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**PRODUCT DEVELOPMENT FOR A
UNIT LINKED LIFE OFFICE**

by

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Section 1: Introduction - Why a Paper?

This paper is not written to break any new actuarial ground. To anyone employed within the field of product development, the concepts described will sound familiar and "everyday". It is written as a piece of extra reading for actuarial students wishing to take the life assurance examination or for actuaries who are not employed in the product development function and who want to understand what their colleagues in this field do.

I hope that these people will find it useful.

I would like to thank Chris Moore for his comments on the paper. I would also like to thank Vanessa Quayle for her patience in typing and re-typing the many drafts of this paper. As always, I would like to stress that any errors are my fault and the views expressed are my own.

Section 2: Why Develop New Products

2.1 Introduction

For every task, there should be reasons and objectives. Therefore, before undertaking product development, we should ask why we are undertaking it. We must set objectives that can be achieved and we must measure the outcome to see whether we have achieved it.

There are 4 major reasons for developing new products. Any one of these may be sufficient but the real reason may be a combination of them.

2.2 Profit Maximisation

The role of the management of any company is to maximise the shareholders' profit. The shareholders may, of course, include participating policyholders. New products may achieve greater profitability with no fall in the sales of the product type and this must provide the main incentive for developing the new product.

More common under this heading, though, are changes in the pattern of supply or demand. New technology may make possible complex products that meet the consumer's needs more closely. Without computers, unit linked life would be difficult to write and flexible whole of life would be impossible.

Demand may also change. Rising incomes may create a wider market with different needs. The role of the state may decline causing a greater need for private provision. All of these points interact leading to a need for new products to be developed.

Products may also be developed to increase overall profitability of the company by re-balancing the tax calculation. An example here is income bonds which generate sufficient investment income to relieve some excess expenses carried forward.

2.3 Marketing Edge

Competitors may not have spotted a particular change in demand or have developed the technology to supply the product. If the company is quick to develop and launch the product, it can charge the consumer a greater profit margin than it could on more traditional products. This can lead to a greater overall profit and leads to a "marketing edge" for the company.

2.4 Added Value

The new product, if it is unique, may be charged at a higher rate than more mundane products. This is part of a more global marketing phenomenon. Any product that is perceived to have a high value by the consumer is worth more to him. The products that have a higher value are those to which the manufacturer is able to add value. A term assurance has very little chance at being differentiated from any other term assurance as they are all much of a muchness. Flexible unit linked whole of life, though, all have slightly different options and all have different fund choices. These elements create "added value" to the basic product (life cover) at very little intrinsic cost.

"Branding" can also add value. Consumers view a product that they know the name of as being more valuable than a more prosaic product with exactly the same contents. An example is Heinz Baked Beans versus Sainsbury's own brand. Marketing departments are all trying to create brands around their product to increase consumer identification, increase sales and build margins.

2.5 Image and Excitement

Another very valid reason to develop new products is to create activity in the market place which shows to your retailers, your consumers, your staff and your competitors that you are a dynamic "go-ahead" organisation. This must be "fleshed out" with other marketing activities such as good PR, advertising and decent marketing literature.

2.6 The Marketing Trap - Sales Problem

A fairly common reason often used is the wrong reason. Quite a lot of products are developed to try and increase sales. These are frequently requested by the sales divisions on the basis of "If only we had this product" or "We are losing sales because we lack this product!". The real problem is very often one of management of the sales force. Developing products draws attention from this real problem and usually leads to greater problems after the product is launched. The best thing to do is to find the real problem. If it is due to sloppy management, then it's about time you replaced your sales manager!

2.7 Marketing and Finance

Product development is a mixture of these two disciplines. Therefore we need to consider the effects of each set of considerations in product development. In the next section, I deal with marketing considerations.

Section 3: Marketing Considerations

"So, you see, products aren't important", Trevor Deaves

3.1 Introduction

The above quotation seems out of place in a paper on product development. However, it is saying something I wish to make clear in this paper. Products are only successful if they are sold. The selling of products requires the company to be aware of its market and to know how it will get to its market.

We must also remember that the financial services provided by a life assurer are complex. Experienced salesmen or brokers are able to determine their clients' wants and needs, to prioritise them and to provide suitable solutions.

Therefore, before considering anything else, the product development actuary should ask himself: how is this product going to get to the client and what are the requirements of the distribution channel? Without satisfying himself or herself in this regard, there would be little point in continuing the development of the product.

3.2 Types of Sales Outlets

There are four basic types of sales outlets that are used in life assurance:

- (i) The independent intermediary or broker. These retailers of the product are independent of the life company which has no control over them or responsibility for them.
- (ii) The direct salesforce. Here the retailer and the manufacturer are part of the same organisation and should have the same goals and targets. There is a two way exchange of responsibility.
- (iii) Direct response through mail or through newspaper advertising. Here service is reduced to the absolute minimum.
- (iv) Tied agents. These are ex brokers who have decided that the costs of independence are too great. They have, therefore, tied to one life office. They frequently keep their own corporate identity and culture.

Each of these sales outlets has its own needs and requirements. I deal with this in the next few sections.

3.3 The Needs of Brokers

Brokers have six considerations in deciding which life offices to support: commission amount and speed; fund choice, range and investment performance; product terms; administration speed and competence and, lastly, technical support. LAUTRO tried to remove commission from the list by regulating the amount of commission payable. However, this factor has returned to the top of the list much sooner than expected with the ending of the Maximum Commission Agreement. The others remain in much the same order of importance.

How can the life office that hopes to succeed in the broker market achieve that success? The basic answer is by providing all of the above requirements as well or better than anyone else and by making sure that brokers are aware that this is true. A full product range is far from essential or even necessary.

Standard Life has a very large presence in all parts of the broker market including that for unit linked policies. Their overall supremacy is assured by a certain amount of inertia selling by brokers feeling safe with Standard Life's products, good service and investment performance.

This conservatism has been reinforced by the Financial Services Act. An independent intermediary cannot be criticised for recommending Standard Life's investment products. He could be criticised for selling an unknown office or second rank office unless there was a clear reason for doing so. This has led to "best advice" being safe advice. There has also been a drain on the numbers of brokers in the market as both the costs of compliance and the reduction in income due to the maximum commission agreement have taken their toll.

"Best advice" has also meant that the broker is concerned with the financial stability of the life office. Although this is very proper, the concern has manifested itself in ranks of "Form 9 ratios". These ratios are the amounts of solvency margin and free reserves shown by the DTI Returns divided by the long term fund. This has led to traditional unit linked offices losing business to with profits offices due to the latter having Form 9 ratios inflated by the terminal bonus and capital gains tax reserves.

A small broker based unit linked office should concentrate its resources. This means restraining the marketing department from too many new developments. It is better to concentrate on two or three product types to start with, concentrate all resources to ensure smooth administration and good sales aids and documentation, reasonably good products and blameless investment performance before moving onto new products. If the company wants to become known as "innovative" it should look to replace a product that is at the end of its product life rather than add an extra

product. Quite a lot of marketing "hype" can be generated by redressing existing products to meet new needs: "keyman" policies, inheritance tax planning, school fee provision for example. The office should ensure a good working relationship between its brokers, its inspectors and its administration. One promise not honoured could lose the broker forever.

