

## **UNIT-LINKED DEFINED BENEFIT PLANS**

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### **SUMMARY**

The development of a unit-linked product to comply with the Norwegian legislation is described in this paper. Methods of managing the solvency risk caused by this product, are discussed.

In Norway, only defined benefit plans are permitted. Unit-linked products are allowed, but an interest of minimum zero percent must be guaranteed. By the end of the year the insurance company must credit the policy's account at least a yield equal to the interest rate used at premium calculation. If the return on the assets are less than the guaranteed interest, the deficit must be covered by the shareholders.

The solvency risk can be minimized by limiting the policyholders' rights to invest in volatile assets, by premium tariffs with lower guaranteed interests, by pricing the financial risk and by building up special funds.

**Régimes de retraite à prestations déterminées  
et à capital variable**

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**Résumé**

La mise au point d'un produit à capital variable conforme aux dispositions réglementaires de l'administration norvégienne est décrit ici. Sont également examinées les méthodes de gestion du risque d'insolvabilité résultant de ce produit.

En Norvège, seuls les régimes de retraite à prestations déterminées sont autorisés. Les produits à capital variable sont permis, mais à condition qu'un intérêt minimum de zéro pour cent soit garanti. A la fin de l'année, la compagnie d'assurances doit créditer au compte de la police un intérêt au moins égal au taux d'intérêt utilisé pour le calcul des primes. Si le rendement de l'investissement est inférieur au taux d'intérêt, le déficit doit être couvert par les actionnaires.

Le risque d'insolvabilité peut être minimisé en limitant les droits des titulaires de polices à investir dans des titres volatils, par des tarifs de primes à taux d'intérêt garanti plus bas, en évaluant le risque financier et en constituant des fonds spéciaux.

## 1. NORWEGIAN LIFE INSURANCE LEGISLATION

The new insurance law came into force in Norway in 1988.

Only the regulations which are relevant to this paper will be described, such as:

- distribution of historic surplus
- minimum equity capital
- profit sharing
- one account for each policy
- policyholder's right to transfer a policy
- unit-linked products
- new legislation for pension funds

In 1991 the life insurance companies' accumulated historic surplus funds were distributed to each insurance policy. Because of this, there is no longer any common surplus fund in the insurance company to serve as a buffer fund to cover losses. Instead it is required that the equity capital shall cover the investment risk, and a special solvency fund shall cover the loss on mortality, disability, etc.

The minimum equity capital required is depending on the asset allocation of the insurance company; more volatile assets require a higher equity capital. In this field the new insurance legislation is similar to the bank legislation. To decide the size of the equity capital, a weighted balance is calculated. Investments in government bonds have a weight of zero percent, increasing with more risky assets up to hundred percent for investments in stocks. The minimum equity capital required is 8 % of the weighted balance.

The Norwegian insurance legislation limits how the insurance companies may invest their assets. For example investments in stocks are allowed, but such investments are limited to maximum 20 % of balance.

By the end of the year maximum 35% of the statutory surplus can be transferred to the shareholders' account to increase the equity capital and to pay dividends.

The Norwegian legislation requires that the insurance company keeps an account for each

policy. Premium payments and interest are credited, and annuity payments and expenses are charged to this account. The policyholder gets a statement of the policy account every year.

The highest permitted interest rate of the premium tariff is at present 4 % p.a. Statutory reserves are calculated on the same basis as the premium tariff. At year end the insurance company must credit the policy's account at least a yield equal to the interest rate of the premium tariff. In addition, the policyholder's part of the statutory surplus must be credited to the policy's account by the end of the year.

In the event of an insufficient return on investments, the remainder must be charged the equity capital to fulfil the obligations. Such an amount must be covered directly by the shareholders.

The new law gives a policyholder right to transfer the policy with all funds from one insurance company to another, or from an insurance company to a pension fund and vice versa. The policyholders get their assets in cash, including their part of the historic surplus.

The new law allows a kind of unit-linked products, called "policies with individual investment contracts". Unit-linked products are characterised by the policyholders' right to decide how the insurance funds are invested in different units in investment funds. The value of the insurance is given by the market value of the units.

Since the insurance company must guarantee to credit the policy's account a yearly return of minimum zero percent, including policies with investment contracts, ordinary unit-linked products are not allowed in Norway.

There are no special rules for the administration of the investment funds for the unit-linked policies.

A new legislation for unit-linked products are being prepared, expected possibly to open up for real unit-linked products. Adjustments to the EC rules are also being considered.

