

# SUPERVISION AND ASSET RISK IN INSURANCE

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## ABSTRACT

The effects on supervision of a more liberal approach to the regulation of asset risk in insurance companies are discussed in the light of modern financial theories and products. The consequences of being incredulous of the possibilities of asset models are illuminated and the potential role of the actuary is underlined.

## 1. INTRODUCTION

Sweden's insurance business is in a transitional state, leaving an older approach to regulation and entering more open financial market conditions. Part of this transition is marked by the signing of the EES Treaty, which presupposes the adoption of relevant EEC regulation. The third generation EEC insurance directives, EEC (1992a, 1992b), give a minimum bound for the regulations concerned with the financial risk of assets, although this lower limit at times seems rather vague. During the second half of 1992 Swedish regulators are discussing with the parties involved how Sweden's regulation and supervision in the field of investment and asset administration should be changed in order to perform well and effectively in the future. One important aspect which is partly the subject of this paper, is the impact of modern theories and product novelties on supervision of the asset risk of an insurance undertaking.

## 2. GENERAL CONSIDERATIONS

Much of current financial theory and product novelties seem to make use of a few common fundamental assumptions. The first is that assets, and liabilities, represent future cash flows; the second is that market prices, in particular interest rates, are stochastic and can be modelled.

In many cases cash flows are stochastic, too, depending on default and currency risk in assets and on the risk insured on the liability side, which also may be subject to inflation risk. A third fundamental assumption is that collectives of risk units or risk exposure can be modelled also as regards their degree of interaction or interdependence.

These assumptions are necessary in order to derive prices and values needed for practical purposes. In the simplest case one would rely on expected values, while more sophisticated approaches would take measures of adverse deviation into consideration, using second-order properties (variance) or other properties of the statistical distribution, such as quantiles and confidence limits.

Ideally, management and supervision of asset risk would rely on this theoretical framework, using it as one source of input for an actuarial calculation of the resulting risk for insolvency or other adverse development. In practice, however, the stochastic phenomena of the financial markets are at times so erratic, fluctuating and non-stationary in the short perspective, that risk management techniques rather than insurance analogies seem to be called for. This, at least, is the bitter experience of Sweden and several other countries.

There remain restricted situations or areas where financial risk can be reasonably well modelled. One such example might be Wilkie models, see Wilkie (1986), for interest and inflation rates based on an extremely long historical experience and applied only for long-term purposes.

If the description given above is accepted, however, supervision of asset risk must to a large extent concentrate on defensive approaches, of risk management character, at least as long as solvency control ranks highest among goals for supervision. This implies a critical attitude to asset modelling as well as a deeper interest in describing and classifying asset risk. To the extent that pricing or effective management of assets lies within the scope of supervision, a more or less thorough knowledge of the financial theories used, must of course be available to the supervising authorities, using internal or external resources.

### 3. CRITICAL ATTITUDES TO ASSET MODELLING AND VALUATION

The last decade has illustrated the problems that are connected with the valuation of assets and with the modelling of market interest rates, currency exchange rates, and market value of shares and property. Modelling may still be valid for a long-term perspective using historical

data, but the short-term perspective has gained importance. This is due to the public interest in short-term performance and the desire for almost frictionless mobility of investments and savings, between insurance companies and between various financial institutions.

If we restrict our attention to life insurance, a riskful combination would be one in which products with generously high guaranteed yield are offered under very liberal investment regulation. Such a situation could be attacked in various ways. Firstly, regulation might be sharpened by requiring a proper amount of matching fixed-interest assets, including a proper liquidity buffer for meeting withdrawals. Even without sharpened regulation, the supervising authorities may demand a proper reporting of liabilities by types as well as a corresponding reporting of investments, classified into categories of risk. Secondly, responsibility might be moved from regulation and supervision to the Appointed Actuary or some corresponding function, responsible for the insurer's efforts to meet the risk. An altogether different approach, of course, would be to discourage the marketing of products with high guaranteed yield, replacing them e. g. by combined guaranteed yield and unit-linked products, or by products with surplus participation.

As can be seen from the preceding example, the dependence on asset modelling may vary. Strict regulation or matching requirements may eliminate the risk for mismatching to a large extent. Massive withdrawal/surrender may, however, strain liquidity even under such circumstances. An additional measure might be to allow a proportional or at least a considerable withdrawal cost to the insured, reflecting the cost of liquidity.