Brokers need to feel that they are adding value to the product by their advice. They also need a product that will cater to all of their client's possible needs over the term of the product. Both of these requirements lead to broker based products having a wide variety of options and benefit types. A flexible whole of life plan must include an FIB option, PHI cover, total and permanent disability prepayment option, RPI options on the life cover (just in case the policyholder needs to increase his cover), premium "holidays", loan facilities and, if possible, lump sum investment facilities. The investment choice should include everything from a "Lascar Smaller Handbag Manufacturers Fund" to a managed fund so as to cater for all possible investment fads as well as providing the investment choice of the majority of policyholders. The broker can only then say that the policy chosen will cater for all of the possible needs of the client as well as providing the required investment freedom.

3.4 The Needs of a Salesforce

A salesforce employed by the life office (or by the group to which the life office belongs) has very different requirements and needs from brokers. The key requirement is being able to provide a product for every client and every client's need.

It is easy to forget that the salesman can only sell the products that are made available to him. He will try to match the product range against the needs of the client in front of him. If a salesman has a client with an obvious life insurance need then he would be rightfully annoyed if his life company could not satisfy it. In the extreme case, the salesman could lose the client which, with all the possible referrals, could be a substantial part of his income. Therefore, direct salesforce actuaries start talking in generic terms (protection, savings, investment, capital sums, health protection and pensions) rather than in terms of flexi-whole life with insurability options. The key is to ensure that you can cover all of these areas for the vast majority of clients. This has important consequences:

- 1) Underwriting must, obviously, protect the account but, equally, must not seem unreasonably harsh to the salesman. A broker office can establish very tight underwriting and establish a reputation for good value, a salesforce based office cannot afford such luxuries.

The vast bulk of applicants (say 95%) should be accepted at normal rates. This sets the standard of normal rates. Declining lives should occur, if possible, on only a very small number of cases.

- 2) Age ranges must be wide. The salesman needs to be able to sell a protection policy for inheritance tax planning to an 80 year old as much as to a 65 year old.
- 3) Minimum premium levels should be reasonable although one must avoid too low a level as the minimum can have a large impact on the average premium.

Secondary requirements are:

- a) The product and its rules must seem reasonable.
- b) The product must be reasonably competitive. The salesman should be able to feel some pride in his product range.
- c) Commission levels must ensure that the salesman can make a reasonable living.

Of course, all of these points should not be followed to the extreme of losing money for the office. The salesforce should be managed and this management is more of a skill or art than a science. Excitement, recognition, growth and reward all go hand in hand. Salesmen are like all other employees in needing to feel that they are working for a success story and that they are contributing to it. Cynicism can be the death of a salesforce. All rewards and recognition should be based on objective measures so as to avoid this death knell.

Products must be heavily packaged. Unlike brokers, salesmen prefer having the product geared to one need alone and selling on that need. If the client develops other needs, then other sales are possible. A complex product complicates the sales process and reduces the chance of new salesmen succeeding in their career.

3.5 The Needs of Appointed Representatives

The key requirements here are:

- a) Commission and commission advances. A key reason why many appointed reps became "tied" was to avoid low LAUTRO commission. The tied agent requires a large amount of capital to start his business. He also wants a high amount of commission to keep his business profitable. He would be crazy, therefore, not to try to get the best price possible. A large part of the workload of an actuarial department in an appointed rep office is spent on setting terms!

- b) Service in administration and in technical support.
- c) Reasonably good value in the product range and a full product range. Here the appointed rep is like a salesforce in its requirements but with the added problem of previously being a broker and having any life office's products available.
- d) An appearance of independence. The appointed rep will not have any loyalty to the life office and will frequently change life offices if allowed to!

I believe that appointed reps are far more expensive to acquire than building up a salesforce as you are buying a going concern's production. However, not many life offices have the skills or expertise to set up a successful salesforce and they have very little choice but to sell through appointed reps.

3.6 The Needs of a Direct Response Office

There are not many life offices using this method of distribution solely. The product range has to be simple and must aim itself at "wants" rather than "needs". The key age groups for life cover for the salesforce based office is the early 30's, for the direct response office it is the late 40's and early 50's.

For life cover, limited or no underwriting goes hand in hand with high premium rates and maybe a restriction on cover in the early part of the plan. Options are removed and the cover is provided at very low levels of sums assured (less than £100,000 normally) so as to remove any problems caused by minimal underwriting. This basic level of cover is often inflated by the use of "package" coverages such as accidental death benefit. These extra coverages cost very little compared to the life cover at the key ages but provide nice headline figures.

To sell savings based plans, direct response life offices have to present very simple plans that show large cash returns for a small regular outlay. Therefore plans tend to be rather down market. The projected values are shown in bold print even though they tend to be standardised LAUTRO projections which bear no resemblance to the likely maturity values of those plans!

The financial aspects of direct response selling are quite complex and this method of selling is certainly not cheaper than any other method. Gifts often have to be used to generate sales and fight the inertia of the consumer. Inserts into Access bills or quarter page adverts in the Daily Mirror cost a great deal. The key numbers are therefore the response rate and the conversion rate (how many respond and

how many convert this response into sales). The actuary will set about monitoring these statistics very carefully to measure costs and product profitability.

The packaging of the direct response sale has now become very standardised. It includes:

- a) A personalised letter saying how marvellous the offer is. This may be endorsed by a "personality".
- b) A leaflet describing the plan and dealing with point of sale disclosure. Clients tend to like small print as it implies that you are telling them all the "nasties" so even if none is necessary, its a good idea to include some!
- c) A simple application form with maybe 4-5 underwriting questions (AIDs, hazardous pursuits, major medical care, drugs).
- d) Reply paid envelope.
- e) Details of a special offer or gift for applying within a limited time period or, even, at all.

It is important to ensure that the administration can handle all of the applications within a week (at the outside) of receiving them. Without a salesman or broker reassuring the client that "things are happening", the client can frequently "cool off" very quickly. Also, this method of selling generates gluts of applications and then nothing until the next insert/advert is used.

Once policyholders are on the books, the office should use them as often as, say, once a year for repeated mailings with fresh "opportunities". Once sold, the policyholder is more likely to buy again.

3.7 "Image" and the Financial Services Group

The "image" of a life office (or "Financial Services Group" if you are image conscious) is often more important than we actuaries like to think. Although it is true that image does not sell any policies and therefore does not give shareholders any real value, it can add enormously to other items in the marketing "mix".

Firstly, it can act to recruit, retain and motivate a sales-force, employees and broker inspector force. It gives a sense of belonging and achievement to all concerned. This should not be underestimated. If this is right, then management is a lot easier. Salesmen (like all other employees) want recognition for their efforts, similarly, they want to work for their ideal of a company.

Secondly, the image of a life company can make sales easier by increasing the identification of the consumer with the company. This is essential for a direct response life office where the policyholder wants to know the company with which he is dealing. A company with the wrong image will find it more difficult to sell its policies. Solidity, financial strength, investment performance, dynamism, friendliness, efficiency and positive attitudes are all good images (but sometimes slightly at odds!). Slackness, rudeness and a poor financial position have the wrong impact!

Thirdly, the image will affect the type of products required and will affect the balance of sales between products. This is where all items of the marketing "mix" come together: sales outlet, image of company, product and marketing services. A staid "well established" life office wants its products to give a "feel" of authority and conservatism. However, nearly all life offices are now trying for a dynamic, even "sexy", image.