A new legislation for pension funds came into force in 1993. The purpose of this is to give similar legislation for pension funds and for insurance companies, especially concerning required minimum equity capital and the use of a year's statutory result.

## **2. DEVELOPING A UNIT-LINKED PRODUCT IN NORWAY**

### **2.1 Traditional group pension products**

For the policyholder to get a tax credit for the premiums, the group pension must be a "defined benefit" plan.

The benefits in Norwegian group pension are mainly old age pension. In addition the group pension usually includes a disability, a children and a widow pension. The benefits are supplements to the public pension.

The policyholder's surplus in group pension is every year credited a surplus fund, called "premium fund". Also historic surplus has been credited the "premium fund". The policyholder may use this fund primarily for future premium payments.

### **2.2 Why to develop a unit-linked product**

The main reasons to develop a unit-linked product for group pension were:

- the policyholder's new right to transfer a policy
- competition from the pension funds

During the last years group pension policyholders in Norway have become more interested in the investment of their funds, especially those with large pension funds. Many of them have professional portfolio managers in the staff, and they often have other preferences of asset allocation than the insurance company's investment policy.

The policyholders wish to influence on how their pension funds are invested, and thereby the expected return on the assets. An alternative is to establish their own pension fund instead of having a group pension policy in an insurance company, since transferring the policy from an insurance company to a pension fund is now permitted.

In a pension fund the policyholder decides how the assets are invested. With a traditional group

pension in an insurance company their assets are a part of the company's ordinary insurance fund, where all policies get the same return on the assets. Upper limits on the investments for pension funds are equal to the limits for insurance companies.

Some of the policyholders want to take out loans from the insurance company, preferably at a favourable interest rate. Traditionally a large part of the assets in Norwegian insurance companies is mortgage loans to the policyholders. Such loans are common in pension funds too, where the interest rates are often even more favourable.

The policyholders want an asset allocation different from the company's asset allocation, and the solution is a kind of unit-linked product which is adapted to the traditional Norwegian group pension product.

### **2.3 A unit-linked product**

A new product, "group pension with investment choice" was introduced in the Norwegian company Uni Life Insurance in 1990. The product has since then been further developed and improved.

The product could, as mentioned earlier, not be an ordinary unit-linked product. It is in many ways the same traditional group pension product as before. The benefits and the premiums are unchanged, but the policyholder is given a limited freedom to decide how to invest the policy's assets.

Statutory reserves for retired and non-active members of the policy are also included in the investment contract, since the interest is guaranteed by the insurance company, there is no risk for the member's benefits.

The product is offered by the same life insurance company as the traditional life insurance products.

When a group pension is changed to an insurance with investment choice, all the assets of the traditional policy are transferred from the insurance company's ordinary fund to assets of the insurance with investment choice.

An investment contract is set up, specifying how the insurance's investment portfolio should be invested.

A maximum of 12 % of the portfolio may be invested in the stock fund. The sum of investment in stocks and properties may not exceed 25 % of the portfolio.

Up to 80 % of the portfolio may consist of mortgage loan from the insurance company to the policyholders or the policyholders' employees, often with a (limited) favourable rate of interest.

When this product was launched, the insurance company's assets were split into five investment portfolios or investment funds. Each fund were divided into units of 100 NOK. The five funds were stocks, bonds, commercial papers, properties and mortgage loans.

The Norwegian authorities do not allow these pension funds to be invested in asset funds managed outside the insurance company. Neither are any from outside the insurance company allowed to invest in these funds.

To organize investment funds in this way is rather complicated since the insurance company's assets consist of a mixture of a large ordinary fund for all traditional products, and a small number of individual portfolios belonging to policies with an investment contract.

Policies with an investment contract are at the end of the year credited a yield according to the return on their units, as a result of their own investment choice. As for the traditional products, a yield minimum equal the guaranteed interest are credited.

All accounted return on the assets in a fund for the year is credited each unit at the end of the year. If the policy is transferred from the insurance company, or the units are sold and bought, the market values of the units are used.

The insurance company is not allowed to set up a specific solvency fund for this product, and the equity capital required pay no attention to unit-linked products.

### 3. THE SOLVENCY RISK

As described earlier, the Norwegian insurance companies must credit every policy by the end of the year a yield minimum equal the guaranteed interest.

Since the insurance companies do not have any surplus fund, a loss on the guaranteed interest must be covered by the shareholders.

