

Distortion of Competition in the European Insurance Market through National Solvency Regulations

Frank Andreas Schittenhelm and Hans-Joachim Zwiesler
Germany

The harmonization of the life insurance business has brought about a multitude of changes in Europe. Nonetheless, despite all concordances, consequential differences still exist in many areas which can put a country's insurance companies at a distinct disadvantage.

We wish to present this for Germany by way of a specific product example, i.e. a single-premium annuity with no bonus. We will show that German life insurance companies suffer a clear competitive disadvantage due to national supervisory regulations - as compared to Great Britain, for example. The main cause for this are Germany's regulations regarding valuation reserves, which mandate the creation of additional reserves for such products.

In this paper we will consider as an example the following aspects of the single-premium annuity: asset-liability management in view of supervisory requirements necessitating the creation of additional reserves, profitability, and competitive disadvantages for German companies because of the higher costs for the additional reserves.

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Wettbewerbsverzerrungen im europäischen Versicherungsmarkt durch nationale Solvenzbestimmungen

Frank Andreas Schittenhelm und Hans-Joachim Zwiesler
Deutschland

Die Harmonisierung der Lebensversicherungswirtschaft hat in Europa vielfältige Veränderungen gebracht. Doch trotz aller Annäherungen bestehen weiterhin in vielen Bereichen gravierende Unterschiede, die zur eindeutigen Benachteiligung für Versicherungsunternehmen eines Landes führen können.

Anhand eines konkreten Produktbeispiels, nämlich einer Rentenversicherung gegen Einmalbeitrag ohne Überschußbeteiligung, soll dies am Beispiel Deutschlands vorgestellt werden. Dabei wird sich zeigen, daß deutsche Lebensversicherungsunternehmen durch nationale Aufsichtsbestimmungen einen klaren Wettbewerbsnachteil (z.B. im Vergleich zu britischen Unternehmen) haben. Hauptursache hierfür sind die deutschen Solvenzvorschriften, die für derartige Produkte die Bildung zusätzlicher Reserven vorschreiben.

In dieser Arbeit werden wir beispielhaft die folgenden Aspekte bei der Rentenversicherung gegen Einmalbeitrag betrachten: Aktiv-Passiv-Steuerung vor dem Hintergrund aufsichtsrücklicher Erfordernisse mit dem Zwang zur Bildung zusätzlicher Deckungsrückstellungen, Profitabilität, Wettbewerbsnachteile für deutsche Versicherungsunternehmen durch erhöhte Kosten für die zusätzlichen Reserven.

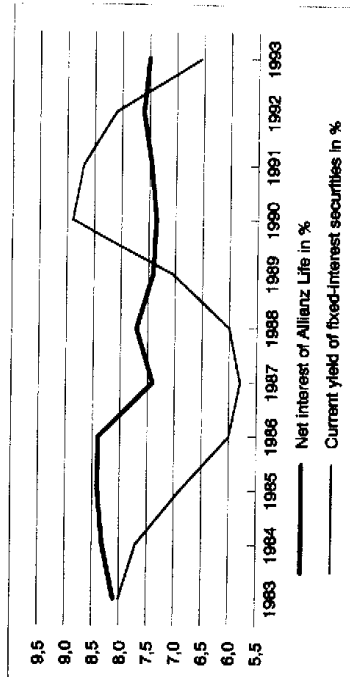
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The Current Situation in Germany

Single-premium annuities are of particular interest for product-specific asset-liability management. Because those portions of the single premium allocated to the capital investment are invested immediately at market conditions, there is a strong interdependency between the insurance product and the capital investment.

As of yet, though, the insurance companies in Germany still maintain a different practice, in that every insurance policy profits from the gains earned by the entirety of the invested capital, independent of when the premium was received. One fundamental reason for this is the fact that in Germany just about the only policies are those including a bonus, since up until deregulation other forms of product design were not permissible. One of the reasons, why since then single-premium annuities with increased guaranteed annuity payments and no bonus have not been put on the market, is the disadvantage to these products due to solvency regulations, as will be shown.