3.8 The Consumer

To marketing men, it must seem strange that I have not mentioned the preferences or desires of the consumer. For them, the consumer is the real key. It is obvious that the product must attract and hold the consumer if it is to succeed. Most research that has been undertaken shows the following key requirements for the consumer:

- (a) The product must be simple and meet an identifiable need.
- (b) It also must be flexible enough to change to meet changing circumstances. This contradicts (a).
- (c) The consumer requires the prospect of good returns and would like a guarantee if it was free. It is doubtful if the consumer would pay for any large scale maturity guarantees at their full economic cost. How many consumers realise how variable are the returns from their policies, though?
- (d) The consumer is not prepared to pay for a very high level of service but expects that errors will not be made and that there will not be many delays in servicing him.

Overall, the consumer has very limited experience in deciding whether a particular policy is good or bad. Most policies are sold, not bought, and most of the consumer work of the life office is to reassure him that he has made a wise decision. This takes the form of brochures, annual statements and carefully designed policy conditions.

The consumer profile is important to the choice of products, though. There is no point in developing home reversion schemes for a salesforce that sells to young just married consumers. Neither is there any point in developing pensions products if the client base is all aged over 65. Therefore, the actuary would be well advised to study the company's client base on social class and age to see what type of products would meet their needs.

3.9 Conclusion

The marketing influences on product development are, therefore, very profound. It would be an incredibly unwise actuary who had a fixed idea of the products suitable for his office without first considering the marketing angle.

Section 4. : Financial Considerations.

To say that product development is purely marketing is obviously nonsensical. Indeed, it is the blend of "soft" marketing considerations with seemingly "hard" financial considerations that gives product development its particular blend of interest.

4.1 Techniques Used

I do not propose to give a full explanation in this paper of well trod ground. It is obvious that the primary tool should be cashflow modelling and profit test techniques. These give not only the single figure results for return on capital employed, payback (the period in which the initial losses of writing the business are recouped by the emerging profits) or present values of future profits but, also, give the shape of the cashflows. They are essential in any forecasting of future corporate profitability. These techniques are covered more than adequately in the references at the end of the paper (especially Smart and Lee). The only warning I have to make to students is that cashflow techniques are extremely "active" valuation methods. Extreme care has to be exercised in choosing the assumptions to be made and especially on the interactions between the assumptions. An example of carelessness might be "negative sterling reserves" with a low sterling interest rate compared to unit growth!

4.2 Is Finance Important?

To understand the full impact of finance on product development, it is only necessary to think of two financial extremes. One is a life office set up in the Nineteenth Century with free reserves and estate (after allowing for the funding of a reasonable level of terminal bonus in the future) of about 15% to 25% of the total assets. The other is a small unit linked office founded last year with a capital of a million and not much chance of attracting further capital. The impact of the financial realities are very different on these companies.

The small company has to struggle from day to day. Financing reinsurance becomes essential and a quick "turnaround" is required in the capital supporting each generation of business. Guarantees and options would not be welcomed (to say the least) by the appointed actuary in his valuation. The actuary would get very nervous about the mix of new business and would require strict financial control exercised on a monthly basis (at the longest).

The large, well established office, on the other hand, seems to have a very easy time. However, we must ask whether the office is using the investment of its shareholders and participating policyholders very wisely. Is this level of sol-

vency really required? Therefore, the key problem for this life office may be to increase sales to use capital to maximise the return for the risk taking shareholders and with profit policyholders. Complacency in the solidity of the office can also be a great enemy as we have seen only too recently.

What are the financial considerations and how should they be taken into account by the product development actuary?

4.3 Capital Base of the Office

The capital base of the life office is a primary factor in the design of new life plans. The amount of capital available determines:

- (i) the amount of new business that can be written. Solvency margins and new business strains have to be financed. For some types of plans (term assurance for example), even on profitable rates, there is a continuing financing requirement throughout the term of the contract. The solvency margin based on sum assured gives the minimum amount of capital required which can be transformed into the maximum sums assured that can be written. Commission financing is very expensive if it is not possible to Zillmerize the product.
- (ii) the type of new business that can be written. Single premium bonds can (on LAUTRO commission rates) break even after the life company's expenses on day 1. Therefore, there is no financing requirement if there is no sum assured (and therefore no solvency margin). Term assurance and flexible whole of life use a lot of capital. The commission financing strains are accentuated by a 3 per mille solvency margin which can only be reduced for reinsurance to 1.5 per mille. Stamp duty at 50p per mille was, until recently, another burden. The payback period can stretch into years rather than months for these plans. Until only recently, the profitability of pure term assurance was also low due to cut-throat rates. AIDS has, thankfully, given us a good excuse to increase rates!
- (iii) the guarantees and options that can be built into the plan. Although the statutory solvency margin is a straight 4% of the actuarial reserve irrespective of the type of guarantee, the appointed actuary should be ensuring there is a stronger solvency margin on some sorts of guarantees compared to others as a form of "safety margin". Some guarantees or options are intrinsically unsafe to grant (a guarantee to out-perform building

society accounts on an equity fund for example) but others can be costed and, as long as a sufficient price is paid by the consumer, there is no problem. However, if the company has insufficient capital resources to set aside the "safety margins" necessary, the guarantee may be impossible to grant. Examples of this are deposit administration policies in pensions with a "managed" fund investment policy, or most mortality options post-AIDS. It is questionable, in any event, how much policyholders want these guarantees and options. When my company started charging 2% of the premium for a money back maturity guarantee in the mid '70's, virtually no-one took the option up even though it was only 3 years after the '74 crash. If the company had a large amount of resources, these guarantees and options could become marketing "extras" which are seldom utilised but often quoted as the reason to choose this product.

The source of capital is also an important consideration for two reasons. With profit policyholders may require a completely different shape of profit emergence than a shareholder. There seems little point in holding up the profit emergence on the conventional business without thinking very carefully about how the profit should emerge on the unit linked business. A shareholder will require a return similar to any other investment and will therefore require management to maximise the present value of the surplus.

The second reason is the limits that might be placed on further capital due to the source of the present capital. A private shareholder (or a collection of private shareholders) may have very limited additional resources to call on. Even if the investment is sound, will the resources be there? A large financial services group, on the other hand, may be prepared to make extra investments if the situation changes and an adequate return will be given. A mutual fund cannot call on any extra capital even if the business is a sound one.

4.4 Reinsurance

Reinsurance can assist product development for a unit linked life office in four main ways:

- (a) Technical assistance. The product development actuary is frequently too busy to check population statistics on, say, the incidence of heart attacks. Reinsurers will have economies of scale in collecting and analysing these statistics for all of their clients. Dread disease cover is obviously an area where the reinsurers have a major role to play in shaping the life company's deduction rates.

- (b) Financing reinsurance. The reinsurers can act as a major source of capital to a fast expanding life office as long as the gearing does not get too great. The loan capital available through financing treaties is the only loan capital that is of any use to life insurers. Any other debt would have to be shown as a liability on the balance sheet. Reinsurance mortgages future profits on policies already written. As the profits are not shown in the balance sheet, then neither is the debt.
- (c) Reducing risk. There are also the obvious benefits of being able to reduce the risk of either too many claims or of claims of too large a size. This can allow the product development actuary to develop a product with very large sums assured possible.
- (d) Solvency Margin Relief. Reinsurance can reduce the sum assured based solvency margin to 50% of its gross level and the reserve based solvency margin to 85% of its gross level. This may be an important consideration for a fast expanding office.

