Can Customers Rely On Predicted Savings?

A Way To Help The Actuary.

by

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Summary.

Customers often obtain a life insurance based on an offer. The offer contains both the guaranteed and the predicted savings at maturity.

The guaranteed savings are based on the guaranteed interest rate, which is usually very much on the safe side.

The predicted savings are based on assumptions and of course including a non-guaranteed interest rate.

To give an accurate prediction it is therefore important that the assumptions used are realistic and secure. The forecast can only be based on the knowledge of to-day.

It is among other things important to find out whether the insurance company can give the predicted interest rate to the customer or the company will be broke.

The paper describes a way to build a model - a very important tool for the actuary to secure the survival of the company or at least to know what to do if something changes. The model can also be used to what-if and sensitivity analysis.

In other words: a tool to help the company doing the right thing.

Les clients peuvent-ils faire confiance aux prévisions relatives à l'épargne ?

Aide pour l'actuaire.

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Résumé

Les clients contractent souvent une assurance vie sur la base d'une offre. L'offre contient à la fois des prévisions et des garanties concernant l'épargne à l'échéance.

L'épargne garantie est basée sur le taux d'intérêt garanti, qui est généralement estimé de manière très conservatrice.

L'épargne prévue est fondée sur des hypothèses diverses, parmi lesquelles, bien évidemment, un taux d'intérêt non garanti.

Il est donc important pour que cette prévision soit exacte, d'adopter des hypothèses réalistes et sûres. Toutefois, les prévisions de l'avenir ne peuvent reposer que sur les connaissances du présent.

Il est important, entre autre choses, de déterminer si la compagnie d'assurances peut servir le taux d'intérêt prévu au client ou si elle risque le dépôt de bilan.

Le présent article décrit une méthode de l'élaboration d'un modèle qui constitue un instrument très important pour permettre à l'actuaire d'assurer la survie de la compagnie ou au moins pour que l'actuaire sache ce qu'il doit faire en cas de changement. Le modèle peut également être utilisé pour effectuer des analyses de sensibilité et des simulations.

En d'autres termes, il s'agit d'un instrument qui aide la compagnie d'assurances à faire ce qu'elle a à faire.

1. Background.

In Denmark life insurance companies write insurances based on a guaranteed calculation basis. The company is obligated to give a minimum interest rate, can not exceed a certain cost level for administration and commissions (in the rest of the paper just called costs) and has to use the same mortality and disability tables in the lifetime of the insurance.

The definition of a guaranteed calculation basis may change, so that the customer in the future is guaranteed only the insurance benefits.

When one writes long term insurances, e.g. 30-50 years, it is necessary that the guaranteed parameters are stipulated very much on the safe side.

The present, most frequently used calculation basis was introduced in 1982. The guaranteed interest rate was and still is 4.5% per annum with at most an 11% deduction off the premium and a 7% deduction off the single premium in costs.

In 1982 the new placement interest level was around 16-18% per annum, and therefore the calculation basis was very much on the safe side.

In 1983 the Danish Government decided to introduce a tax designed to reduce the high Danish interest yields. The tax rate is calculated and based on an extremely complicated legislation. Tax is paid on certain assets such as bonds and cash, but not on shares, index-linked bonds and real estate.

The tax rate depends on average yields in the market and the inflation. At first the tax rate was around 40% per annum and has fluctuated up to 56% per annum. The tax has not changed the guaranteed interest rate, which now is 4.5% per annum after tax.

Danish companies stipulate every year in December which bonus interest rate they will give back to their customers in the year to come. Since one does not know the development of the new placement interest rate and the increase or decrease in the number of new policyholders it is necessary to make some assumptions.

Concurrently with decreasing interest levels in Europe and Denmark in particular it is highly important to have a tool to help the actuary stipulating the bonus interest rate for the year to come.

The new placement interest rate in Denmark is now 7-8% per annum before tax, and with a tax rate of approximately 50% per annum today the average yield of new investments are below the guaranteed interest rate.

2. Assets And Valuation.

The most common assets are ***bonds***[a], index-linked bonds, shares and real estate. The Law demands that at least 60% are placed in secure assets, such as bonds and cash.

