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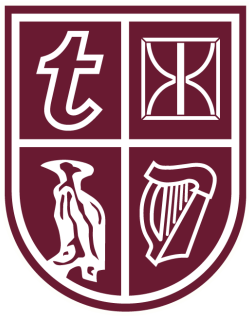

IRISH CRITICAL ILLNESS EXPERIENCE 2001-2003

Report of the Critical Illness Working Party

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1 Executive Summary

The original Working Party was formed by the Life Committee of the Society of Actuaries in Ireland in May 2000. The purpose of the party was to consider how to investigate critical illness experience in Ireland and they presented their findings in November 2003 on the experience from 1995 to 2000 inclusive under the following terms of reference:

- Compare the critical illness experience of insurance offices selling within the Republic of Ireland with relevant published tables and analyse the data for trends.
- Determine whether the production of an Irish insured lives critical illness table is appropriate and if so, produce one.
- Survey current reserving bases for critical illness of Irish insurers and make recommendations.

This report provides an update on the experience between 2001 and 2003 inclusive under the same terms of reference.

1.1 Analysis of Experience

We collected data on insured lives and claims settled between 2001 and 2003 and also had access to the 1995-2000 data. We closely followed the methodology of the original working party and engaged the CMI in the UK to provide data handling and calculation support on a consultancy basis.

The CMI identified one significant data issue which we now believe existed in the 1995-2000 data so our best estimate is that the reported All Irish Offices claim rates for 1995-2000 were overstated by approximately 2.5%.

On analysis of the claims data confirmed that Incurred But Not Reported (IBNR) and Incurred But Not Settled (IBNS) claims are a significant feature of critical illness products. In analysing the experience, we estimated the total claims diagnosed during the period using the IBNS features of all claims settled during 1995-2003.

We estimate that 72% of claims diagnosed during a calendar year are reported by year end while 50% are settled. 87% of claims are settled by the end of the next calendar year but one cancer claim took over seven years to be settled.

When compared to the 1995-2000 report it is clear there has been a marked increase in reporting and settlement delays and the average delay from diagnosis to settlement has increased by two months.

At the product level the observed experience on a lives basis, after we have allowed for the IBNS, are as follows:

2001-2003	Males			Females		
CIBT 93	**Non-smoker**	**Smoker**	**All**	**Non-smoker**	**Smoker**	**All**
Accelerated	40%	87%	51%	52%	77%	58%
Stand Alone	57%	93%	65%	69%	87%	72%

The corresponding table from the previous report is shown below:

1995-2000	Males			Females		
CIBT 93	**Non-smoker**	**Smoker**	**All**	**Non-smoker**	**Smoker**	**All**
Accelerated	46%	91%	57%	52%	72%	57%
Stand Alone	55%	80%	60%	57%	83%	64%

Overall it appears that Accelerated business is broadly at the same levels as for the previous experience with some improvements for Males. Stand Alone by contrast shows marked disimprovement with perhaps a 10% overall worsening for both sexes.

It is evident from the exposure data that the rapid rate of growth in in force CI business over the 1990's has now stabilised to about 6 to 7% per annum. Overall, the claims experience is still developing and with only 1,772 claims paid within the period 1995 – 2000 and 1,961 claims paid within the period 2001 – 2003, this study can only give early indications of the ultimate levels that are likely. In particular, claims rates clearly increase with age and there are relatively low exposures at ages above 50. It is the experience in these age groups that could potentially have the biggest impact on the ultimate profitability of the product and it will be many years before we have any creditable experience at these ages.

As expected, smokers experience heavier claims ratios than non-smokers and this differential appears to increase with age. We also noted that policies sold to smokers are experiencing higher lapse rates and that the proportion of new business sold to smokers continues to decline.

It is difficult to distinguish any trends, or give a definite view on analysis by cause of claim. As soon as the data is broken down, the credibility that can be placed on the results falls dramatically. For females the key illness is cancer, which accounted for three-quarters of the female non-death claims in the investigation. For males cancer is also important, as is heart attack and these two causes account for about two thirds of male non-death claims.

Looking at the results on an individual office by office basis, no clear patterns emerged where any office displayed significantly different results from the rest. The main reason for this remains the relatively small size of most offices' portfolios, which means that the variability of results is simply too large to enable any real differences in underlying experience to emerge.

In the 1995-2000 results it appeared that direct sales had higher experience than bancassurers and IFAs. When we grouped the 2001-2003 experience by distribution channel we saw a different pattern with now no clear evidence of direct sales having worse experience than the other two channels.

The Continuous Mortality Investigation Bureau (CMI) has investigated UK experience for the years 1999-2002. Overall the results would suggest that UK experience is lighter than Irish experience. This might reflect its relative immaturity but it is important to note that the impact of IBNS for both investigations will also be different. UK experience may be significantly lighter, up to 10% lighter, if policies with sums insured under £10,000 are excluded. Care must be taken when drawing this conclusion due to the nature of the underlying study, which is all we could compare, additional factors determined by the underlying mix of business will influence the result. Areas where the Irish experience appears high in comparison with the UK are Female Heart Attack and Stroke claims and CABG claims on smokers, which could be indicative of a different philosophy in the respective health services.

1.2 Critical Illness Table

We agreed with the conclusion of the previous working party that at this stage there is insufficient data to construct a table that would prove to be a better shape than IC94 or CIBT93. A lack of data will continue to be a real issue for the Irish investigation for many years to come and means it will be some considerable time before an Irish insured lives experience table can be produced.