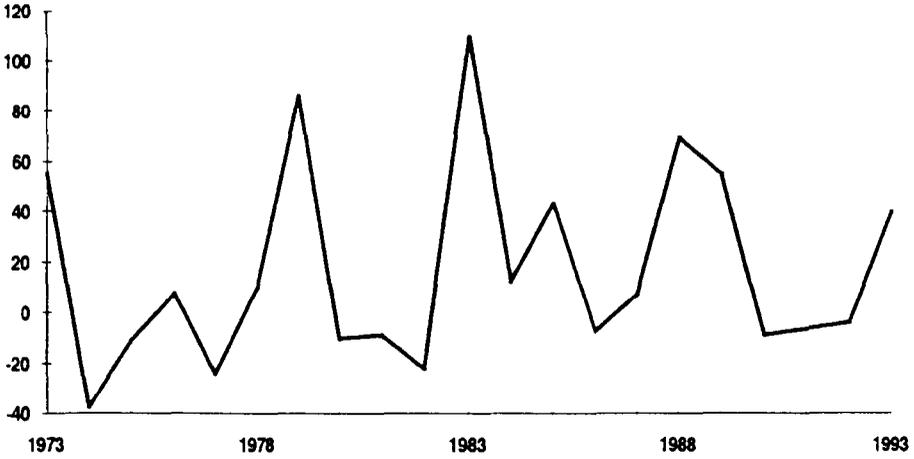
For unit-linked products the insurance company lets the policyholders decide the allocation of their assets. This makes an increased solvency risk for this product relative to traditional products, since the interest in the premium tariff still must be guaranteed.

The insurance company is left with the downside risk of not achieving the necessary yield, and the policyholders get an unlimited upside possibility of a higher yield. The policyholders may therefore speculate in investing in as much volatile assets as possible, to increase the expected return.

The interest of Norwegian premium tariffs is relatively high, earlier up to 10 %, today, 4 or 6 %, and from next year maximum 4 % or a lower maximum.

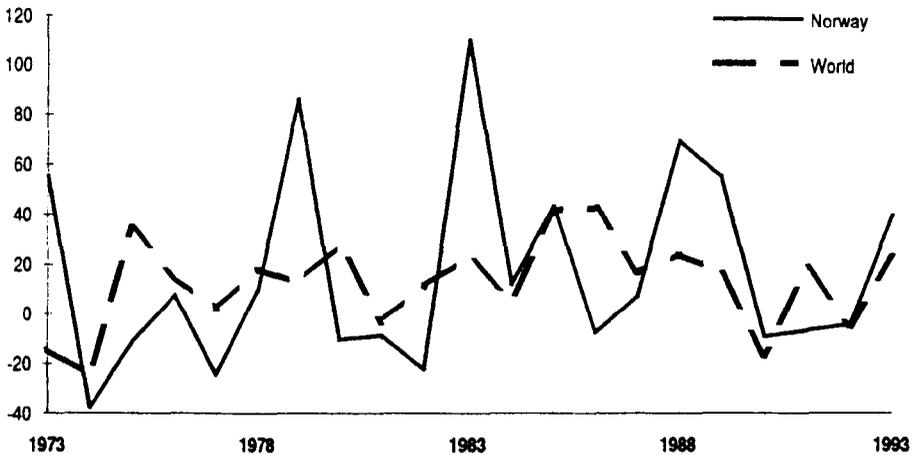
The return in the Norwegian stock market is illustrated in figure 1. The highest return was in 1983, with 110 percent and the lowest return was in 1974, with - 38 percent.

**Figure 1:** Return on stocks in Norway in percent. Annual rate.



The Norwegian stock market is quite small and volatile compared to foreign larger stock markets. This is illustrated in figure 2. The risk of investing in the Norwegian stock market is higher than investing in for example the US stock market.