The support given to underwriters, claims managers and to the general management of the office can also be of obvious importance to the life office.

All of the above is obtainable at a price. The price is giving away profitable risk premium business to the reinsurer. The interaction between reinsurance, capital requirements, technical support and product development becomes clear when considering the case of a flexible whole life contract. For a small life office, it seems desirable from a technical support and capital point of view to have a 50% quota share treaty with a maximum retention of, say, £100,000. This, however, reduces the mortality profits in future years by half. A larger and better established office would instead have a surplus treaty with a very large retention (say half a million).

4.5 Return Requirements and Expansion Plans

If a product had a loss on day 1 of x and a profit exactly one year later of 120% of x , then the return would be 20% of capital employed. It is a fairly simple exercise to see that if business expanded by more than 20% then the profits on one generation of business would not be sufficient to cover the losses on the next. Extra capital would always be required to cover these losses as long as new business continued to expand at this speed. In this situation, it might be best to reduce the day 1 strains as far as possible or to substantially reduce the company's expansion plans.

This phenomenon was first commented on by Smart (reference 1) and can be simply stated as "the return on capital employed must be greater than the rate of expansion in the business to allow the office to generate its own capital".

We have already seen in section 3 that it is more difficult to control a salesforce or a marketing strategy than it is to change the costing structure of products. If a salesforce is artificially restrained to reduce the growth of new business, then it will tend to break up as, firstly, the managers get demoralised and then the salesmen become cynical. This applies as much to a salesforce of broker consultants or inspectors as to direct salesmen. If we cannot change the salesforce's rate of growth, then what can we do? The options are:

- (a) change the products that have the worst capital strain so as to reduce the strain even at the cost of long term profitability. The product could be said to be "improved" if the long term values are increased even if the short term surrender values are reduced. The point of changing products this way is that the return on capital would increase by the earlier emergence of profits and therefore a higher growth in sales could be sustained.
- (b) influence the salesforce in the types of contracts sold. There is no doubt that the commission payment and reward system can change the sales pattern even if it is to only a limited extent. If the salesforce is encouraged to sell plans with a higher return on capital employed, then, although individual products would not change, the overall return could increase to a significant extent.
- (c) exhort the salesforce to change sales patterns. In some very highly motivated salesforces, this could work if coupled with a limited form of (b). The message should be consistent to have any effect.
- (d) use reinsurance. This can be used if none of the above would have any impact. Products with low returns on capital employed may still generate adequate profits for a reinsurer who can then take the business into his account. Reinsurers are also, as we have seen, the prime suppliers of loan capital and with a "financing re" treaty can increase the ceding company's return on capital significantly.

In developing a product, the rate of expansion of the business could be a far greater consideration than more theoretical ones of shareholders' needs for risk returns. The major unit linked companies have all expanded at more

than 30% consistently within the recent past. The fear of running out of capital does concentrate one's mind on capital efficiency!

4.6 The Taxation Position of the Life Office

Tax influences product development considerably. If the life office was well established and heavily excess I, it would have no tax need to write heavily excess I policy types such as Income Bonds or single premium unit linked contracts. These contracts would, therefore, have to generate sufficient profits without any value given to the taxable investment return. In the case of income bonds, this would mean that the office would not be competitive.

If the office was heavily excess E, though, it would be willing to subsidise income bonds heavily so as to relieve some of its excess E. It would also want to charge flexi-whole life policies more than the netted value of their expenses to reflect the impact of extra sales here on the life company's finances.

4.7 The Valuation Actuary's Role in Product Development

The valuation actuary plays an important role in product development. Good communication is required between the valuation actuary and the product development actuary to allow either of them to do their jobs.

The first impact the valuation actuary has is as someone who monitors the results of the product development actuary's work. The product development actuary can very easily get trapped into thinking about future problems so much that he forgets the past. The valuation actuary should, as part of the valuation process, measure the profitability of the contracts presently on the books and should give these results to the product development actuary.

Similarly, the valuation actuary will gain useful information on the mix of business written, the age and sex mix of policyholders, the size of premiums and sums assured as well as the more traditional areas of mortality and lapse investigations. The results can often come as a surprise to the product development actuary.

The valuation actuary has an equally important impact on the financial costing of any new product. The valuation actuary is responsible for setting the valuation reserving method and therefore the emergence of profits. The great advantage of profit testing techniques is also, sometimes, its undoing. Because the method allows for the valuation method used, it graphically shows any strains of writing the business. This is fine if the reserving method provides prudent but realistic levels of reserves but if the reserves are set on an arbitrarily high level then the profit test will show

artificially high strains. It does not seem right to penalise the policyholder or to advise senior management not to write the policy type simply because the valuation method produces artificially high reserves!

An example of the above might be term assurance where a straight net premium method is used or even a fixed percentage of premiums rather than a gross premium or Zillmerized net premium method. These methods are frequently used because of convenience rather than any conscious strength of reserves. An argument used is "we have such a strong balance sheet, we don't need to weaken reserves". This "strength" can produce really strange results when entered into profit tests. It is obvious that the correct procedure is for the product development actuary to convince the valuation actuary of any problems caused by his method in profit emergence and in creating strains. If this does not work or the company continues to use arbitrary reserves, the product development actuary should use his judgement in setting more realistic reserving methods for the profit tests. Any decision made on the grounds of convenience should not be used as a reason why management should not know the true costs or profits of writing different types of business. If there are additional strains due to convenience, it is best handled as a section in the actuarial report on the product.

4.8 The Three Categories of Bases for Pricing Assumptions

There is an excellent paper written by Munich Re (reference 4) on the different types of pricing assumptions that can be used. Unfortunately, this paper is not available from the Institute.

There are three types of pricing assumption for each product for each life office:

- (i) The product is going to be the major part of sales. It therefore will have to earn most of the office's profit margins. As such, it should be considered on a stand alone or "self supporting" basis.
- (ii) The product is purely marginal to the life office's business. Most, if not all, of the life office's overheads are covered elsewhere and we need only consider the marginal impact of the product on the finances of the company.
- (iii) The product is going to be one of the major product lines but not the only one. Between these major product lines, the company will need to support its overheads. All the products will help support each other and that support should be recognised in pricing. This is called the sector basis of pricing.

An example is taxation. On the self-supporting basis, other products are ignored and excess E is not relieved. In the extreme of this case, excess E is not relieved over generations. The marginal basis ignores any excess E or I and assumes full and immediate tax payment and relief or assumes no tax payable or relievable. The sector basis assumes somewhere half-way between these two extremes. Partial relief is given to E and partial tax is charged to I.

What makes life assurance interesting is that, at any time, there will be a number of life offices all pricing their products on a different one of these three methods. Each will have a pricing advantage in one sector of the market.

We are now able to start discussing how to set the actuarial basis for a particular product.

Section 5 : The Elements of the Actuarial Basis

5.1 Introduction

We are now at the stage where we can put some flesh onto the bones. We have decided on the types of products to be sold and the way in which they are to be packaged. We can now set out the actuarial basis. As mentioned in the last subsection above, on some elements it will be necessary to consider the product range in total rather than in parts.