As mentioned above one only pays tax of yields of bonds. It is therefore interesting to examine which investments one shall make to fulfil the guaranteed interest rate and to secure that policyholders get the stipulated bonus interest rate for the year to come.

a Definition of a bond. A bond is a standardized claim, replacing individual debt instruments. The debtor is obliged to pay fixed interest on specific dates, and also to repay the loan after a period of time agreed between the parties. This can either take place by redemption of all issued bonds at one time if the bond is convertible or by the early redemption of bonds on each due date.
Index-linked bond is a special type of bond of which the nominal interest rate is usually 2.5% per annum. The difference between a bond and an index-linked bond is that the remaining debt of the index-linked bond is subject to continual index adjustments. Instalments are likewise index-linked.

2.1 Assets Are Booked In Different Ways.

Bonds are valued at acquisition price plus mathematical adjustment, which expresses the price adjustment towards DKK 100 per 100 which takes place year for year as maturity is approached.

This means, that according to the market value of the bond there can be a surplus or a loss, if one wants to sell the bond. If one actually sells the bond, one has to pay tax on the surplus/loss. It is possible to spread the tax over the years to come with 20% per annum.

Shares are valued at acquisition price and are adjusted if there is a permanent price increase or a decrease is expected. Real estate is valued the same way.

When one books as mentioned there can be big hidden values in the company and they only show up, when one sells the assets or the bonds are redempted. These values are called additional values.

When the new placement interest rate decreases, the price of the assets increase even faster than the mathematical adjustment expresses. In other words: The company gets richer. Since bonds are redempted, the new investments obtain a lower interest rate and it is therefore necessary to use the additional values to fulfil the bonus interest rate.

3. Tendering.

When customers want to buy a life insurance they normally obtain an offer. The offer is based on the guaranteed insurance benefits and does not include future adjustments. One calculates - using the equivalence principle - what the customer has to pay for the chosen benefits and vice versa.

Because the policy is calculated on the safe side, it is custom also to give a calculation, which incorporates the stipulated assumptions of the costs, the bonus interest rate and the deduction of mortality and disability. In other words: If the company can pay back this profit, the customers know what they will get at maturity. The calculations also take into consideration if the payments are adjusted for inflation.

Calculations of this character are and will always be forecasts, because nobody is able to prophesy the coming new placement interest rates.

In the last decade Danish companies - from time to time - have had to adjust their expectations to the future new placement interest levels. Many calculations were made on unrealistic assumptions, e.g. a very high interest rate and a very low inflation. Customers did believe in these predictions and today they find themselves mislead.

In Denmark we now have rules telling the companies how to calculate the forecasts. The forecasts must be realistic and secure based on the actual market situation and on the actual situation of the company. If nothing is changing in the society the company is obligated to give the first 5 years calculated bonus interest rate, if the company is not able to explain the cause of the divergences. It is therefore necessary to know that the calculations are realistic and secure.

Until these rules came, the company's bonus interest rate for the year to come was approved by the authorities. This situation is unchanged but the above-mentioned rules implicitly approve the first 5 years forecast of the bonus interest rate

4. Model.

In the last couple of years the entire life insurance business has worked to find a tool helping to make the predictions.

I present a general model because I only want to show a way to create a controlling tool. The model is easy to change to satisfy the needs of the company.

The model used in Danish companies is far more sophisticated, since the model takes into consideration old insurance calculation bases and so on.

The model is based on Thiele's differential equation and can be expressed as:

(1) $\Delta V_t = (1+i_t) * V_t + P_t - C_t - R_t$

ΔV_t *is the change in the reserve at time* t
V_t *is the reserve at time* t
i_t *is the bonus interest rate at time* t
P_t *is the payment at time* t *which is premium minus paid benefit*
C_t *is the costs at time* t
R_t *is the riskpremium at time* t

4.1 Society Conditions.

Because the whole idea is to forecast the bonus interest rate for years to come it is necessary to stipulate the long term inflation rate and the long term yields of the assets. It is also necessary because the tax rate depends on these factors.