But our example also shows that there are situations in which asset models may play an important role. Theoretically, the value of any asset mix may be modelled and the expected yield may be the base for the guaranteed yield. The crucial, and classical, problem, see e.g. Turner (1970) and Wilkie (1970), is to determine how much the expected yield must be reduced in order to be essentially guaranteed or riskless. The supervisor, or at least the Appointed Actuary, must be convinced that the result is reasonably safe. This in turn either restricts the asset choice, or keeps the guaranteed yield down.

#### 4. CONSTRUCTIVE APPROACHES TO RISK CLASSIFICATION

As noted by Burghard (1992), classification of assets according to risk and yield is likely to be an important task when the third generation EEC directives come into force in 1994. Although modelling may be feasible, as proposed e.g. by Daykin and Hey (1990) even for shares and property, it seems that asset classification is a slightly simpler task than asset modelling. Classes that cannot be modelled, may still be possible to identify as classes of assets having similar risk characteristics.

If the assets are identifiable as individual assets or parts thereof, such as investments in the shares of a specific company, we are in fact close to the problem that meets us in credit insurance: measurement and diversification of credit risk. This problem may not yet have found a satisfying solution within credit insurance, but it could at least be described in terms of insurance and risk management.

This introduces a few things to bear in mind when classifying assets. Average yield and average appreciation of assets must in many cases be seen in the light of the risk for adverse deviation from the average. In some cases this risk may be measured by the variance or the standard deviation based on historical data. This is the natural approach for much of portfolio theory, which probably would like to see all assets classified in a simple two-way scheme with expected yield and variance as classifying factors.

In other cases, however, history is of no avail, or is not even available, and some kind of model must be invoked. If inflation or interest rate policy are important factors, candid opinions on such matters might be the basis for a catastrophe scenario and might lead to conservative estimates of the risk or of the long-term average yield. A special aspect of this topic is the need for a classification according to the asset's degree of liquidity. A low probability of having to sell an asset with loss or with unreasonably low profit would indicate a high degree of liquidity. The matter is complicated by the fact that this probability in reality may depend on the size of the market (dumping), on surplus partition techniques or on the behaviour of policy-holders.

The consequence of this discussion is that there is a need for other modes of characterizing assets than mean-variance. Exactly what such alternative classifications look like seems to be open for study, but at least one aspect could be mentioned, the interest rate risk or market value risk, measured e.g. by volatility.

## 5. PORTFOLIO CHARACTERIZATION

A fundamental merit of portfolio theory is of course that it has drawn the attention to the fact that the characteristics of a portfolio differs from any simple addition of the properties of the single assets. The simplest example is the reduction in variance that can be attained by combining contravariant assets, that is, by diversification.

This complicates the task of classifying and reporting assets. It is just a first step to classify and report the relative share of assets having specific mean-variance characteristics or liquidity properties. The type of dependence or contiguity between different asset groups should also be taken into account. This leads us to a related area, the idea of risk-based capital requirements, see NAIC (1992). The U.S. regulators are, in a very ambitious way, trying to derive a formula that measures the joint risk effect from insurance risk and asset risk. This joint measure is thought of as a requirement for free capital or a solvency margin. What is interesting, among other things, is that dependence between different factors will be reflected in the formula.

## 6. SPREADING THE RESPONSIBILITY OF SUPERVISION

If investment regulation is liberal, you cannot expect that the supervisory authorities can follow asset risk in detail in every company under supervision. Furthermore, almost any rule defining a class of assets or giving diversification guidelines can be used in a way not foreseen. This points to different measures of self-regulation, as a means of spreading the responsibility. One example of such measures is to give the Actuary a role in evaluating asset risk, supported by ethical guidelines and joint industry approaches to a sound classification of assets.

It is also important to involve management and one way of doing this would be to let the supervisory authorities stipulate that a certain kind of asset risk reporting should regularly be presented to the Board of the company.

## 7. CONCLUSION

Although this paper shows a sceptical attitude to much of theoretical asset modelling, it is the opinion of the author that the concepts of modern financial theory are useful and should be known to a wide

audience, including actuaries of all four kinds — life, non-life, finance, and supervision actuaries.

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