There has been some significant work ongoing in the UK using their latest insured experience and population medical data to fit new tables. An updated version of CIBT93, known as CIBT02, was presented to the Staple Inn Actuarial Society in December 2006 in the draft paper “Exploring the Critical Path”. In addition, the recent report “A Critical Table” describes the production and verification of a new insured lives critical illness table (CIIT00) for the UK market

The working party believes that the most practical option to produce an Irish insured lives table would be for a future working party to take the then latest UK tables and produce an adjustment factor that reflects the experience differences between Ireland and the UK.

1.3 Reserving Recommendation

When reserving for critical illness we recommend that all offices carefully examine their own experience and consider allowing:

- a margin for variation of 25% to 35% over best estimate
- an allowance for deterioration of 1% to 3% per annum for Accelerated
- an allowance for deterioration of 2% to 4% per annum for Stand Alone
- an allowance for IBNS deterioration factor in the range of 0.5% to 1.5% per annum or an IBNR deterioration factor in the range of 0% to 0.25% per annum if the office is already reserving explicitly for notified claims.

1.4 What Next

This paper provides a further marker against which to measure experience and a guide to pricing/profitability, allowing future work to build on this and develop the study of trends and other features as the credibility of the data grows. Whilst the inferences that can be made are limited, we think this has been a valuable exercise and recommend that work should continue if the co-operation of and funding by offices can be secured.

We are conscious that it has taken over 3 years to gather, analyse and report on the 2001-2003 experience. We suggest that the Life Committee should consider the merits of a 'light' approach to gathering the most recent experience which would be designed to give a very quick annual turnaround of certain key indicators annually. This could include comparing notified claims in any one year against one standard table, gathering summary data on reporting and settlement delays on all claims and a persistency measure for in-force portfolios. The use of this 'light' approach would not preclude repeating the more detailed investigation on a less regular basis, particularly if the 'light' approach had identified any significant change in underlying experience.

2 How The Group Operated

2.1 Introduction

This paper is a presentation of the work of the Critical Illness Working Party. The original Working Party was formed by the Life Committee of the Society of Actuaries in Ireland in May 2000. The purpose of the party was to consider how to investigate critical illness experience in Ireland and they presented their findings in November 2003 on the experience from 1995 to 2000 inclusive under the following terms of reference:

- Compare the critical illness experience of insurance offices selling within the Republic of Ireland with relevant published tables and analyse the data for trends.
- Determine whether the production of an Irish insured lives critical illness table is appropriate and if so, produce one.
- Survey current reserving bases for critical illness of Irish insurers and make recommendations.

This report provides an update on the experience between 2001 and 2003 inclusive under the same terms of reference. The current Working Party members are:

- Anthony Brennan, Chairman
- Tony Jeffery
- Brendan McCarthy
- Colin Murray
- Brenda Papillon
- Hendri Solomon

We closely followed the methodology of the previous working party and engaged the CMI in the UK to provide data handling and calculation support on a consultancy basis and the operation of this is described further in Section 3. We also followed the previous model by approaching a number of offices to fund this work.

The outcome is the reported results on 2001 - 2003 experience which were circulated to participating offices in late 2006 and this paper which analyses those results.

2.2 Role of Data Liaison Officer

When the original working party started the work on gathering the 1995-2000 data they were expecting to have to resolve detailed data integrity issues with individual offices as they were effectively starting from a blank piece of paper. In order to protect the integrity of each individual office's data, they appointed a Data Liaison Officer who had no commercial interest in the data.

The Data Liaison Officer took on the following duties:

- Data follow up work with each individual office to ensure both timely and accurate data.
- Initial contact point for individual office queries.
- Receipt from the CMI of any analysis of an individual office nature
- Checking role to ensure that other members of the Working Party only had access to All Offices data, or subsets of the data sufficiently disguised to protect the data of any individual office.
- Production of any analysis independently of other Working Party members into the difference between individual offices.

We were able to make full use of the existing procedures and data validation so we were able to proceed without filling this role separately because the UK CMI kindly offered to take on the Data Liaison role for this investigation. We would like to thank the CMI team for taking on this role and, in particular, for the fact that they then went on to voluntarily produce initial drafts of Chapters 6 & 7 which was far above and beyond the data processing role they had taken on in the previous investigation.

2.3 How to use our paper

Section 3 describes the investigation performed by the CMI on the data submitted by the offices. It discusses the methodology used to analyse the critical illness data and highlights the advantages and drawbacks of the chosen option. A natural consequence of the chosen methodology is that the results are distorted by a lack of correspondence between claims and exposure. The claims are also understated to the extent that claims incurred during the investigation period but not yet settled are not included.

Section 4 describes the analysis of the Incurred But Not Settled (IBNS) claims for 2001-2003 and for the combined data from 1995-2003. It also describes the adjustments made to the reported results to estimate actual overall claims incurred experience.

Section 5 contains the main analysis of the All Irish Offices data from the investigation period 2001 - 2003.

Section 6 analyses the data for trends by office.

Section 7 compares the Irish results for 2001-2003 to the UK results for the years 1999 - 2002.

Section 8 outlines some of the issues to consider when using the results.

Section 9 contains a survey of the valuation bases of the offices included in the investigation. In particular, it also contains our future reserving suggestions.

Section 10 includes our recommendations on how to proceed with future investigations.

Appendices 1 to 4 include extra information as referred to in the various sections of the paper.

3 Collection and analysis of data for the CMI investigation

3.1 Introduction

The original Working party decided that it would be important to ensure that the Society would have access to regular data analysis, and at an early stage realised that it would be difficult for the Society to commit to a regular analysis without third party assistance.

The Working Party approached the CMI in the UK, as they were known to be investigating the UK experience. The CMI expressed an interest in offering data handling and calculation support on a consultancy basis.

The original data processing and development of the necessary systems were carried out in parallel with the CMI's own UK critical illness investigation. The data requirements were agreed to be essentially the same for both investigations with the intention that a common analysis methodology could be used for both investigations. Therefore the same systems could be employed for validating data and analysing the underlying experience. The validation proved to be a key phase of the previous study and is equally applicable for the latest study.