Fig. 1: Comparison between net interest for Allianz Life and the current yield on fixed-interest securities



Source: Allianz Life Insurance Corp., annual report for 1993, p. 21.

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Figure 1 compares the net return, which Allianz Life grants every policyholder, with the (averaged) current yield on fixed-interest securities. While Allianz Life's net return varies but to a small extent over time, the current yields exhibit marked fluctuations. This has the following effects for a potential insured and the insurance company:

- If the current yield on the securities is clearly less than the insurance company's rate of interest, the insured profits from the high interest. The insurance company for its part passes on an excessively high rate of interest to the policyholder, as it can only obtain the present rate of interest according to the current yield on the invested premium. In the end one may assume an increase in business for the insurance company, though this will not be profitable.

- The situation is different when the current yields are greater than the net interest. Basically, in this case, the insurance company pays the insured too little interest, as one would be able to earn a rate of interest on the premium on the level of the current yield. As a result one would have to expect a decrease in business despite the individual contract's being profitable for the company.

The Primary Regulatory Conditions

Two supervisory regulations are of particular importance for a single-premium life insurance policy:

1. While the book reserves must principally be calculated on the basis of an interest rate of 4%, for a single-premium annuity one may calculate the reserve over the first 8 years using an interest rate of 85% of the average return on government bonds with a maturity of up to 8 years. In Germany this interest rate is currently 4.3% which is decidedly lower than the returns obtainable on fixed-interest securities for long-term investments such as annuities. Insurance companies wishing to guarantee their customers returns on single-premium annuities which correspond to current capital market levels must therefore determine their reserves using the lower assumed interest rate, which leads to reserves that are significantly greater than the premium.

(The pertinent regulations are to be found in §65 of the Insurance Supervision Act (*Versicherungsaufsichtsgesetz (VAG)*) in combination with §2 of the Code of Regulations for Reserves (*Deckungsrückstellungsverordnung*))

2. In addition the Insurance Supervision Act (§11 VAG) mandates that one must not by plan and on a long-term basis require funds to finance the reserves which do not originate from the premiums paid. Thus it is necessary to insure that the reserve increases can be created within a foreseeable period of time from the expected revenues. In order to ascertain this and prove it to the regulatory authority, the insurance companies are forced to select relatively low-risk investments with secured returns for this product.

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The Basis for Calculation

For the purpose of examining the effects of the German solvency regulations, we will conduct a profit test on our example of the single-premium annuity, once leaving additional reserves out of account, once including them.

All other calculatory factors will remain constant in order to exclude other influences.

The product under examination is a lifelong single-premium annuity, starting immediately, to be paid yearly in advance. The objective is to offer the insured the highest possible guaranteed annuity payment.

The annuity payment shall be determined by the equation of value, using the following calculatory factors:

- mortality table

DAV 1994R, year of entry: 1997

(This is the table prescribed by the supervisory authority for the calculation of the reserves; it takes into account the longevity risk in particular.)

- assumed rate of interest:

5.4%

(Whether the thus determined annuity payments can be financed through appropriate investments and will earn a sufficient profit, will be discussed afterwards.)

- expenses:

initial one-time fee of 5.3% of the single premium
current annual fee of 1.5% of the annuity payment
(these are the common fees for the German market)

For a 60-year-old male, a single premium of DM 100,000 would thus generate a guaranteed annual annuity payment of DM 6956.66.

Subsequently one must investigate the feasibility of financing the annual annuity payments thus calculated. As this is a product whose high guaranteed interest return demands a relatively low-risk portfolio composition, the appropriate strategy is one of cashflow matching with a resulting emphasis on fixed-interest securities. This is in concordance with the supervisory requirements which call for the generation of the increases in the reserves through the expected earnings over a foreseeable period. (This also eliminates additional effects on the results, e.g. stock market activity, which is essential to our analysis of the effects of increased reserves)

The purpose of cashflow matching is to design the security portfolio's returns - i.e. interest and redemption sum upon maturity - in such a manner as to enable the payment in full of all expenses due. Cashflow matching ensures the funding for the future expected liabilities and generates a certain return which is used for the creation of the increased reserve. First off, one must calculate the liabilities as specified by the conditions in the policy. For the above example and the applied calculation basis these are as follows: At the start of the policy the liability is composed of the first guaranteed annuity payment, paid in advance, of DM 6956.66 plus the one-time initial expenses as

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well as the administration expenses. For the following years the liabilities are determined by multiplying the guaranteed annuity payment and administration expenses by the assumed survival probability.