**Figure 2:** Return on stocks in Norway and the global market in percent. Annual rate.

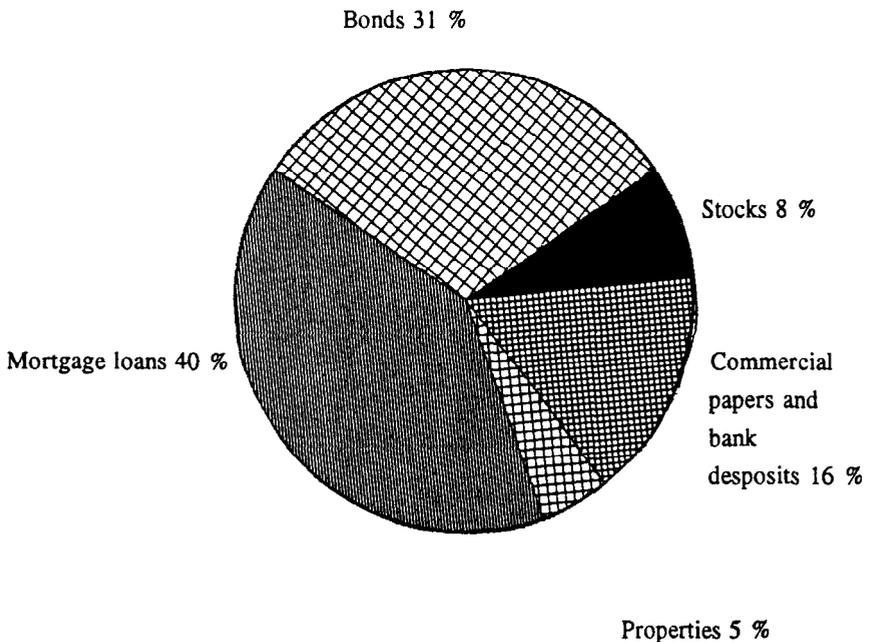


Norwegian insurance companies and pension funds are allowed to invest maximum 20 % of their assets in stocks. None of the insurance companies utilizes this possibility because of the large risk caused by the guaranteed interest. In 1992 only 8 % of Norwegian life insurance assets were invested in stocks.

The bond portfolio has also given variable return because of the changes in the bond market during the last years. Properties have also traditionally given variable results.

In figure 3 the asset allocation of the Norwegian insurance companies in 1992 is given as an illustration.

**Figure 3:** Asset allocation of the Norwegian insurance companies as at 31.12.1992.



Source: "Norsk Forsikring 1992" by the Norwegian Insurance Association.

The task is to manage the increased solvency risk of the insurance company when introducing unit-linked defined benefit plans within the Norwegian insurance legislation. The probability of getting a yield equal to or higher than the interest of the premium tariff must be maximized for each investment contract every year.

#### **4. METHODS FOR MANAGING THE SOLVENCY RISK**

The insurance company wishes to give the policyholders the freedom to invest as much as possible of their funds in volatile assets within the limits given by the authorities, and at the same time minimize the solvency risk.

Methods for fulfilling these demands give the policyholders limited freedom to invest, and some can be expensive for the policyholders. Many of the methods will also depend on the approval from the authorities.

##### **4.1 Limiting the rights to invest**

Traditional asset liability analysis tends to advise investors of long term objectives to have a high investment in stocks. Because a minimum return on the assets are guaranteed by the insurance company each year, traditional asset liability analysis is not possible for deciding the investment portfolio of the policyholders. The probability of loss each year must also be taken into account, as a loss must be carried by the insurance company.

A worst case scenario for a year should be the basis for deciding upper limits for investing in each fund. Such scenarios should build on historical statistical materials and economic forecasts.

In figure 4 an example is given to show how a worst case scenario decides upper limits for investment in stocks without charging the equity capital any loss. The upper limits are decided to different corresponding guaranteed interests.

**Figure 4:** Upper limits for investment in stocks.

Return on stocks one year	: - 30 %
Risk free return on all other assets	: 6,5 %
Upper limits for investment in stocks	Guaranteed interest
1 %	6 %
7 %	4 %
12 %	2 %
18 %	0 %

An assumption in this analysis is also that a negative return in one fund is charged to the account at the end of the year, which is the case in the product today.

It is important to allow asset allocations which give a higher expected return on the assets than if the whole portfolio was invested in risk free interest rate assets. The risk by having all the assets invested in one fund must be calculated. This means that it is necessary to set limits on the investments in each fund available, this means that the risk is spread by investing in more than one fund.

General limits for all policyholders may be set, but these limits will be very strict, as for the product today. In chapter 2, the limits of the investments on the product are given. The limits should therefore be adjusted to each policyholder at any time, based on the historical statistical materials and reasonable prospects for the policyholders particularly asset allocation.

Continually evaluation of the limits for each policyholder would then be a day to day routine in the insurance company. Administrative systems for this purpose must be developed.

#### **4.2 Overruling a policyholder's choice**

The policy conditions of the product allow the insurance company to overrule the policyholders decisions to some extent, if the asset allocation seems too risky for the insurance company.

Overruling a policyholder's choice however is difficult. The free choice of investment is what the policyholders want when choosing a unit-linked product. Transferring the insurance to another insurance company or establishing a pension fund may be the policyholders next step.

Overruling the choices of investment of the policyholder is therefore not the best way to reduce the solvency risk for the insurance company.