The validation and analysis systems were developed in light of the features observed in both sets of data and, in particular, the significant delays observed in many claims between diagnosis and settlement led to a revision of the experience analysis methodology. The methodology revision also led to, in the case of the 1995-2003 Irish investigation, a request for resubmission of claims data to capture the dates of diagnosis where this had not previously been given and the production of a detailed data coding code that was circulated to all participating companies when gathering data for the latest Irish investigation.

3.2 The investigation

All offices that had participated in the 1995-2000 investigation were invited to submit data. Unfortunately two of these offices were unable to provide data for this investigation. We decided to proceed as these two offices represented less than 5% of the total exposure in the 1995-2000 data so we believe this latest investigation should still give a good indication of experience for the Irish market as a whole. In addition, other offices that did not have data and all of the reinsurers currently working in Ireland were also invited to financially support the investigation.

Investigations were carried out on the following policy types:

Stand Alone	where benefit is paid on diagnosis of a critical illness
Full Acceleration	where benefit is payable on the diagnosis of a critical illness or death, whichever occurs first

The investigation analysed the experience of these policy types by sex, smoker status, duration and broad age group. Full Acceleration cases were analysed based on both critical illness (including TPD) claims only and on all claims (including mortality). The method of analysis involved compared actual claims to expected claims based on a standard table. Each analysis was carried out on both a "lives" basis and an "amounts" basis.

All of the comparisons in the main body of the report were done against the CIBT93 base table. CIBT93, was constructed by the Critical Illness Healthcare Study Group and published in the paper "A Critical Review" presented to the Staple Inn Actuarial Society on 14 March 2000. The table was developed from UK population data in respect of 1993 and is not adjusted in any way to estimate an insured experience, although the paper did suggest adjustments for insured experience.

A less detailed comparison was carried out against the IC94 table developed in the paper "Reserving for Critical Illness Guarantees" presented to the Society of Actuaries in Ireland in November 1994 and these results are only shown in Appendix 2. IC94 was largely derived from UK population data but adjusted for Irish population cause of death information. Further adjustments were then made to attempt to move from a population basis to an insured lives basis.

Both tables are aggregate tables, (i.e. no split between smoker and non-smoker).

We used CIBT93 as our primary reference table because (contrary to the numbering) CIBT93 is the more recent table. The CMI analyses use an initial exposed to risk and an age definition of age nearest. This means that lives are exposed from age exact x–½ to x+½. Since the rate q applies as at the start of that year of age, either qx-½ (if the table is based on exact age) or qx (if the table is based on age nearest) need to be used.

The paper "A Critical Review" stated that the age definition of the CIBT93 table was age exact, which is the age definition of most standard actuarial tables. However, the same paper also contained the results of an investigation into the claims experience in 1991-1997 and in producing the A/E figures in the paper it appears that CIBT93 was used as if the rates were age nearest. After consulting with the authors, the CMI has used the table consistently with the latter interpretation, i.e. assuming the rates are age nearest, in the results it has released to date which include both Irish investigations.

Further analyses were also provided by main causes of claim and by sales channel, both using the CIBT93 comparison basis.

Each office that submitted data received its own office's results for each individual year from 2001 to 2003 as well as results for the combined years 2001 -2003. Each office that supported the investigation received the all office results for the same time periods.

3.3 Data requirements

Data required for each investigation year (n) were:

- In force (i.e. on risk for benefits) on 1 January in year n.
- Claims in year n.
- In force on 1 January in year n + 1.

Offices were requested that claims submitted in respect of a year should be based, where possible, on date of settlement. If this was not known, date of admission, date of notification or date of diagnosis were used to define whether a claim falls in the year. In any event, offices were requested to be consistent from one year to the next, such that no valid claim would be either missed or double-counted.

In practice, most offices did not supply all four of the dates required in respect of a claim. In these circumstances, they were requested to supply the dates they could and otherwise leave fields blank. The participating Irish offices were able to supply the date of settlement and date of diagnosis for the vast majority of claims which significantly reduced the impact of date estimation compared to the UK investigations.

Offices were also asked to supply cause of claim as the critical illness event under which the claim was admitted. Offices were additionally requested to specify the site of any cancer. Where cause was unknown, this should be stated.

In addition, the following requirements applied to data submitted:

Only directly written business should be included (i.e. no accepted reinsurance).

The investigation covers cases written on standard premium rates only. Rated cases should be excluded.

Multiple policies should be treated as a single policy where they arise from one underwriting process (e.g. clustered policies for tax purposes, automatic increments, etc.). If new underwriting is involved, a separate record should be submitted for the new policy element.

3.4 Data Validation

Submitted data was subject to a computerised checking process that generated error reports on three levels.

- Illegal coding (i.e. field codings which are not recognised as a valid code, illogical claim dates e.g. settlement before diagnosis).
- Suspect field values which are considered unlikely to be valid (e.g. very high / very low sums insured, very extreme ages, etc.)
- Warning field values which may be invalid and should be checked (generally less extreme values than “suspects”).

The checks covered data sets in isolation and also compared data sets (claims vs. in-force). A report showing the results of the checking process was sent to the contributing office that resulted in queries being raised with offices and some data re-submissions. Most of the queries and re-submissions arose due to errors in individual policy in force and claim records picked up in the validation process. However, as all the offices had participated in the previous investigation and had the benefit of the detailed coding guide there were a relatively small number of such data errors in this latest investigation. While the checks helped to clean up the data to a large extent, they cannot be regarded as foolproof. For example, they could not detect if claims records have been omitted from the data.