5.2 Demographic Elements of the Basis

The old adage about examining the experience of the office cannot be beaten here. The demographic elements do not vary according to whether the case is costed on a marginal or sector basis. For a new office, the actuary will have to rely on his knowledge of other companies in the same position and his "feel" for the new company. It is always best to try to get some data, though, and even early indications are better than none. The elements are:

- (a) Mortality and Morbidity. An actual versus expected analysis should be carried out for both of these elements. Mortality should be subdivided by age, sex, smoker status, product type and duration in force. Morbidity should be split by age, sex, deferment period and by occupation grouping. For morbidity, incidence rates should be investigated separately from recovery annuities. Any changes in distribution outlet should also be investigated. If the product is from a new line of business for the company, then help from the reinsurers may be essential.

For dread disease policies, the actuary should analyse the prepayments by age, sex, complaint covered and by duration of policy. Unfortunately, it will not be possible to analyse the number of prepayment claimants who die shortly after their claim as a result of their complaint.

Over the last few years, there has been a lot of comment about AIDS. There has been a general move in the market to tighten up underwriting and to change policy conditions. There has also been moves to increase the mortality charge for term assurance products especially for male lives. The actuary needs to be wary of the mortality assumption, in particular: reduce guarantees or charge an AIDS allowance for them; remove options if they could be dangerous; do not move too far away from other life companies in the mortality assumption to avoid anti-selection.

(b) Lapses. If one is using a very sensitive and "active" valuation technique such as profit-testing, then lapses need to be taken into account explicitly in the basis. The lapse experience of the sales outlet for this type of product should be investigated split by duration in force. Lapses may be sensitive to age, sex and race of policyholder (or more importantly salesman) but the three main splits of sales outlet, product and duration in force will explain most of the variation. The time of year that a policy was sold may also be important especially if there is a competition for salesmen who will need that one extra sale to win the video. There are three types of lapses for regular premium policies:

- (i) Policies cancelled from inception due to cooling off. The policyholder receives all of his premiums back and all of the commission is clawed back from the salesman. However, the life company has still suffered some expenses.
- (ii) Policies made paid up. There are still renewal expenses to be met as well as some claim expense for PUPing the case.
- (iii) Policies surrendered.

For single premium policies, the second option does not exist (as all cases are PUP anyway!) but a further "lapse" is present:

- (iv) Partial withdrawals. This reduces fund size, has some extra expenses but is frequently the reason why the policy is bought.

Normally, the profit of the product will be very sensitive to the lapse experience.

It is best to monitor all of the above regularly as part of the valuation process rather than needing special investigations every time a product is to be developed. The statistics in summarised usable form can be extremely useful to management in controlling the business.

5.3 The Financial Elements of the Basis - Investment Returns

The investment return elements cannot be investigated in the same way as the mortality or expense elements. The only possible way of setting a basis here is to set something reasonable but allow for a slight level of prudence. The actuary should be aware that a low interest rate is not necessarily more conservative than a high rate all the time. The rest of the product range of the office may be important in setting the assumptions for one new product.

- (a) Unit Growth. Unit linked policies give the return of the allocated units (after any management charges and tax charges) to the policy holder by unit growth. The aim for the life office is to immunise itself from the investment risk. A well designed product will have profits that are not very sensitive to changes in unit performance. If some element of profitability is linked to fund performance, then a reasonable but slightly prudent rate of, say, 10% gross is probably best as a base assumption.

The new practitioner has to be careful that a slightly low rate is actually conservative. Some negative cashflows may depend on unit values (death benefits for example if a multiple of unit value is used) and so a low rate could overstate profit!

The product development actuary should look at the profitability impact of a "random walk" in unit price around a stable growth rate. A contract where unit growth is fundamental to profit is single premium bonds where the profit margin is the management charge and the tax value of the investment return.

Products which are seemingly immunised against poor fund performance may be open to risk. An example is a product with a low overall premium against a high deduction for a guaranteed benefit. If the tail of the contract relies on the fund value to pay the deductions, then the contract is at risk from poor fund performance!

- (b) Interest on Sterling Reserves. The same type of considerations apply here. We have to be careful of the interaction of the two elements of the basis. The obvious starting point is that the rate of return will be slightly less than unit growth as the investment is more restricted. The sterling reserves will normally be invested in short dated gilts, deposits or fixed interest deposits.

If the sterling reserves are negative, then different considerations apply. Here we are saying that we have a sterling asset of a variable term that is pledged to other liabilities. Therefore, it should be charged a rate of return akin to that on variable term commercial mortgages.

- (c) Interest on Solvency Margin. Solvency margins are really an arbitrary sterling reserve. Therefore, if a stand alone pricing basis is used, there is an argument to say that the solvency margin will earn the same rate as the sterling reserve and will cause strains to the cashflow of the office as they are written.

However, if large amounts of capital are within the office's balance sheet, then there is an argument for using a marginal pricing basis and ignoring solvency margins.

The really key point is therefore the financing costs of the solvency margin and how this interacts with the return on capital employed required. If shareholders are happy with an investment trust element to their investment in the life office for the solvency margin then no consideration has to be given to solvency margins. If the life office was fast expanding with large capital strains and no source of further external capital, then the solvency margin should be carefully costed in. Reinsurance can play a key role here by reducing the solvency margin to one half as mentioned earlier.

5.4 The Financial Elements of the Basis - Expenses

This may seem simpler to deal with in a text-book fashion. It is true that an expense investigation can and should be undertaken. However, the product development actuary should ask him or herself some fairly fundamental questions:

- (a) How are we apportioning expenses? Per policy, per life assured or policyholder or by premium or commission? None of these are "right" but a combination of methods may be near the truth.
- (b) How are we dealing with the indirect marketing costs? These include the managing director's salary, the product development actuary's salary and most of the marketing department.
- (c) Would the same level of service be required if the fund was closed to new business? If the service is reduced, quite a high proportion of the renewal expense can be removed. Is this part of the renewal expenses a new business cost?
- (d) Why are we apportioning expenses the way we are? Are the reasons to do with the market, force of habit or practical convenience?

In the end, we need to arrive at a practical set of expense allowances that will maintain the product range's marketability and generate sufficient margins to cover the actual expenses in total. The obvious starting point is what we know:

- (a) Stamp Duty. This tax applied up until 1.1.1990 when it was abolished. This was fully allowed for at 0.05% of the guaranteed death benefit known to exist on the first day of the policy.

- (b) Sales expenses and commission. The commission paid to salesmen or to brokers is obviously best expressed in terms of a percentage of a commission measure. Every company will express its commission measure differently: LAUTRO, a commission base, unit of sale or volume. Now, it is relatively easy to allow for a particular override structure but the division's overhead expenses are more of a problem area.

If we take a marginal costing view, the overheads can effectively be ignored as they are being supported by the main lines of business. If we are considering a self-supporting position, we should determine the overheads of a sales outlet designed for this particular product on its own and give these expenses as the overhead costs. If we are to use a sector basis then the traditional methods apply. An expense analysis will show the proportion of expenses of the branch which are related to each line of business.

The best way to express expenses for the sales side is as a proportion of the commission measurement. A full allowance will be about 150% to 200% of the basic consultant's commission for a salesforce or about 125% to 175% of the broker's commission. The actuary should have a feel for the market place to see whether the expenses are reasonable. Every sales operation needs time to generate sufficient sales to become self-sufficient. However, a good sales manager will turn around a loss making operation far quicker than a poor sales manager (if he succeeds at all!). It is important to see whether a high expense margin is due to poor expense control or to poor sales performance. If the latter is true, the solution may not include cutting expenses!