#### **4.3 Guaranteed interest**

The guaranteed interest may be reduced, and extra reserves may be set up to reduce the risk for a loss on the guaranteed interest.

##### **Premium tariffs**

Premium tariffs that match the investment allocation for each policyholder may be developed to minimize the solvency risk for the insurance company.

As mentioned earlier, the lowest guaranteed interest allowed in Norway is 0 %. This interest might be guaranteed for one year (the first only), for the whole period the insurance is in force, or for other periods.

The premium will depend on how long period the lowest interest is guaranteed. A guaranteed interest of 0 % (or another low interest) for the next year only, will give the smallest increase in the premium compared with the present premiums.

The guaranteed interest should depend on how much the policyholder wants to invest in volatile assets, as the limit of the investment in volatile assets should depend on the guaranteed interest.

### Extra reserves

An alternative to introduce a new premium tariff, is to minimize the guaranteed interest, but still use the present premium tariff for premium calculation.

An extra premium must be paid to set up a reserve sufficient to allow the use of the traditional premium tariff. If these reserves are not spent one year, they will be transferred to the next year, and a smaller or no extra premium will be charged.

At present it is expected that the Norwegian authorities will accept that this extra premium may be charged the policyholders, if the reserves are accounted as statutory reserves.

### **4.4 Pricing the risk**

The risk may be priced by charging a kind of option premiums, or by special rules for calculating the return on the equity capital. The charges may be so high that the policyholders will avoid investing in some of the funds containing volatile assets.

### Option premiums

Option premiums may be useful to price the risk of the guaranteed interest for the insurance company. This means that the policyholder pay a premium for a put option that guarantees a return equal to the guaranteed interest.

Option premiums may be charged for all unit-linked policies, or only when the policyholder chooses a higher investment in volatile assets than the insurance company.

A fund must be built up by the option premiums to take future risk. The charging of option premiums and building up such a fund require approval from the Norwegian authorities. Such approval has not been given up to now.

If unit-linked products are in a separate insurance company, the equity capital may have the same function as such a fund.

Return on the equity capital

The minimum equity capital required by the authorities is depending on how the insurance funds are invested. The rules are given briefly in chapter 1. Similar methods might be used when deciding the size of the return on the equity capital from each unit-linked policy. The asset allocation will decide the share of the statutory surplus to be kept in the insurance company for each unit-linked policy.

A reasonable upper limit of the share of the statutory surplus transferred from each policy to the equity capital might be 35 %, which is the upper limit for the insurance company's total return on the equity capital.

A return percent may be decided by looking at

- the requirements for the minimum equity capital
- investment in the most volatile assets shall give the highest return
- the most risky investments allowed (20 % in stocks and 25 % in stocks and properties total) shall give the highest possible return on the equity capital (100 %).

In figure 5 and 6, an example is given to show how the return on the equity capital from different investment portfolios may be decided as a share of the statutory surplus disponible for this purpose.

**Figure 5:** Return from different investment funds.

Investment funds	Return
Stocks	4,00
Bonds	0,13
Commercial papers etc.	0,13
Mortgage loans	0,13
Properties	2,00

**Figure 6:** Return on the equity capital in percent of the statutory surplus disponible for this purpose for different asset allocations (P1-P3).

Investment funds	P1	Return P1	P2	Return P2	P3	Return P3
Stocks	20,0	80	7,5	30		
Bonds	60,0	8	47,5	6	10,0	1
Comm.papers etc.			10,0	1	60,0	8
Mortgage loans	15,0	2	30,0	4	30,0	4
Properties	5,0	10	5,0	10		
Return		100		51		13

The allocation P1 will then give a return on the equity capital of 35 % of the years statutory surplus. P3 will give a return on 4,55 % of the years statutory surplus.

The drawback with minimizing the solvency risk by giving return on the equity capital, is that it is not necessarily the same policy that needs the capital who has built it up.

## 5. CONCLUSION

When unit-linked products are offered, each policyholder must pay a fair price for the solvency risk.

The preferable methods will depend on

- the approval of the authorities
- the policyholders attitude
- available systems for administration of the method in the insurance company
- the equity capital of the insurance company.

A combination of all or some of the methods are also possible.

The new Norwegian legislation for unit-linked products which presently is being developed will hopefully give guidelines for the future.

Until a sufficient solvency fund is built up, or the equity capital is high enough, limiting the policyholders right to invest in volatile assets should be recommended. The method does not charge the policyholder any amount directly, and it is approved by the authorities.