The CMI identified one significant data issue which, when corrected, reduced the All Irish Offices claim rates for 2001-3 by 2.5%. One office had inadvertently supplied just one record per policy on each joint life case in the in force data used to generate exposure, where there should have been two and both lives had contributed to the claims data. We believe the same data issue existed in the 1995-2000 data so our best estimate is that the reported All Irish Offices claim rates for 1995-2000 were overstated by approximately 2.5%. As the market convention for setting up joint life policies appears to be to record the male life as the first life, the exposure would have been particularly under-stated for females.

The CMI also found a more minor data issue with the classification of claims by cause for one office. For example, a significant number of claims were coded as "Heart – major organ transplant" with a seemingly low % of Heart Attack claims. As the office was unable to re-categorise the claims in the time available we followed the approach of the UK investigation and designated all claims for that office as "Unknown". We believe this particular data issue is confined to the latest investigation only.

3.5 Analysis Methodology

The current investigation has closely followed the methodology used for the 1995-2000 investigation so this section 3.5 is a virtually exact copy of Section 3.5 in the previous report.

3.5.1 Exposure calculation

The in-force data collected, being a list of in-force policies at each year-end, does not permit an exact method of exposure calculation. A census method was therefore used.

For all in-force data at 1/1/n, the age nearest and curtate duration were calculated as at 1/1/n. The data was then grouped for analysis purposes by age, duration, sex, smoker status, benefit type, sales channel, etc. as required. Each census record included both a "lives" and an "amounts" field.

$P_{x,r,n}$ = In-force at 1/1/n for lives age x nearest and curtate duration r at 1/1/n

The claims in calendar year n were grouped as for the in-force data except that the age nearest and curtate duration calculations were as at the "date of claim" (see below). The claims were sub-divided by cause (as allocated by CMI) for analysis and, in particular, deaths were separately identified for Full Acceleration business.

${}_c\theta_{x,r,n}$ = Claim of type c in calendar year n, age x nearest and curtate duration r at date of claim

The exposure for calendar year n is then calculated as

$$E_{x,r,n} = \tfrac{1}{2} * [P_{x,r,n} + P_{x,r,n+1} + \sum_{all\ c} \theta_{x,r,n}]$$

Different exposure calculations were not required when analysing experience for a particular cause of claim as a multiple decrement table was used for the expected experience.

The CMI decided that it was not feasible to attempt to calculate a separate exposure for each of the critical illnesses covered, nor to reflect any variations in the definition of particular critical illness events. Variations in policy coverage (sometimes retrospectively introduced) and definitions over time for individual offices would make this a complex exercise and the great majority of claims would in any case be expected to relate to the major causes covered by all offices.

3.5.2 Calculation of actual vs. expected

For each age and duration, the value of 100 A/E was calculated as:

$$100 \text{ A/E} = 100 * {}_k\theta_{x,r,n} / [E_{x,r,n} * {}_kq_x]$$

Where ${}_k\theta_{x,r,n}$ is the sum of ${}_c\theta_{x,r,n}$ for cause of claim (or group of causes) k and ${}_kq_x$ is the relevant rate of incidence from the standard table for cause of claim (or group of causes) k.

The exposures and claims used in the calculation are grouped by sex, smoker status, benefit type and sales channel as required. They may also be grouped over a number of calendar years.

3.5.3 "Date of claim" for analysis purposes

This proved to be a difficult area of the investigation. Which one of the four dates (diagnosis, notification, admission or settlement) should be used in the analysis as the "date of claim"? In fact, the question is really more complex still since the date is used for two purposes:

- Firstly, to assign a claim to a particular year's experience for the purpose of the analysis and to match it against that year's exposure.
- Secondly, to determine the age and policy duration at the time of claim.

Using settlement date would have the advantage of reflecting actual cash flows. However, it would not be appropriate for pricing as it would not reflect the true cost to the insurer as measured by claims actually incurred in the period of insurance but not necessarily reported or settled. This would be best reflected by the use of the date of diagnosis of the insured event. This would be consistent with most mortality investigations where the date of the insured event, i.e. death, is used.

However, using the date of diagnosis results in several practical problems:

- Some types of claim (e.g. TPD) may not sit well with the concept of a date of diagnosis.
- Date of diagnosis is not precisely defined and could be defined differently by different offices or even by different claims assessors within an office.
- Since claims submitted to CMI in respect of a single year relate to claims settled in that year, this would mean reallocating claims to previous years for the purpose of matching to exposure.

The latter would give considerable problems. The CMI investigation was set up to be a continuous investigation. It would mean that several years' data would need to be collected before a year's experience could be confidently closed off leading to problems with out-of-date information.

There would also be problems with offices coming and going from the investigation and from new portfolios of data being added from one year to the next by individual offices. In practice this has not been a major issue for the Irish investigations to date as the larger offices from the 1995-2000 investigation have all participated again in the 2001-2003 investigation and there have been no new entrants.

Based on the results of prior investigations in the UK and Ireland, the CMI decided that the following methodology would be used:

Use the claims records submitted in respect of a particular year (the great majority of which relate to claims settled in that year) to compare against the expected claims derived from the exposure in that year.

Calculate the age and duration of claim based on the diagnosis date, if supplied. If not supplied, the diagnosis date is estimated using the following algorithm:

- *Use date of settlement, if available, less 155 days.*
- *Otherwise, use date of notification, if available, less 80 days.*
- *Otherwise, use date of admission less 155 days.*
- *The estimated date is set to the policy commencement date if it would otherwise precede it.*

These parameters came from a study of available claim data (including UK data). In practice the vast majority of the Irish claim records included the data of diagnosis, notification and settlement so only a small number of records required adjustment in line with the algorithm above.