For the life company itself, we should split the expenses into three areas:

- (c) Life administration expenses. These are the costs of getting a policy onto the books and maintaining the record when it is there. An expense investigation of the policy administration area can give very fruitful results here if the analysis is carried out carefully. A simple exercise is to time all of the tasks undertaken on each policy type and then to find a rate of each task per renewal, claim, or issue activity. These combined will give you a cost of the activities of renewal, claim or issue. The time should be loaded for rent, rates, direct computer costs, electricity and other overheads and for supervisors' time and effort. This loading can vary according to whether a marginal sector or self supporting basis is to be used. If the former is used, then only those expenses that are caused directly by the line of business are loaded. If

a sector basis is used, then the overheads of the admin area are shared out amongst the major product lines. A not uncommon result is to find that there is a minimum time and effort for each activity but that bigger cases require more effort.

- (d) Computer systems, administration systems. Modern unit linked offices would not be able to function without computer systems. This area has three different results for the three different bases.

For the self supporting case, the whole of the development costs of a computer system including the hardware should be costed into the plan. The marginal costing route would only charge the extra costs of any system enhancements necessary for this particular plan. The sector costing method would apportion the basic expenses of the system among the main policy types and would cost any enhancements directly to the relevant product. If the enhancements are expected to be used for other new products later then the additional costs may be watered down to reflect this.

In any case, the actuary will need to spread substantial development costs over the future life of the plan. It seems dangerous to assume a term for this purpose much longer than three years. The costs must be split between renewal processing, claims processing and new business. Within the market, it is normally assumed that all computer systems are new business costs. This may be too simplistic but it does follow the simple logic that if the company was not writing new business, it would not need new computer systems.

- (e) Support services. These include accounting, actuarial, senior management, the investment department and the marketing department. This can be quite a large proportion of the total expense bill. The division of expenses between product lines and also between new business, claims and renewals is very subjective here.

Let us take the latter split first. The accounting department could be considered to be all renewal work apart from a small element for each new policy or claim. Similarly, the investment department could be considered to be totally renewal. However, with the investment department we should query the size of the department if the office was closed to new business. A stripped down investment function through unit trusts and investment trusts with the least frequent unit pricing allowed by the policy conditions would be the norm for closed funds. Actuarial could be considered to be split equally between new business and renewals

but, again, a reduced service may be provided on a closed fund. Senior management and marketing could be considered to be totally new business orientated.

The split by product type will be completely subjective. On a marginal pricing method, it could be argued that none of these expenses (or very little of them) need be allocated to a particular product line. A self supporting method comes up with entirely the opposite conclusion. The sector method will allocate on some proportionate basis probably in relation to the other allowances except for specific adjustments if it is known that one product is especially expensive.

After carrying out all of the investigations above, the actuary has to arrive at a set of practical allowances to make within the pricing structure. The product development actuary must be careful to ensure that his charging basis does not cause the appointed actuary problems in his valuation basis. The "normal" expense allowances in the market are:

Stamp Duty (until 1990) fully allowed for as 0.05%

Initial Expenses:

Commission & sales :	% of a commission measure.
Life company :	% of the commission measure plus fixed per policy (broker office especially) plus % of premium (rarely used).

Renewal Expenses:

Commission & sales :	% of premium.
Life company :	fixed per policy plus % of premium plus % of funds under management (investment expenses only).

Claims Expenses:

Life Company :	% of claim payment and fixed per claim.
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The combination of these allowances actually used by any company will depend on the marketing stance of the company as much as anything else. Fixed expense allowances give good policy holder values for larger premiums but reduce the policy holder values for small premiums. A percentage of a commission measure allows the life company to target its expenses to the sales production achieved.

If a percentage of premium or a percentage of a commission measure is used, care must be taken in setting the minimum premium. One method that can be used is to set the minimum premium to cover the purely marginal expenses of administering one extra policy. The expense allowance is set so that

the expenses that we require to cover overall are covered by the average premium. The minimum premium affects the average so care has to be taken here.

5.5 The Financial Elements of the Actuarial Basis : Taxation

If the product development actuary made an error with this element of the basis, the life office could generate large losses. If the expense basis or demographic basis was set on poor data, the actuary has always got his experience to help him out.

The only satisfactory tool of the actuary for projecting the taxation position of the life company is the model office. This method combines profit tests in such a way as to model the whole portfolio of business and therefore shows the taxation position unfolding from year to year. The important asset of model office techniques (as with all profit test based techniques) is the ability to answer "what if" questions. The actuary needs to be careful of his assumptions. The important assumptions for the taxation position are mix of business, rate of growth of new business, the realised taxable investment returns and the expenses of the business.

After 1.1.90, a new taxation regime starts for life offices. The Inland Revenue has set in progress a number of reforms. The key items are:

- (1) Acquisition expenses (which is defined to include renewal commission) will be spread over the seven tax years after the expense was incurred in the taxation accounts. There is a transitional period whereby:

for 1990 business: 5/7ths will be relieved in 1990 and 1/7th in 1991 and 1992,

for 1991 business: 4/7ths will be relieved in 1991, 1/7th in 1992, 1993 and 1994

for 1992 business: 3/7ths relieved in 1992, 1/7th in each of 1993, 1994, 1995, 1996

for 1993 business: 2/7ths relieved in 1993, 1/7th in 1994, 1995, 1996, 1997

- (2) Excess expenses from the life fund will not be available for relief against Pensions Business Fund profits. The expenses of pensions business will be split off and allowed against the PBF profits directly. Separate accounting funds may be needed for pensions business from life business to properly split the investment return. Any excess E carried forward from 1989 can be relieved against future PBF profits and/or future excess I.

- (3) All life fund taxation is carried out at one rate which is a mixture of 35% (the Corporate Tax Rate) and 25% (the individuals Basic Rate). The mixture is supposed to approximate to taxing the shareholder's profits of the life business fund at 35% and the policyholder's investment return at 25% although there seems to be some technical problem with the formulae chosen.
- (4) Stamp duty on life contracts is abolished.
- (5) The revenue wish to tax the gains that have been sheltered up to now in "captive" unit trusts. This will be done by assuming that the whole portfolio of unit trusts is sold at each tax year end but then spreading the resulting CGT on "unrealised gains" over a seven year period. Realised gains are still going to be taxed as they occur with an offset for the tax paid on unrealised gains.

The immediate problem for product development actuaries is the deferment of tax relief on acquisition expenses. Although the transitional period could be allowed for directly, it would imply recosting the plans each year. The correct answer depends on the length of time that the product will be sold for, the marketing position of the company and what its competitors will be doing.

In the past, the tax relief could all be generated in the month of issue for the purposes of profit testing (although all product development actuaries thought this treatment a little simplistic). Now, it should be spread over the tax relief period. This means that if the profit test is carried out in months, $1/84$ th of the acquisition expenses is spread over each of the next 84 months for the "ultimate" seven year spread.

The profits of pension policies are fully taxable at 35% if there is insufficient shareholders franked investment income to offset the Case VI profits and 25% if it can be offset. This should be allowed for in the relevant profit-tests.