The next step is the selection of appropriate fixed-interest securities for the funding of the above liabilities. In determining the actual returns on the invested capital, for reasons of simplification we will use the German forward rates (as of 22 Jan 1997). These are obtained from the continuous annualized swap-zero curve and take the following form (where $n \geq 7$):

$f(0,1)$	$f(1,2)$	$f(2,3)$	$f(3,4)$	$f(4,5)$	$f(5,6)$	$f(6,7)$	$f(n,n-1)$
3,2	3,78	4,84	5,78	6,45	6,79	7,1	7,1

For the above example the required capital can be determined via a system of linear equations from the expected liabilities as well as the amortization and interest payments according to the above forward rates. For our case it amounts to DM 93.295. This demonstrates that the product described above can be financed by means of cashflow matching.

It is for purposes of simplification that we suppose an unlimited availability of securities with the various maturities, in this way the effects of the additional reserves can be analyzed especially clearly and independently of other influences.

In conclusion a profit test will be performed to determine whether the policy conforms to the company's criteria concerning returns. In the following we suppose the company's expected internal return to be 12% at minimum. Also all subsequent calculations are designed so that the guaranteed annuity payments plus capital earnings will generate this internal rate of return.

For the profit test we make the following assumptions, as are realistic for the German market:

- The realistic mortality corresponds to that given in the DAV 1994R mortality table for the entry year 1997.
- The initial commission equals 5% of the single premium.
- There are additional internal expenses of DM 500.
- For the first year the administration costs amount to DM 100, from then on they rise by an assumed annual inflation rate of 3%.
- The insurance company must create a solvability reserve of 4% of the funding capital.
- For the solvability reserve the assumed annual interest return rate is the same as the security portfolio's.
- No account is made for taxes in order to prevent the results being distorted by the influence of other factors.

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In this manner, the major part of both risk and cost earnings are eliminated. The only source of income for the case in question is the investment gain, the profit being the difference between the interest actually earned and that passed on to the policyholder.

Of crucial importance for our study is the question of how the reserves are set up. In one case we will assume their calculation to be based on the same factors as are used for determining the annuity payments (and which make economic sense, as the cashflow matching illustrates), in the other we will apply the conditions required by the German regulations. Presently these specify a maximum assumed interest rate of 4.3% for the first 8 years and of 4% thereafter, which results in the reserves exceeding the investment capital calculated by the cashflow matching. Although according to the cashflow matching not the entire single premium is required to fulfill the future liabilities, the remainder is nevertheless not at the company's disposal because it is needed for the increased reserves.

All in all, the following quantities are deposited into the book reserve

book reserve	=	valuation reserve according to German regulation
	=	investment according to cashflow matching
		+ remaining funds from the single premium
		+ additional funds for increased reserves

Since the additional reserves are not paid for out of the single premium, they must be financed in advance by other means. This can be done with company funds or by advance financing through a reinsurance company. These additional funds too are assumed to accrue interest according to the forward rates.

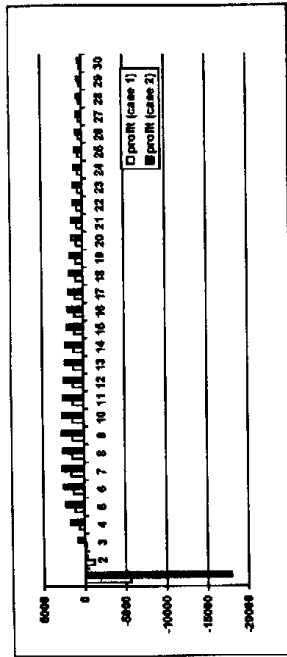
Figure 2 displays for these assumptions the annual expected profit¹ as the result of the profit test for the above example.