In order to properly identify the claim date, the date of diagnosis was required. Most offices were able to comply and the investigation now only includes a small number of claims (6% of the Irish investigation) where the date of diagnosis was not submitted. All these had reported date of settlement. The advantage of this methodology is that claims are allocated the correct duration and age relating to the point of claim. It thus resists the tendency of a system of claim durations based on settlement dates to show a “false” pattern of initial selection due to delays between diagnosis and settlement. It still enables key features of a year’s experience to be published quickly. Within a stable portfolio it would provide a reasonable estimate of the cost to the insurer because claims incurred in the investigation period but not settled would be balanced out by claims settled in the investigation period which were incurred in previous periods.

The methodology can be criticised on a number of points. Primarily, it does not correctly match the occurrence of the claim event (diagnosis) to exposure where the event happened in a prior investigation period. Previous period’s delayed claims are matched to the investigation period’s exposure and the investigation period’s delayed claims are omitted. This has a number of consequences. For example one would expect it to understate the eventual claims experience of an exposure period when the insured portfolio is growing, as has been the case for the Irish portfolio during the investigation period. Even if the overall portfolio is stable in size, individual aspects will always be varying. If the exposure and the claims are not correctly matched there will always be a distortion in the results. The estimation process for the diagnosis date, when not supplied, is also extremely crude. It is possible that the actual delays will vary by such factors as office, cause of claim, age and sex. Also, one of the natural consequences of reporting on the claims settled during the investigation period is that claims settled after the end of the period will be excluded. This is especially problematic for the later years of the investigation.

It was with these issues in mind that the original Working Party felt that they should adjust the reported results, as described in Section 4, before analysing the results in Section 5 and we have again followed their methodology.

4 IBNR and IBNS

4.1 Introduction

The methodology of the CMI critical illness experience investigation has the advantage of being able to report quickly on a year's experience. For a portfolio that has stabilised in size this method can give a reasonably good approximation of overall experience. However for an increasing portfolio of business, it underestimates the true underlying experience because, although the exposure immediately reflects the growth in the portfolio, the claims are underestimated because of the delay between diagnosis and settlement. To report as accurately as possible on the experience within the investigation period, the Working Party felt that we should estimate the total claims diagnosed within the investigation period to correspond fully with the exposure of the in force data.

The methodology of the CMI critical illness experience investigation means that in order to estimate the total claims diagnosed within the investigation period two adjustments need to be made to the claims data:

- Claims diagnosed prior to (but settled in) the investigation period must be removed.
- An estimate must be made for claims diagnosed during the investigation period but not yet settled i.e. Incurred But Not Settled (IBNS) claims.

The need for these adjustments and the fact that the portfolio of business is expanding means that the CMI reported results are distorted with the following consequences:

- The aggregate & individual calendar year results and all analyses thereof are underestimates (this would not necessarily be the case if the portfolio was a stable size)
- The trend of results between calendar years is affected by the presence of claims incurred in prior years.

It is important to note that there are two different delays that must be considered. The CMI critical illness experience investigation includes only settled claims. The experience therefore needs allowance for IBNS. In contrast, individual actuaries needing to calculate reserves will have access to the reported but not settled claims and can reserve for them directly. They will only need to add a reserve for Incurred But Not Reported (IBNR). The majority of our work concerns IBNS as this is crucial to the calculation of our adjusted results.

The following sections describe our analysis of IBNR and IBNS. We then illustrate how the estimated total claims were derived from the claims settled during the investigation period. This analysis has a number of elements:

- Discernment of features of the IBNS
- Preparation of triangle developments using basic chain-ladder method
- Adjustments to the reported experience to exclude prior year claims and to allow for IBNS

Adjustments to raw Claims data

- We combined the claims data from the 1995-2000 and 2001-2003 investigation periods in analysing and calculating the IBNS adjustments.
- All claims that did not have both actual date of diagnosis/death and settlement date were removed from the raw data for analysing experienced settlement delays and for constructing development triangles. This ensures that the methodology used in estimating incomplete dates doesn't affect these analyses.
- However, the estimates for these dates had to be used in the IBNS adjustment to ensure that all claims experience is included in the final ultimate claims projection.
- Claims where the diagnosis date fell prior to the investigation period were included in analysing experienced settlement delays, but were removed from other analyses depending on the relevant analysis period.

These adjustments are summarised below for each element of the analysis:

In Section 4.2 we consider settlement delays experienced on all claims settled between 2001 and 2003 irrespective of reporting date. This ensures that all available data on delays are used and that any changes in delays compared with previous investigations will be evident. Only claims that had both actual date of diagnosis/death and settlement date were included.

For Section 4.3 we consider all claims incurred and settled in the combined investigation period from 1995-2003. This ensures that the run-off triangles include as much relevant data as possible to get as close as possible to a fully developed year of diagnosis. By definition it is necessary to exclude all claims where the diagnosis date fell prior to the investigation period (1/1/1995 for the combined analysis) for the analyses in this section. Only claims that had both actual date of diagnosis/death and settlement date were included.

In Section 4.4 where ultimate claims incurred for the 2001-2003 investigation period are estimated, we consider only claims diagnosed in this period, i.e. all claims included in Section 4.3 excluding claims where the diagnosis date fell prior to the investigation period (1/1/2001).

This basis differs slightly from the previous investigation in that cases where the diagnosis date fell prior to the investigation period were previously excluded from Section 4.2. For example four claims with settlement date in the 2001-2003 period with a diagnosis date before 1/1/1995 would have been excluded previously but are now included in the settlement delay analysis.

Note that unless stated otherwise all tables include 2001-2003 claims data.

4.2 Features of the IBNS

We obtained the raw claims data for 2001-2003 and removed cases that did not have both actual date of diagnosis/death and settlement date. We found that of the 1,961 reported claims, there were 1,831 claims to study for IBNS. The difference between diagnosis and settlement was calculated in days and all analysis in this section is in days.

