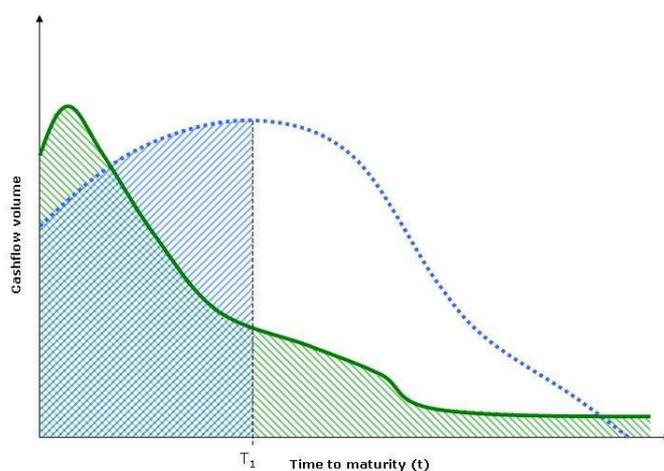
Our aim is to introduce a method that will reduce the volatility in the long end of the interest rate curve as opposed to an interest rate curve that is extrapolated from short term market rates in the absence of long term market interest rates.

The method is comprised by three parts detailed by the maturities  $T_1$  and  $T_2$ , marked in the figure below as A, B and C. In the area A, the market is deep and liquid and the interest rate is the risk-free interest rate curve observed in the market. As the market is deep enough for all participants in the financial market, actions by insurance companies will not affect quoted prices.



**Figure 1**

The liquidity cut-off area, at  $T_1$ , is observable in the market as the last point where there is no more duration available to cover the interest rate risk in the insurance liabilities. This is illustrated in fig 2. as the point where the volume of liability duration (i.e. the area under the blue dotted graph) equals the supply of duration in interest rate instruments (i.e. the area under the green continuous graph). Depending on the market, prices of fixed income assets with maturities after this point might often only be theoretical prices on a screen. When there is a lack of supply, the trade in such bonds is scarce.



**Figure 2**

The interest rate at  $T_2$  and onwards, in the area B in fig.1, is the long term equilibrium level interest rate. This interest rate is based on sound macroeconomic assumptions, creating a reasonable discount rate for instruments with very long maturities.

The long term interest rate will fluctuate around a mean, the long term equilibrium level. This is the point where the interest rate is assumed to be equal to the short term real interest rate in an economy, calibrated from market data, and the future inflation target.

A term premium is added to the real rate and the inflation target. The term premium is the premium for holding long maturities and is derived from the market as the difference between the quoted interest rate at the liquidity cut off area and the sum of the real rate and the future inflation target.

The long term interest rate might also include a tuning component, designed to absorb observed market movements and is designed to mitigate distortions depending on imbalances between supply and demand especially in times of market distress. The adjustment is continuously made via a factor, which is basically the ratio between available interest risk in the bond market (the area below the green continuous graph in fig.2) and the interest sensitivity of the aggregated pension liabilities (the area below the blue dotted graph in fig.2). The factor is applied to a change in the observed market rate at  $T_1$  and added to the long term interest rate.

With the introduction of a market adjustment factor, there is consequently an interaction between the ratio and the liquidity cut-off area. Let us assume that a significant amount of bonds are issued at all maturities. As the volume of supplied duration increases, the cut-off area will move closer towards the long term equilibrium level ( $T_2$ ). The market movement adjustment factor will approach one as the liquidity increases and the method will ensure that the interest rate curve used for valuation of liabilities will converge with a marked-to-market model. Thus, there is no

contradiction between the interest rate curve derived by the normal interest rate method and the interest rate observed in the market when the market is deep and liquid.

The interest rate between  $T_1$  and  $T_2$ ,  $C$ , is determined by linear interpolation between the interest rate at  $T_1$  and  $T_2$ .

#### **4. The valuation based on the model compared to fully marked based – proof of symmetry**

The normal interest rate method develops a robust yield curve which reflects current market conditions while at the same time displaying adequate stability. The interest rate risk in the long end of the liabilities is therefore deferred. This creates stability in the market as the liabilities are not fully affected by short term changes in the market, but if the changes get permanent, the valuation of liabilities will converge to this new long term level.

The method displays a dampening effect both in the case of extremely low interest rates and when interest rates are high. In case of falling interest rates the effect on the liabilities of the insurance sector at an initial stage will be curbed. This will dampen the demand for bonds with long maturities and prevent the insurance companies from going into the vicious circle described above. In the case of rapidly rising interest rates the method will lead to higher liabilities than a fully marked-to-market extrapolated yield curve, which would otherwise have created imaginary buffers in the balance sheet.

As shown above, the method is applicable to large and small markets alike. The method is not constrained to the structure of an individual market. When applied to different market data the method will create different yield curves but the methodology used is the same. The different yield curves will show the same qualities such as stability and limitation of pro-cyclicality. By stability we mean that the short term interest rate fluctuations are not fully realised into the valuation of long term insurance liabilities.

#### **5. Permanence or extreme conditions?**

Solvency II methodology should allow for the described macroeconomic principles to be put in place on a permanent basis. As discussed, the different parameters will be determined by the economic realities in the market. The method will have actual effect only when there is a shortage of supplied duration in the market. This will typically be the case in small currency areas or in stressed market conditions. Permanent availability is therefore fully compliant with a level playing field for all insurance companies.