In Denmark we have an agreement that we do not compete in making prophecies. The insurance business stipulates - at least once a year - the expectations to the yield of the assets. These are stipulated for each asset type with a value for each of the first 5 years and a long term value (after the first 5 years). In the same way the expectations to inflation are stipulated. With these assumptions it is possible to calculate the tax rate for the years to come.

In other words: The company's bonus interest rate is now depending on these assumptions. Only changes in these parameters will explain differences between forecasted bonus interest rates and actual bonus interest rates.

4.2 Company Assumptions.

In excess of the mentioned assumptions on the society interest rate and inflation, the only knowledge one has is the company's account and budgets for the years to come. This is the basic knowledge.

The budget stipulates what the company expects in increase and decrease in the number of policyholders and implicitly how much the company has to invest in the years to come.

The account shows which portfolio of insurances and assets the company has. From this one can see, what the company expects to get in yields of the assets and how many of these the company has to use to fulfil the guaranteed interest rate.

For the development of the model I refer to appendix A.

5. Sensitivity Analysis.

The model in appendix A describes the company on an aggregate level, but nevertheless it gives a good overview of the company's financial situation. One can adjust the assumptions to evaluate whether the parameters are of significance or not.

- One can try to change the increase in new policyholders. Can the company survive by forcing the market with unchanged bonus interest rates? Or will it be necessary to change them?

- The decrease in policyholders can also be examined. Is the reason maturity or surrender? How many policyholders shall surrender to change the reported bonus interest rate? (The situation can be critical - because of the booking method - in a market, where the interest rate goes up and the asset prices are falling).

- Changes in the new placement interest rates can be examined. What happens if the interest rates rise and the inflation goes down?

- Changes in future investments can be examined. Right now this may be the most interesting subject to examine.

To examine the above mentioned one just adjusts the assumptions to see the influences on the result.

6. Future Enlargements.

One way to enlarge the model is to examine how replacement of assets influence the result.

Because of the aggregation the described model is not suited to examine the change of one specific asset with another. If one wants to do this it is necessary to have information on daily basis of the price of every asset the company has, the payments and so on.

In my opinion the idea of the model is more to see trends. It is more interesting to see which changes a replacement of e.g. 15% of bonds to 10% real estate and 5% shares adds to the result.

If the new placement interest rate keeps falling I recommend to make these what-if calculations. Reacting on these calculations is one way to survive.

A method to implement the replacements is described in appendix B.

7. Conclusion.

Because of the main question: Can customers rely on predicted savings, it was necessary to examine the security of the company's stipulated bonus interest rates, and to do so I had to build this model.

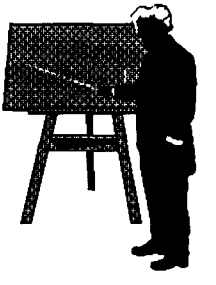
The model is to be considered as a tool, a help to give an overview of adjustments of the many parameters used to forecast the bonus interest rate. Besides this the model helps to examine how changes in the society affect the company. To make these examinations as easy as possible I strongly suggest that the model is developed in a spreadsheet or a similar tool.

We saw it was pretty easy to change the assumptions and immediately see the consequences. Now the actuary has a tool, where it is possible to see what will happen, if the company wants to force the market, if something changes in the society and further more, a tool to describe the financial situation of the company in a very easy way.

One must not blindly rely on the result of the model, because there is uncertainty connected to aggregate data. It is very important to use the same aggregation for assets and liabilities, so there is a logical connection in the model.

To answer the question stated in the headline: Customers can rely on predicted savings provided nothing changes in the company's assumptions or in the society. Since we do not have a static society, predictions are and will always be propheciees. But using a model gives a better result than tossing a coin.

Furthermore customers are secured, that they buy a life insurance in a company not going broke because of no control. The reported bonus interest rate is realistic and secure based on the assumptions one has to the future. So it is only a matter of believing in the assumptions. The forecast is naturally true.



Appendix A. The Development Of The Model.

As mentioned in the paper the only knowledge one has is the account and the budgets. So it is natural to start here.

Since it will be impossible and in my opinion a waste of time to work with all the items in the account it is necessary to group the items.