Some offices are in a position whereby their investment returns exceed their tax allowable expenses and they are therefore tax paying. These are "excess I" offices.

The majority of unit linked life offices are rapidly expanding their new business. They are therefore likely to be "excess E". If a life office has tax allowable expenses exceeding its taxable investment returns, it will not be claiming relief on all of its expenses which means that the office will be making a loss of this lost relief. The expense relief is carried forward until it can be relieved by "excess I". For some offices, this carry forward of excess E can be treated as an asset as it will be relieved at some

foreseeable time. For other companies, though, this asset has a nebulous value as the company is likely to be excess E for some considerable time.

The three bases provide different ways of allowing for taxation. The self supporting basis will only relieve the expenses of the product if there is sufficient taxable investment income available from that product. This can be extended to consider each generation separately and to insist that expenses are only relieved when that generation has generated sufficient taxable investment return.

For a marginal basis, two approaches are possible. The first does not differentiate between generations and looks at the overall impact by that type of product on the taxation bill of the office. If the office is excess E, then no tax is payable or relievable on the policies although the policyholder may pay tax on their fund or receive relief through competitive expense margins. A heavily excess I policy (single premium bond or income bond for example) will have a large tax value.

Similarly, for an excess I office, all of the expenses are relieved and all of the investment income is taxed. This is referred to as a "fully net" taxation assumption in the actuarial literature. The rate of tax paid or relieved used to depend upon the mix of types of investment income but should now be 25% for all policyholder returns.

If the office is excess E, the second marginal pricing method differentiates between generations by looking at the tax impact of this generation of business but assumes no further new business will be written. Any further new business will be costed using a similar method allowing for the circumstances at that time. Expenses are relieved when this generation and previous generations and/or type of business becomes excess I. This is known as the "time delay" method. An example can help. A company's existing business and this year's new business becomes excess I in 2 years and fully recovers the expense relief over the next 3 years giving an average time delay of 3 1/2 years. The rates of tax relief to use is the normal rate discounted for 3 1/2 years.

Sector pricing is my personal preferred approach. The taxation position is projected by means of a model office (as with all the approaches above) and the existing portfolio and new business is divided into major categories of business. These categories are chosen for their taxation profile. The interaction between these categories is then monitored.

If the office is excess E, the actuary could view the tax calculation as either of two extremes:

- (1) All of the investment return is fully taxable, but only a proportion of the expenses are relieved.
- (2) None of the investment return is taxed but, equally, none of the expenses are relieved.

or a mixture of the two representing an equitable share of profit and losses between the categories. The choice is purely subjective. An example can help.

Let us assume that we have a life company with an existing fund which has a taxable investment return of 30 and expenses of 10. Furthermore, let us assume that the fund is writing regular premium policies with expense value of 100 and investment return of 10 and single premium policies with investment return of 20 and expenses of 2. The following table summarises this position:

Type	I	E	I-E	Tax assuming Fully net I-E at 25%
Existing	30	10	+20	+ 5.0
Regular	10	100	-90	-22.5
Single	20	2	+18	+ 4.5
	--	---	---	-----
	60	112	-52	-13.0

Now if we examine all of the pricing bases and show the difference from the fully net taxation position:

Type	I-E	Tax Net	Self Supporting Tax Diff	Fully Gross Tax Diff	Proportion of E netted Tax Diff
Existing	+20	+ 5.0	+5.0	0	+5.0
Regular	-90	-22.5	0	+22.5	-9.5
Single	+18	+ 4.5	+4.5	0	+4.5
	-----	-----	-----	-----	-----
	-52.0	-13.0	9.5	+22.5	0

The proportions of E netted tax column shows the result of relieving all of the E in the single premium business and the existing fund but only 38/90ths of the excess E in the regular premium cases. Both this method and the fully gross method arrive at the right overall tax position but they share the profits and losses amongst the two extreme groups. If we chose an arbitrary expense relief proportion of 20% (say) then, to equate the overall tax payment to nil, we need to tax the income at $90/38 \times 0.2 = 47.368\%$ say.

The taxation amount would be, on a variety of arbitrary expense relief proportions:

Tax Relief E	0	10%	15%	20%	25%	30%	35%	42.222%
Tax Charge I	0	23.684%	35.526%	47.368%	59.211%	71.053%	82.895%	100%
Tax Existing	0	+1.1842	+1.77632	+2.36842	+2.96053	+3.55263	+4.14475	+5.0
Mode Regular	0	-2.25	-3.375	-4.50000	-5.62500	-6.75	-7.875	-9.5
on Single	0	+1.0658	+1.59868	+2.13158	+2.66447	+3.19739	+3.7308	+4.5
Type	-	-----	-----	-----	-----	-----	-----	-----
		0 0	0	0	0	0	0	0

All showing varying degrees of profit or loss for each class from the fully net norm. The choice of the tax relief proportion on E or the taxable charge on I is purely arbitrary and must be chosen by the actuary by his knowledge of the market. The important point to note is that, when one is chosen, the other is fixed. The life company must be consistent in its pricing.

A similar position arises for an excess I life office. Here, the two extremes are fully net or all expenses being gross whilst only a proportion of taxable investment return pays tax. If the company had a new table showing:

	I	E	I-E	Fully net. Tax
Existing	100	10	+90	+22.5
Regular	20	80	-60	-15.0
Single	40	2	+38	+9.5
	---	--	---	-----
	160	92	+68	+17.0

The other extreme from the fully net position would be when we assumed that only 68/128ths = 53.125% of the excess I was taxed. The choice between these two extremes depends, again, on the market and the actuary's judgement.

The taxable amounts would be on a variety of arbitrary proportions for:

Tax Charge I	53.125%	65%	75%	90%	100%
Tax Relief E	0	25.333%	46.667%	78.667%	100%
Tax Mode Existing	+11.95	+14.625	+16.875	+20.250	+22.5
on Type Regular	0	- 3.800	- 7.000	-11.800	-15.0
Single	+ 5.05	+ 6.175	+ 7.125	+ 8.550	+ 9.5
	-----	-----	-----	-----	-----
	+17.00	+17.000	+17.000	+17.000	+17.0

A "nasty" of being excess E is the possibility of incurring a Notional Case 1 tax charge. This is a charge on profits of the life business and the amount of profit charged is added to the excess E carried forward to be relieved in the

future. The effective rate of tax is Corporation Tax Rate/(1 - Corporate Tax Rate) which at present = $0.35/0.65 = 53.85\%$ as life profits are deemed to be net of tax and needing to be grossed up by the Revenue! If the life company is in an excess E position, then this NC1 tax should be allowed for in the profit tests thus increasing the costs to the life company and increasing the costs for the consumer or reducing the available profits to the company.

5.6 The Financial Elements of the Actuarial Basis: Profit

The profit allowance is obviously dependent on the source and cost of capital. If capital is relatively cheap and plentiful, then the cost of the capital is unlikely to demand a large profit margin on the products. If the office is expanding rapidly on a small and restricted capital base, then the return on capital employed should be higher than the rate of growth in new business as we showed in Section 4. Again, the office with cheap and plentiful capital should ask itself whether it needs that level of solvency and how it can expand sales to use it properly.

The profit margin required is also dependent upon the type of pricing basis used. If a marginal pricing basis is chosen, then the aim will be to arrive at just a positive level of profit as the cost of capital is being financed on other lines of business.