Case 1: The reserves are to be determined using the same assumed rate of interest as for the annuity payments

Case 2: The reserves are to be determined in accordance with the Code of Regulations for Reserves, using an assumed rate of interest of 4.3% for the first 8 years and of 4% thereafter.

¹ These and all subsequent calculations were carried out using the software tool ProSys, which was developed by the Institute for Finance and Actuarial Science in cooperation with Peter Giesener & Panther Ltd. for the purpose of asset-liability management for single-premium annuities.

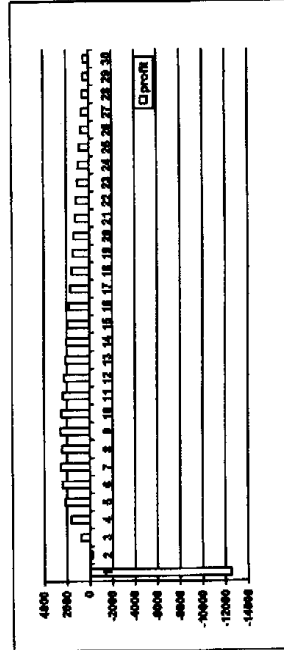
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 Fig. 2: Illustration of the cashflow as determined by the profit test



The graph illustrates clearly the high initial investment necessary in Case 2 because of the additional internal funding required for the increased reserves. In later years Case 2 profits by the release of these reserves. Yet, based on an assumed rate of interest of 5.4% for calculating the premium and taking into account the cover reserve, the product achieves a real internal rate of return of only a scant 9%, therefore, it should be considered as unprofitable.

Figure 3 shows the development for an assumed rate of interest of 4.9% for calculating the premium and under compliance with the Code of Regulations for Reserves. In this case the requirement of a return on equity of at least 12% is fulfilled.

Fig. 3: Illustration of the cashflow as determined by the profit test



The purpose of this section is the analysis of the amount by which the annuity payment must be reduced so that the increased reserves can be financed without having to lower the product-specific earnings prospects for the company. Here we will use the same calculation basis as in the preceding section and will consider the following two cases for calculating the reserves:

Case 1: The reserves are to be determined using the same assumed rate of interest as for the annuity payments.

Case 2: The reserves are to be determined in accordance with the Code of Regulations for Reserves, using an assumed rate of interest of 4.3% for the first 8 years and of 4% thereafter.

The insurance company sets a goal of a return on equity of 12%. Thus the projection calculation should result in an internal interest rate of at least 12%. Any other factors necessary for a more extensive product analysis shall not be regarded here. The results for a male insured are contained in Table 1:

Table 1:

Age	Case 1		Case 2		Difference in Percent
	Guaranteed Annuity Payment	Assumed Rate of Interest	Guaranteed Annuity Payment	Assumed Rate of Interest	
40 Years	5592,99	5,6	5089,95	4,9	8,99
45 Years	5747,81	5,5	5326,97	4,9	7,32
50 Years	6048,84	5,5	5638,15	4,9	6,79
55 Years	6393,68	5,4	6059,93	4,9	5,22
60 Years	6956,66	5,4	6630,75	4,9	4,68
65 Years	7701,21	5,3	7445,55	4,9	3,32
70 Years	8805,94	5,2	8616,41	4,9	2,15

Summary

These are the essential aspects of the preceding discussion.

1. Insurance companies which are subject to supervisory conditions different from those in Germany may be able to offer significantly higher guaranteed annuity payments for the same projected earnings. This constitutes an obvious disadvantage to German companies.
2. It is not possible to get the insured to understand and accept reduced guaranteed annuity payments caused by the need for advance financing of additional reserves.
3. Annuity products with increased guaranteed annuity payments and no bonus should hold particular interest for German insurance customers. In comparison to products based on a bonus system (but with lower guaranteed annuity payments), they are much more easily comprehensible for the customer. And they offer a higher degree of reliability, the traditional annuities, which are based on a bonus system, have lately suffered a substantial drop in customer confidence due to bonus reductions in Germany.
4. There is no justification for the claim that the conditions mandated by the Code of Regulations for Reserves constitute an increase in security in the case of the product in question, because, as discussed above, the single premium is invested immediately at capital market conditions. In this manner, for fixed-interest investments the portfolio's returns are determined from the beginning.
5. British life insurance companies enjoy additional earnings opportunities through higher investment in equity. For German life insurance companies this investment strategy is more difficult in our case for two reasons. On the one hand, there are supervisory limits on equity investments, on the other, §11 of the Insurance Supervision Act mandates certain returns for the funding of the increased reserves, which can only be obtained via fixed-interest investments.