The grouping depends on the company. But it is important to use same principles for assets and liabilities. If one uses different degrees of detail for assets and liabilities, one can risk that the very precise calculation of one or two items may result in a strange result.

The grouping shall reflect the necessary items, making it possible to calculate the bonus interest rate.

The account has to be translated into an insurance account described by Thiele's differential equation (1).

Some of the items in the account have to be calculated. An asterisk (*) shows that the item is known and a number shows that the item has to be calculated. The number refers to the formula given below. For the balance sheet the end-year items are not known. Formulas are not mentioned since these are simple additions.

A.1 Company Account. (Aggregate Level)

Income Statement Year XX

Income	
Premiums[a]	xx^*
20 % Realization Fund	xx^1
Taxable interest	xx^2
Taxfree interest	xx^3
Expenses	
Benefits[b]	xx^4
Administration costs	xx^*
Real interest tax	xx^5
Surplus	xx

Balance Sheet

Assets	P	U	Liabilities	P	U
Bonds	xx^*	xx	Reserve	xx^*	xx
Index-Linked Bonds	xx^*	xx	Security Fund	xx^*	xx
Shares	xx^*	xx	Realization Fund	xx^*	xx
Real Estate	xx^*	xx	Net Capital	xx^*	xx
Cash	xx^*	xx			

where P stands for start-year values and U stands for end-year values.

a Premiums cover both premiums and single premiums.

b Benefits cover both paid benefits and surrender values.

The account translated into an insurance account gives the following result:

Insurance account

Surplus	xx
- deposit to Security Fund	xx[6]
=Deposit to Reserve	xx

Using Thiele's differential equation (1):

Deposit to Reserve	xx
- Premiums	xx
+ Costs of insurance business	xx[7]
+ Benefits	xx
= Amount of value to interest	xx

A.2 Calculation Principles.

One can use a lot of energy discussing calculation principles. Is the calculation continously, monthly, yearly and so on. Accounts and budgets are based on snapshot items and not on real cashflow, because one does not take into consideration the inflation in the year. Therefore it does not matter which principles are used, but in my opinion one shall make the model as simple as possible.

The calculation principles of course depend on the company's way of writing insurances. Are all insurances written in the first couple of months of the year, the last couple of months of the year, or are they distributed evenly over the year? I have made the last assumption.

It is now possible to fill in the figures and calculate the bonus interest rate[8] for the year to come, with the following formulas.

A.3 Formulas.

Let t=1 to ∞ be the time, where t is end-year. Let [t-1,t] be a timeperiod of one year.

Let j=1 to ∞ be the asset type to invest in, e.g. j=1 denotes bonds an so on.

Formula 1:

$$20\%RealizationFund = 0.2*(Realization\ Fund_{t-1} + \Delta\ Realization\ Fund_{[t-1,t]})$$

Formula 2:

$$Taxable\ interest = \sum_{j=1}^{\infty} \left(1_{\{Tax=yes\}} * F^{j}_{t-1} * i^{j}_{t-1} * B_{t-1} + 1_{\{Tax=yes \text{ and } x>0\}} * NF^{j}_{[t-1,t]} * \left(\sqrt{1+Ni^{j}_{[t-1,t]}} - 1 \right) * x \right)$$

where

F^{j}_{t-1} *is the percentage of the total assets placed in fund # j*

i^{j}_{t-1} *is the interest rate in fund # j*

B_{t-1} *is the total asset*

$x = Premiums_t - Benefits_t - Administration\ costs_t$

$NF^{j}_{[t-1,t]}$ *is the percentage of new placement in fund # j*

$Ni^{j}_{[t-1,t]}$ *is the new placement interest rate in fund # j*

Formula 3:

$$Taxfree\,interest = \sum_{j=1}^{\infty} \left(1_{\{Tax=no\}} * F_{t-1}^{j} * i_{t-1}^{j} * B_{t-1} + 1_{\{Tax=no \text{ and } x>0\}} * NF_{[t-1,t]}^{j} * \left(\sqrt{1+Ni_{[t-1,t]}^{j}} - 1 \right) * x \right)$$

Formula 4:

Benefits can be looked up in the account. On the other hand, if one is dealing with an old company the value can often be expressed as a percentage z of the reserve which I choose.

$$Benefits = z * V_{t-1}$$

Formula 5:

The real interest tax is found by solving a second degree equation.