If a self supporting basis is used, exactly the opposite result is achieved. All of the capital must be supported by this product and this product alone. Therefore, apart from investment return on the shareholder's capital (the investment trust type of return) all of the profit must be generated by this product.

A sector basis will arrive at a point of compromise between the two extremes. The profit of the company has to be earned over the whole product range on which this is one important element. The amount of profit that is built into this plan may be in proportion to the number of cases or the amount of commission but may also be on a split that is to reflect the marketing position for each of the product lines rather than any aim of management. The important point is to aim to maximise the total profit of the company and this can require that some products are written at less profit or even at no profit. For example, a salesforce based company may need a product to complete its range even though it is difficult to make the product profitable. Some products, on the other hand, may have high profitability within the market place due to insensitivity of demand to price and the company should exploit this.

The market place is, obviously, an important consideration. The new product will have to be justified to the sales outlet in terms of competitiveness, especially for a broker

based office. The consumer is, at present, not educated about the costs of policies and competitors' products. The sales outlet very frequently is!

It must be remembered that, if a policy type is making an overall loss on a marginal basis, then the appointed actuary should set up reserves for policies that are not yet sold! This tends to act as a break on the competitive nature of the business!

In the market place, it is common for the major unit linked companies to be setting a margin of 30% to 45% of its main commission measure for its major product lines when the profits are discounted at 15% p.a. This roughly equates on most medium strain products to a return on capital employed of 35%.

5.7 Sales Elements of the Actuarial Basis

There are five elements of the actuarial basis that are related to the sales experience. These are:

- (i) The distribution of cases by size of premium and by size of sum assured.
- (ii) The total amount of sales. This should be calendarised and there should be an estimate of growth of sales by number and by size of case.
- (iii) The distribution of sales by sales outlet.
- (iv) The distribution of sales by age, sex and occupational group of policy-holder or life assured.
- (v) The length of time that the product will continue to be sold after the launch of the new product (sales life) and the delay between costing the plan and launching the plan.

These assumptions are not only important in costing the new product, but are also important in testing the viability of the product against development costs.

There are three techniques that can be used to help the actuary set these elements of the basis. He can look at the equivalent product already being sold and alter the picture shown by experience to take account of differences in the two products. Secondly, he could discuss the product with senior sales and marketing management to find their views early on. This method can often give very useful answers but the actuary should beware of the subjectivity of the sales manager. The actuary must be careful in the questions asked. Thirdly, the actuary can gain data from other life companies selling a similar product. This technique has the disadvantage that all distribution outlets are slightly dif-

ferent in sales technique and this can produce quite different results. A mixture of all three with a lot of common-sense is probably the correct approach.

The sales life of the product is unlikely to be greater than four or five years. Products always need to be replaced as technology improves and, also, to give the impression of activity by the life company. Some products, though, have lasted, with minor alterations, for over ten years. The delay period very often depends on administration systems.

5.8 Actuarial Reserves

The profit-tests should allow for the actuarial reserve formulae and method. This was discussed in section 4. The important point to remember is to involve the valuation actuary early on in the new product and its design.

Section 6 : The Actuarial Report, Administration and Monitoring the Result

6.1 The Actuarial Report

At the end of any product's development, it is essential that the actuary report to senior management. The report has 4 functions to carry out:

- (a) a statement of the assumptions that need to be fulfilled in order for the product to be profitable.
- (b) a statement of the extent of that profitability and the implications of the product on the financing of the life company.
- (c) a statement of the sensitivity of the product to changes in experience.
- (d) a recording of these statements for "posterity".

Although there are many ways to present this information, I believe the most sensible approach is to design the report to have:

- (I) an introductory section stating why the product was designed with a generic definition of the product and the main conclusions of the report.
- (II) a section describing the contractual details including any options and the charging structure.
- (III) a section giving the actuarial basis and why it was chosen.
- (IV) a short section giving the results of the main profit test and the "central" conclusions.
- (V) a sensitivity section showing the impact of changing each assumption in turn to a reasonable but extreme position (i.e. inflation increasing from 5% - 8% up to 14% - 16%.
- (VI) a section showing whether the development costs are repaid.
- (VII) if the product is going to impact other areas of the product range, a section showing how and why this impact is occurring.
- (VIII) a concluding section restating the main conclusions of the report.

6.2 Administration

We are now leaving the world of what is desirable and entering the world of what is possible. Administration systems are frequently the real bug bear of the product development actuary.

A new product, normally, will have to be administered by the main life administration system and will therefore have to fit into the methods used on other plans. Programming changes to systems always seem to take far longer than one may feel is necessary. A minor change can take between one month in a reasonably efficient organisation to six months in a hidebound company. Major changes could take years.

The ideal, then, is to have a main computer system that is flexible enough to cope with any style of product by purely parameter changes (keyed into a "plan structure file"). However, any system that is this flexible would cost too much to develop and take far too long to deliver so that, inevitably, it would be out of date by the time it was working.

Most companies achieve a compromise whereby the products are, to some extent, fitted around the system rather like a child forcing his toys into the wrong shaped box.

The golden rules are fairly simple: make sure administration and data processing have plenty of warning; get DP professionals to make constructive suggestions on plan design; try to keep all of your products in the same style of design which then allows you to share development costs; question DP if the costs or timescales seem unreasonable as it may be a problem that can be solved easily.

Many companies employ a professional project manager to run product development. The computer systems can frequently be the largest cost of the development and, here, people's effort needs to be co-ordinated.

6.3 Monitoring the Result

It is not enough just to design new plans and leave them alone. The product development actuary should always try to see the outcome of his work and check whether he can improve the product. The person who can be of most assistance is, of course, the valuation actuary but other areas of the company should be involved in the review. The following are the main points that need consideration:

- (i) The experience of the actuarial basis. Average age, premium size and benefit size can be found fairly early on in the life of the plan. Mortality or morbidity will take a few years to develop and lapses will take a few months to a

year to emerge. However, mortality, morbidity and lapses should be monitored from the first day of selling the plan as it helps systems to be developed and it allows future products to have an experience to compare their own to for quick early results. The valuation actuary will be the main source of information here.

- (ii) The administration of the plan. Problems here need tackling early on. A committee set up with dp, accounts, product development and (most importantly) administration representation can deal with most of the problems.
- (iii) The sales view of the product. The only sales view that really counts is whether the policy is being successfully sold. Any reason given why a product is not being sold is likely to be woolly in the extreme and could frequently be incorrect. However, any reason given is useful as it helps to build up an understanding of the sales process or the prejudices and biases of the sales people.

Over the short term, this monitoring of the result can frequently seem to waste time. However, over the longer term, it can repay itself by giving the product development actuary a wealth of experience on which to draw.

Section 7 : The Future : Actuaries and Product Development

It is customary to end any paper of this sort with a conclusion. The only conclusion that I feel possible is that product development is here to stay. As technology, sales channels and client needs change so life companies need new products. Now the industry has entered a period of very violent change on all of these items. The companies that succeed are not necessarily going to be the ones with the cleverest product design. But they are going to be companies that can exploit their marketing advantage and one of their tools is going to be product design.

Although there are other professions that can carry out a large part of the product development task, there are none who can carry out the fundamental task of pricing products with a mixture of risk and time value of money. These are the core disciplines of actuarial science.

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