The claim types were divided into deaths on Accelerated policies and non-death critical illness claims and then into claim type groups to analyse if the delay was significantly different for different claim types. The tables below give the average delay and standard deviation, median and inter-quartile range for each claim type. The claim type groups are those used by the CMI in reporting experience by cause.

Table 4.1 - Analysis of settlement delay by claim type (2001-2003)

	Number	Mean	Standard Deviation	Median	Inter Quartile Range
Critical Illness	1,605	238	328	142	156
Death	226	221	280	136	207

When compared to the table in the previous report it is clear that there has been a marked increase in average delays and the variation in delays. The average delay increased by 2 months for Death and Critical Illness claims.

Table 4.2 - Analysis of settlement delay by claim type (1995-2000)

	Number	Mean	Standard Deviation	Median	Inter Quartile Range
Critical Illness	1,325	164	163	113	109
Death	207	158	147	109	141

As expected the death claims are quicker to settle, but not by a great deal. However, the nature of the settlement delay is different for both types. On death claims, 65% of the delay is post-notification. Presumably inquests, delayed death certificates, probate or other legal issues slow down the physical payment of a claim, with liability of claim rarely being an issue. For critical illness claims, on average, almost 60% of the delay is before notification.

These total delays are clearly longer than the assumed 155 days used by the CMI (as described in Section 3.5.3) when the actual delay was unknown. It was felt that this would not significantly affect the results especially since the actual delay was known on 94% of the claims.

The UK mean delay is 176 days so the Irish claims development appears to be significantly longer than for the UK.

Tables of IBNR features are included in Appendix 4.

Table 4.3 - Analysis of settlement delay by claim type group

	Number	Mean	Standard Deviation	Median	Inter Quartile Range
Cancer	692	188	246	119	114
Heart Disease	206	182	166	141	124
Coronary Artery Bypass Graft	60	190	273	125	135
Multiple Sclerosis	73	272	266	188	159
Stroke	85	277	337	161	207
Other	489	328	451	176	237
Total	1,605	238	328	142	156

Table 4.3 shows a number of interesting features.

- The data are heavily skewed to the right in every group, as indicated by the median being smaller than the mean.
- The standard deviation for all claim type groups is high and sometimes greater than the mean itself. All estimates based on these results have such wide confidence intervals for any reasonable level of significance that it is very difficult to represent any single estimate as reliable.
- The straight-forward incidence disease classes (heart disease and cancer) show broadly similar means. These two account for 56% of the claims being examined here. Stroke has seen a significant increase in delays from a mean of 143 to a mean of 277 days and is clearly out of line with the other two.
- MS is the slowest of all specified classes to develop and has the highest spread of delays, as measured by the inter-quartile range.
- It would appear that the longer development of the known "Other" claim type group is due to longer tailed-claim types such as TPD, angioplasty, aorta surgery, benign brain tumour, heart valve surgery and coma. Unfortunately a significant number of the "Other" claims above result from incomplete claim records so in practice a substantial number of these claims are due to the main disease classes.

The distribution of the critical illness claims clearly has a very long tail. In the above 1,116 CI cases (after excluding "Other" causes), 19 have delays of over 3 years. Of these 12 are for cancer, 5 for stroke, 1 for MS, and 1 for CABG. There were 4 cases where the delay was greater than 5 years (2 cancer, 1 CABG, and 1 stroke). In every case of a major delay, the vast majority of the delay was due to late notification, with cases subsequently being settled relatively quickly. One Cancer claim was 2,753 days (over 7½ years).

Analysing the IBNS according to whether the policy was Accelerated or Stand Alone gives the following table.

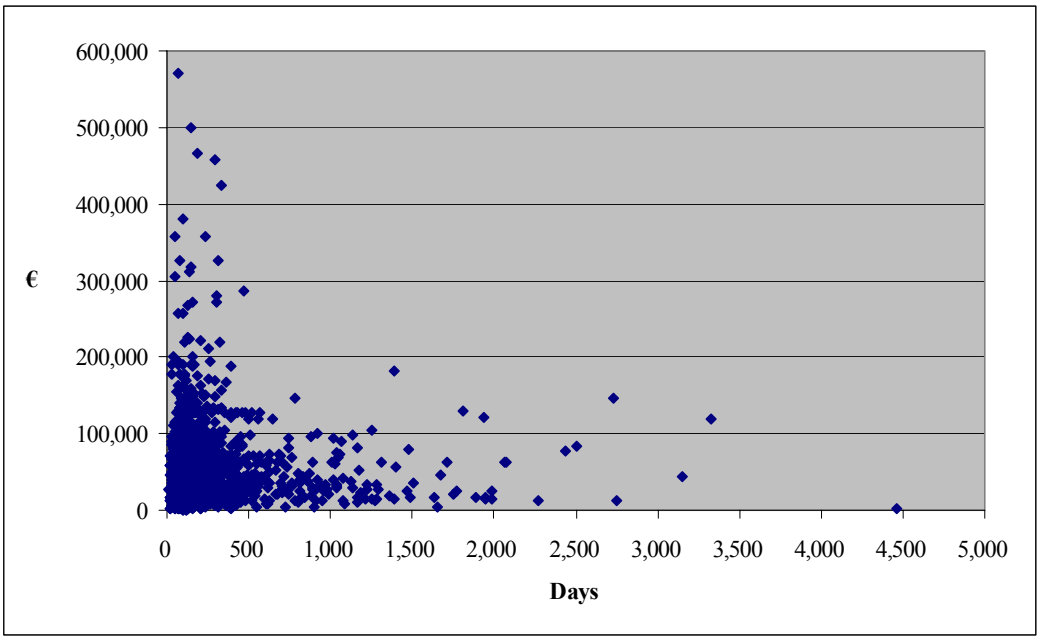
Table 4.4 Analysis of settlement delay by product

	Number	Mean	Standard Deviation	Median	Inter Quartile Range
Accelerated	779	253	347	147	174
Stand Alone	826	225	309	138	137

This does not appear to show any difference of significance and certainly rejects a hypothesis previously considered where Accelerated cases might be admitted more quickly in certain cases because a death claim could be considered likely to follow. We therefore have not retained any differentiation between Accelerated and Stand Alone business in our subsequent IBNS or IBNR analysis.