Let AF be the real interest tax.
*Let a = taxrate$_{t-1}$ * (Taxable interest$_t$ + 20 % Realization Fund$_t$)*
Let b = Liability + Income - Administration costs - Benefits

$$AF = \frac{a \pm \sqrt{a^2 - 4*b*a}}{2}$$

Formula 6:

The deposit to the Security Fund is calculated as a percentage z of the Reserve.

$$Deposit\,SecurityFund = z * V_{t-1}$$

Formula 7:

As mentioned in the paper the deduction is 11% of premiums and 7% of single premiums in administration costs. These amounts are further deducted by a deposit of 1% to an administration reserve, which will be liberated at maturity of the insurance. The administration fee can then be calculated as:

$$cost\,of\,insurance\,business = (0.11 - 0.01) * Premiums_t + (0.07 - 0.01) * Single\,premium_t + 0.01 * Benefits_t$$

Formula 8:

Let x be the bonus interest rate.
Given Amount of value to interest it is now possible to find x:

$$Amount\,of\,value\,to\,interest = x * V_{t-1} + (Payments_t - Costs_t) * (\sqrt{1+x} - 1)$$

This is a normal second degree equation to be solved with respect to x.

A.4 Assumptions Of New Placement.

One also needs to know the following information:

New placement	NF	Tax	Interest rate (Ni)
Bonds	x	Yes	x
Index-linked bonds	x	No	x
Shares	x	No	x
Real estate	x	No	x
Cash	x	Yes	x

A.5 Example.

Given the above situation in the end of the year it is now possible to calculate the bonus interest rate for the year. This is the maximum interest rate that the authorities can approve. Refer to Table C for the calculations.

A.6 Forecasting.

The budgets give the assumptions of the increase in new policyholders and an expected distribution between premiums and single premiums. One can choose to use actual figures or for example express single premiums as a percentage of the total increase in new policyholders, which I do.

In the budgets one can also find the company's investment policy and the suggested new placement distribution between the different assets. To forecast it is interesting to know how these new placements shall be treated. There are several opportunities, e.g.

- One can state how new placement distributions are going to be year by year.
- One can state that one wants for example to state the first year's new placement distribution and then one long term distribution.
- One can state that the distribution between the different asset types shall be unaffected. This means that a change in asset types are necessary, since each asset type may give a different yield.

In my model I choose the second solution.

It is also necessary to decide if one wants to use book values or market values.

- One can state that book values shall be translated into market values and incorporated in the liabilities. By doing this one shows both the hidden values and the real market value of the company at the time of calculation - but this does not fulfil the principle of prudence, since the prices are fluctuating. By doing as mentioned above one may therefore mislead the user to think, that the company is richer than it really is.
- One can state - using book values - that the same situation will occur here. That is true, but since one does not sell the assets the booking principle with mathematical adjustments for bonds incorporates that the effective interest rate is unchanged until maturity. By doing this one does not mislead the user since it is impossible to spend money the company does not have.

In Denmark both principles are used, but just for this description I choose to use book values.

With the last mentioned assumptions it is now possible to forecast more than one year enabling the company to find the stipulated bonus interest rates for the coming years. That is exactly the result we are looking for.

A.7 Example.

The below mentioned figures show yearly changes, dividends and interest rates in percent.

Society Assumptions:

	Year no 1	Year > 1 Long-term
Bonds	8.0 %	6.5 %
Index-linked bonds	4.0 %	4.5 %
Shares	7.0 %	4.0 %
Real estate	6.0 %	4.0 %
Cash	6.0 %	7.0 %
Inflation	2.5 %	2.5 %
Real tax rate	50,1 %	Calculated

Company Assumptions:

	Long-term
Increase in premiums	10.0 %
Single premiums in %	10.0 %
Benefits in % of the reserve	3.0 %
Increase in Administration Costs	6.0 %
Deposit to Security Fund in % of reserve	4.0 %

Company Investment Assumptions:

New Placement	Year no 1	Year > 1 Long-term
Bonds	40.0 %	2.0 %
Index-linked bonds	18.0 %	74.0 %
Shares	10.0 %	6.0 %
Real estate	16.0 %	8.0 %
Cash	16.0 %	10.0 %

Refer to Table C for the figures.