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The fact becomes clear that particularly in the case of younger insured persons the guaranteed annuity payment must be reduced for Case 2. Since any insurance company subject to German insurance supervision is prohibited from using the same assumed rate of interest for the calculation of the reserves as for the annuity payments, for a 50-year-old, for instance, it can guarantee no more than an annuity payment which is 6.79% lower than would be possible in Case 1. For relatively advanced entry ages this discrepancy is no longer as serious; for younger insured persons, on the other hand, it marks an increase.

While for Case 2 a uniform assumed rate of interest of 4.9% was used for all entry ages, Case 1 requires the assumed rate of interest to be reduced as the entry age increases; this is due to the shorter expected life of the policy as well as the rising interest yield curve. In this regard this reduction follows the demands established intuitively through asset-liability matching.

The results for female insured persons amplify the effects described above for the same ages of entry. When allowance is made for the age shift, the results become analogous to the men's (cf. Table 2).

Table 2:

Age	Case 1		Case 2		Difference in Percent
	Guaranteed Annuity Payment	Assumed Rate of Interest	Guaranteed Annuity Payment	Assumed Rate of Interest	
40 Years	5387,48	5,6	4874,24	4,9	9,53
45 Years	5539,92	5,6	5039,47	4,9	9,03
50 Years	5675,11	5,5	5258,72	4,9	7,34
55 Years	5968,80	5,5	5564,56	4,9	6,77
60 Years	6323,72	5,4	5997,03	4,9	5,17
65 Years	6947,25	5,4	6628,77	4,9	4,58
70 Years	7796,56	5,3	7547,10	4,9	3,20

Bibliography

- Albrecht, P. (1995): *Ansätze eines finanzwirtschaftlichen Portfolio-Management und ihre Bedeutung für Kapitalanlage- und Risikopolitik von Versicherungsunternehmen*, Verlag Versicherungswirtschaft, Karlsruhe, 1995.
- Allianz Lebensversicherungs AG (1994): *Annual Report 1993*.
- Hauser, H. (1993): *Profit Testing von Lebensversicherungsprodukten*, VV, Heft 18/1993, S. 1186-1189.
- Hauser, S. (1992): *Management von Portfolios festverzinslicher Wertpapiere*, Fritz Knapp Verlag, Frankfurt am Main, 1992.
- Jost, C. (1995): *Asset-Liability Management bei Versicherungen*, Gabler, Wiesbaden, 1995.
- Kocherlakota R., Rosenbloom E.S., and Shiu E.S.W. (1989): *Algorithms for Cash Flow Matching*, Transactions of the 24th Congress of Actuaries, Volume 40, 1989, S.477-484.
- Kroll, M. and Hochrein, M. (1993): *Festverzinsliche optimal managen: Rendite, Risiko, Steuern*, Gabler, Wiesbaden, 1993.
- Neumann, K. and Morlock, M. (1993): *Operations Research*, Carl Hauser Verlag, München, Wien, 1993.
- Schittenhelm, F.A. (1996): *Lebensversicherung gegen Einmalbeitrag im Aktiv-Passiv-Management eines Lebensversicherers*, Institute for Finance and Actuarial Sciences, Ulm, 1996.
- Schittenhelm, F.A. (1997): *Aktiv-Passiv-Steuerung für Rentenversicherungen gegen Einmalbeitrag*, Der Aktuar, 1/1997.
- Zwiesler, H.-J. (1996): *Der Profit-Test in der Lebensversicherung - eine Einführung*, Institute for Finance and Actuarial Sciences, Ulm, 1996.