Relating the amount of claim in Euro to the delay in payment in days gives the following graph.

Figure 4.1 - Comparison of settlement delay to claim size



Visual inspection of the above may suggest that the outliers show some evidence of an inverse relationship. The largest claims seem to be settled quickly and the longest delays are for small claims. However there are very many over-lapping points in the bottom left corner of the graph. On statistical analysis using the full data, we found that the correlation coefficient is 0.02 which strongly suggests no linear relationship. We also tested the inverse relationships for correlation and found similarly low figures.

Compared to the same graph in the previous analysis the number and amounts of claims for claims with longer delays have increased. For example the number of claims with delays of over 3 years have increased from 7 to 44 and the average claim amount for these claims have increased from €10,500 to €47,500. The number and amounts of large claims also increased: the number of claims greater than €150,000 increased from 25 to 62 with the average claim amount for these claims increasing from €208,500 to €234,800. In line with the overall increase in delays observed above, the average delay for these large claims increased from 127 to 187 days.

Due to the chain-ladder method's sensitivity to these outliers there were a number of changes in the IBNR and IBNS factors compared to the previous investigation that are described in Section 4.3 below.

Analysis of mean settlement delay by policy duration at date of diagnosis is given below.

Table 4.5 - Analysis of settlement delay by claim type group and duration

Claim in Policy Year	1	2	3	4	5	6+
Cancer	275	247	154	191	234	151
Heart Disease	193	164	203	193	202	177
CABG	126	120	364	213	180	192
Multiple Sclerosis	292	382	261	233	265	256
Stroke	294	406	133	335	216	264
Other	586	356	387	381	314	233
Total	357	279	253	270	259	189

We considered the hypothesis that notification delays might be highest on policies of longer durations, but this doesn't seem to be the case. We found that the correlation coefficient is 0.03 which strongly suggests no linear relationship.

Analysis of claim type group by office is given below (for reasons of confidentiality numbers of claims are not shown).

Table 4.6 – Analysis of claim type group by office

Office	Mean	SD	Median	IQR	Mean Cancer	Mean HD	Mean CABG	Mean Stroke	Mean MS	Mean Others
1	167	133	135	89	144	176	119	147	148	196
2	190	249	106	125	171	164	214	227	252	255
3	216	275	143	115	214	118	113	454	181	491
4	225	288	147	127	184	189	170	185	382	334
5	249	430	143	152	n/a	n/a	n/a	n/a	n/a	n/a
6	271	393	160	183	236	212	306	574	212	203
7	357	403	229	194	296	279	217	1186	435	457
8	374	442	212	304	n/a	n/a	n/a	n/a	n/a	n/a

(Note: Abbreviations are consistent with the claim conditions included in Table 4.3)

One might well imagine that either through sales processes at outset, subsequent claim underwriting procedures or just general administration procedures that offices might possibly differ from each other in relation to settlement delays.

Offices 1 and 2 seem to experience shorter delays on average than the other offices with office 1 having consistently below average delays for all claim causes and office 2 for all except CABG. The significant increase in delays in stroke claims highlighted in Table 4.3 (143 in previous analysis to 277) is explained by 3 offices (3, 6 and 7) having much longer delays than the other 3 which was not a feature in the 1995-2000 investigation. However, this apparent change needs to be treated with caution as it is based on a handful of claims and again illustrates the issue of the paucity of data once we try to break down into any detailed analysis.

This is probably better seen from Table 4.7 below which shows ranking of means by office and by office within cause (1 implies shortest).

Table 4.7 – Office ranking for settlement delay by claim type group

Office	Mean	Median	Mean Cancer	Mean HD	Mean CABG	Mean Stroke	Mean MS	Mean Others
1	1	2	1	3	2	1	1	1
2	2	1	2	2	4	3	4	3
3	3	3=	4	1	1	4	2	6
4	4	5	3	4	3	2	5	4
5	5	3=	n/a	n/a	n/a	n/a	n/a	n/a
6	6	6	5	6	6	5	3	2
7	7	8	6	5	5	6	6	5
8	8	7	n/a	n/a	n/a	n/a	n/a	n/a

It is difficult to interpret Table 4.7 clearly. There are many factors which might differentiate the experience of the various offices. The Working Party recommends that individual offices should carefully consider if there are reasons why they might have different settlement patterns than their competitors and if so modify any results / recommendations accordingly.

4.3 Development Triangles

We analysed both the IBNR and the IBNS in classic triangles. This was done on a year by year approach. Quarterly analysis was attempted but proved to have too few claims within each quarter to be worthwhile. The triangles were built up using both calendar year and claim duration years, though in practice the calendar year is the more useful and its results are shown here.

The raw data is given below:

Table 4.8 - IBNS development triangle (numbers)

Individual Total										
Sum of Count	Calendar Year									
Year of Diagnosis	1	2	3	4	5	6	7	8	9	Grand Total
1995	38	38	6	3	1	1	3	0	1	91
1996	89	58	8	4	0	2	2	2		165
1997	138	114	10	4	3	3	0			272
1998	207	118	19	7	3	5				359
1999	232	177	21	13	8					451
2000	267	218	37	9						531
2001	313	240	36							589
2002	312	261								573
2003	328									328
Grand Total	1,924	1,224	137	40	15	11	5	2	1	3,359

(These 3,359 claims are all the claims from 1995-2003 where we have both actual dates of diagnosis and settlement, and the diagnosis date falls into the combined investigation period).