Appendix B: Enlargement Of The Model.

A way to enlarge the model to handle changing of assets is described below. The same notation used in the past will be used here.

A way to handle investment of payments is already implemented and will be used again in the same way to invest gain/loss from the sale of assets.

For every sale one must know:

- Which asset type
- Which amount one wants to sell
- The estimated price the asset has in the account
- The actual sales price
- How much interest the asset has given from the start of the year to the sales date.
- How many days from the start of the year to the sales date.

It is then necessary to make a correction to the account in the forecast.

Now one has a different distribution between the assets in the start of the year, because the model is a yearly model. This correction is not necessary in a monthly model. The gain/loss of an asset is handled as a new payment and the fund in the start-year is therefore reduced with the book amount. The distribution is reduced in the fund selling assets, but not in the others.

Let k=1 to ∞ define the k'th number of sale

New distribution of assets:

$$F_{t-1}^{k} = \frac{B_{t-1} * F_{t-1}^{k} - CN_t^k * CP_t^k}{B_{t-1}}$$

where $\begin{cases} CN_t^k \text{ is the nominal amount to sell} \\ CP_t^k \text{ is the price of the asset in the account} \end{cases}$

Changes in Realization Fund:

If one has to pay tax of the realization (if the fund is taxable) one has to change the Realization Fund.

$$\Delta Realization\ Fund_{[t-1,t]} = (SP_t^k - CP_t^k) * CN_t^k$$

where SP_t^k *is the sale price of the asset.*

Taxable interest is updated with the amount of interest.

Changes in Net Capital:

If the sale is from a fund without tax, the Net Capital shall be updated:

$$\Delta NetCapital_{[t-1,t]} = (SP_t^k - CP_t^k) * CN_t^k$$

Taxfree interest is updated with the amount of interest.

The amount of interest and the yield per sale shall be invested:

Taxable interest shall be updated as:

$$\sum_{k=1}^{\#Sale} \frac{360-\#OfDays}{360} * (SP_t^k * CN_t^k + Yield) * \sum_{j=1}^{\infty} 1_{\{Tax=yes\}} * NP_{[t-1,t]}^j * NI_{[t-1,t]}^j$$

Taxfree interest shall be updated as:

$$\sum_{k=1}^{\#Sale} \frac{360-\#OfDays}{360} * (SP_t^k * CN_t^k + Yield) * \sum_{j=1}^{\infty} 1_{\{Tax=no\}} * NP_{[t-1,t]}^j * NI_{[t-1,t]}^j$$

It is assumed that a year is 360 Days.

Example.

The same example as before but with the following sale of assets:

Sale of asset #	1	2
Fund number	1	3
Nominal asset	50	500
Estimated price	20.00	50.00
Sales price	60.00	90.00
Yield in DKK	5.00	120.00
# of Days	12	90

where Fund number 1 is Bonds, 2 is Index-linked Bonds, 3 is Shares, 4 is Real Estate and 5 is Cash.

Refer to Table D for the result. But as one can see it is very easy to influence the stipulated bonus interest rates. One now has the tool to do it.

Table C: Forecast With No Sale Of Assets.

Assumptions for Company	stee	Year: 1993
Administration Costs		27
Premiums		300
Reserve start-year		3000
Security Fund start-year		100
Realization Fund start-year		70
Net Capital start-year		1307
Single premiums in %		10.00
Benefits in % of reserve		3.00
Increase in administration Costs in %		6.00
Increase in Premiums in %		10.00
Deposit to Security Fund in % of reserve		4.00

		Total Assets start-year		New placement In the year		New placement Long-Term	
Fund	Tax	Distribution	Interest rate %	%Distribution	Interest Rate %	%Distribution	Interest Rate %
1 Bonds	Y	1954	12.74	40.00	8.00	2.00	6.50
2 Index-linked Bonds	N	848	8.74	18.00	4.00	74.00	4.50
3 Shares	N	680	7.25	10.00	7.00	6.00	4.00
4 Real estate	N	895	2.74	16.00	6.00	8.00	4.00
5 Cash	Y	100	8.00	16.00	6.00	10.00	7.00

Sale of asset #	1	2	3	4	5
Fund number	0	0	0	0	0
Nominal asset	0	0	0	0	0
Estimated price	0.00	0.00	0.00	0.00	0.00
Sales price	0.00	0.00	0.00	0.00	0.00
Yield in DKK	0.00	0.00	0.00	0.00	0.00
# of Days	0	0	0	0	0

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Company Account										
Premiums	300	330	363	399	439	483	531	585	643	707
+ 20 % Realization Fund	14	11	9	7	6	5	4	3	2	2
+ Taxable Interest	261	277	281	285	290	295	301	308	315	323
+ Taxfree Interest	150	163	182	202	225	250	278	309	343	379
- Benefits	90	104	118	133	150	168	189	211	236	263
- Administration Costs	27	29	30	32	34	36	38	41	43	46
- Real interest tax	138	154	161	147	131	116	106	101	98	95
=Surplus	470	494	525	582	645	713	782	851	926	1008
Insurance Account										
- Deposit to Security Fund	18	19	20	22	25	27	30	33	36	39
= Deposit to Reserve	452	475	505	559	620	686	752	818	891	970
- Premiums	300	330	363	399	439	483	531	585	643	707
+ Costs of insurance business	30	33	36	40	44	48	53	58	64	71
+ Benefits	90	104	118	133	150	168	189	211	236	263
= Amount of value to interest	272	282	296	333	374	419	462	504	548	595

	start-year	end-year	end-year	end-year	end-year	end-year	end-year	end-year	end-year	end-year	end-year
Assets											
Bonds	1954	2136	2146	2156	2168	2181	2195	2210	2227	2246	2266
Index-linked bonds	848	930	1288	1670	2095	2568	3092	3668	4296	4980	5724
Shares	680	726	755	786	820	858	901	948	999	1054	1114
Real estate	895	968	1007	1048	1094	1145	1202	1264	1332	1406	1486
Cash	100	173	221	273	330	394	465	543	628	720	821
Total assets	4477	4933	5416	5933	6507	7146	7855	8633	9482	10406	11412
Liabilities											
Reserve	3000	3452	3927	4432	4992	5612	6298	7050	7868	8759	9728
Security Fund	100	118	137	157	180	204	232	262	295	330	369
Realization Fund	70	56	45	36	29	23	18	15	12	9	8
Net Capital	1307	1307	1307	1307	1307	1307	1307	1307	1307	1307	1307
Total liabilities	4477	4933	5416	5933	6507	7146	7855	8633	9482	10406	11412
Average Interest rate											
Bonds	12.74	12.34	12.31	12.28	12.25	12.22	12.18	12.14	12.10	12.05	12.00
Index-linked Bonds	8.74	8.32	7.26	6.63	6.20	5.88	5.65	5.47	5.33	5.21	5.12
Shares	7.25	7.23	7.11	6.99	6.86	6.73	6.60	6.48	6.35	6.23	6.11
Real Estate	2.74	2.99	3.02	3.06	3.10	3.14	3.18	3.22	3.26	3.30	3.34
Cash	8.00	7.16	7.12	7.10	7.08	7.07	7.06	7.05	7.04	7.04	7.03
Bonus Interest rate		8.80	7.94	7.34	7.32	7.32	7.30	7.18	6.99	6.82	6.66
Real tax rate		50.10	53.50	55.60	50.30	44.30	38.60	34.60	32.60	30.80	29.20

Table D: Forecast With Sale Of Assets.

Assumptions for Company ste	Year: 1993
Administration Costs	27
Premiums	300
Reserve start-year	3000
Security Fund start-year	100
Realization Fund start-year	70
Net Capital start-year	1307
Single premiums in %	10.00
Benefits in % of reserve	3.00
Increase in Administration Costs in %	6.00
Increase in Premiums in %	10.00
Deposit to Security Fund in % of reserve	4.00

		Total Assets start-year		New placement In the year		New placement Long-Term	
Fund	Tax	Distribution	Interest rate %	%Distribution	Interest Rate %	%Distribution	Interest Rate %
1 Bonds	Y	1954	12.74	40.00	8.00	2.00	6.50
2 Index-linked Bonds	N	848	8.74	18.00	4.00	74.00	4.50
3 Shares	N	680	7.25	10.00	7.00	6.00	4.00
4 Real estate	N	895	2.74	16.00	6.00	8.00	4.00
5 Cash	Y	100	8.00	16.00	6.00	10.00	7.00

Sale of asset #	1	2	3	4	5
Fund number	1	3	0	0	0
Nominal asset	50	500	0	0	0
Estimated price	20.00	50.00	0.00	0.00	0.00
Sales price	60.00	90.00	0.00	0.00	0.00
Yield in DKK	5.00	120.00	0.00	0.00	0.00
# of Days	12	90	0	0	0

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Company Account										
Premiums	300	330	363	399	439	483	531	585	643	707
+ 20 % Realization Fund	18	14	12	9	7	6	5	4	3	2
+ Taxable Interest	280	300	304	309	314	319	325	332	339	347
+ Taxfree Interest	261	159	178	198	221	247	275	306	340	377
- Benefits	90	107	121	137	154	172	193	216	241	268
- Administration Costs	27	29	30	32	34	36	38	41	43	46
- Real interest tax	149	168	176	160	142	125	114	109	105	102
=Surplus	592	499	529	587	651	721	791	860	936	1018
Insurance Account										
- Deposit to Security Fund	23	19	20	23	25	28	30	33	36	39
= Deposit to Reserve	569	480	509	564	626	693	760	827	900	979
- Premiums	300	330	363	399	439	483	531	585	643	707
+ Costs of insurance business	30	33	36	40	44	48	53	58	64	71
+ Benefits	90	107	121	137	154	172	193	216	241	268
= Amount of value to interest	389	290	303	341	385	431	475	517	562	610

	start-year	end-year	end-year	end-year	end-year	end-year	end-year	end-year	end-year	end-year	end-year
Assets											
Bonds	1954	2366	2375	2386	2397	2410	2424	2440	2457	2476	2496
Index-linked bonds	848	1038	1397	1780	2207	2684	3213	3794	4428	5118	5870
Shares	680	535	565	596	630	669	712	759	810	866	927
Real estate	895	1064	1102	1144	1190	1242	1299	1362	1430	1505	1586
Cash	100	269	317	369	427	491	563	641	727	820	922
Total assets	4477	5271	5756	6274	6851	7496	8210	8996	9853	10786	11801
Liabilities											
Reserve	3000	3569	4050	4558	5123	5749	6442	7202	8030	8929	9908
Security Fund	100	123	142	162	185	210	238	268	301	337	376
Realization Fund	70	72	58	46	37	29	24	19	15	12	10
Net Capital	1307	1507	1507	1507	1507	1507	1507	1507	1507	1507	1507
Total liabilities	4477	5271	5756	6274	6851	7496	8210	8996	9853	10786	11801
Average Interest rate											
Bonds	12.74	11.90	11.87	11.85	11.82	11.80	11.76	11.73	11.69	11.65	11.61
Index-linked Bonds	8.74	7.87	7.01	6.47	6.09	5.80	5.59	5.42	5.29	5.18	5.10
Shares	7.25	7.20	7.04	6.88	6.72	6.56	6.41	6.26	6.11	5.98	5.85
Real Estate	2.74	3.26	3.28	3.31	3.34	3.36	3.39	3.42	3.45	3.47	3.50
Cash	8.00	6.74	6.78	6.81	6.84	6.86	6.88	6.89	6.91	6.92	6.93
Bonus Interest rate		12.60	7.92	7.31	7.31	7.34	7.32	7.22	7.03	6.86	6.70
Real tax rate		50.10	53.50	55.60	50.30	44.30	38.60	34.60	32.60	30.80	29.20