Table 4.9 - IBNR development triangle (numbers)

Individual Total								
Sum of Count	Calendar Year							
Year of Diagnosis	1	2	3	4	5	6	7	Grand Total
1995	56	23	5	2	3	1	1	91
1996	116	32	8	1	1	2	2	162
1997	202	54	5	2	2	2	0	267
1998	257	64	11	4	3	4		343
1999	298	95	12	9	6			420
2000	365	117	18	5				505
2001	403	131	19					553
2002	423	94						517
2003	306							306
Grand Total	2,426	610	78	23	15	9	3	3,164

(These 3,164 claims are all the claims where we have both actual dates of diagnosis and notification, and the diagnosis date falls into the combined investigation period).

The data were then re-expressed in cumulative terms, as in Table 4.10

Table 4.10 – IBNS cumulative development triangle (numbers)

Sum of Count	Calendar Year									
Year of Diagnosis	1	2	3	4	5	6	7	8	9	Grand Total
1995	38	76	82	85	86	87	90	90	91	91
1996	89	147	155	159	159	161	163	165		165
1997	138	252	262	266	269	272	272			272
1998	207	325	344	351	354	359				359
1999	232	409	430	443	451					451
2000	267	485	522	531						531
2001	313	553	589							589
2002	312	573								573
2003	328									328
Grand Total	1,924	3,148	3,285	3,325	3,340	3,351	3,356	3,358	3,359	3,359

The individual year on year ratios were then examined, giving:

Table 4.11 - IBNS development ratios (numbers)

	Calendar Year								
Diagnosis Year	1	2	3	4	5	6	7	8	9
1995		2.0000	1.0789	1.0366	1.0118	1.0116	1.0345	1.0000	1.0111
1996		1.6517	1.0544	1.0258	1.0000	1.0126	1.0124	1.0123	
1997		1.8261	1.0397	1.0153	1.0113	1.0112	1.0000		
1998		1.5700	1.0585	1.0203	1.0085	1.0141			
1999		1.7629	1.0513	1.0302	1.0181				
2000		1.8165	1.0763	1.0172					
2001		1.7668	1.0651						
2002		1.8365							
2003									

A similar approach with IBNR cases leads to:

Table 4.12 - IBNR development ratios (numbers)

	Calendar Year						
Diagnosis Year	**1**	**2**	**3**	**4**	**5**	**6**	**7**
1995		1.4107	1.0633	1.0238	1.0349	1.0112	1.0111
1996		1.2759	1.0541	1.0064	1.0064	1.0127	1.0125
1997		1.2673	1.0195	1.0077	1.0076	1.0075	1.0000
1998		1.2490	1.0343	1.0120	1.0089	1.0118	
1999		1.3188	1.0305	1.0222	1.0145		
2000		1.3205	1.0373	1.0100			
2001		1.3251	1.0356				
2002		1.2222					
2003							

Combining the weighted results from the different years of diagnosis leads to:

Table 4.13 – Individual development ratios (numbers)

Calendar Year	IBNS	IBNR
Year 1 to 2	1.7669	1.2877
Year 2 to 3	1.0610	1.0352
Year 3 to 4	1.0223	1.0132
Year 4 to 5	1.0115	1.0119
Year 5 to 6	1.0127	1.0106
Year 6 to 7	1.0096	1.0058
Year 7 to 8	1.0079	1.0000
Year 8 to 9	1.0111	1.0000

Note: To be slightly conservative we gave full weighting to the 1995 and 1996 year 8 and 9 calendar years. It should be borne in mind that these ratios were obtained from only three claims. The additional claims reported/settled since the previous investigation indicates that claims weren't fully developed after 6 years. Even though more 1995 claims are possible, we don't believe any additional claims will be material.

Aggregating these one-year ratios by multiplying them consecutively as required gives numbers that can be applied to known diagnosed claims to project total claims.

Table 4.14 – Aggregate development ratios (numbers)

Calendar Year	IBNS	IBNR
End Year 1 to ultimate	2.0198	1.3894
End Year 2 to ultimate	1.1431	1.0789
End Year 3 to ultimate	1.0774	1.0422
End Year 4 to ultimate	1.0539	1.0286
End Year 5 to ultimate	1.0419	1.0164
End Year 6 to ultimate	1.0289	1.0058
End Year 7 to ultimate	1.0191	1.0000
End Year 8 to ultimate	1.0111	1.0000
End Year 9 to ultimate	1.0000	1.0000

For example the end of the investigation is 31/12/2003 so claims diagnosed in the calendar year 2002 and settled before the end of the investigation have been settled before the end of the 2nd calendar year. The projected eventual total number of claims diagnosed in 2002 is estimated to be the product of 1.1431 and the number of claims already settled from year of diagnosis 2002.

Although the results from Figure 4.1 indicated no overall correlation between benefit size and delay, it did seem that the longest settlements related to smaller claims and the largest claims had shorter delays.

Because these are the claims that most strongly influence the delay factors in the triangles, we reworked the triangles based on amounts, and got the following results.

Table 4.15 - IBNS development ratios (amounts)

	Calendar Year								
Diagnosis Year	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
1995		2.0738	1.0946	1.0222	1.0064	1.0010	1.0667	1.0000	1.0032
1996		1.5984	1.0297	1.0191	1.0000	1.0138	1.0134	1.0139	
1997		1.9465	1.0318	1.0051	1.0192	1.0068	1.0000		
1998		1.5952	1.0516	1.0194	1.0062	1.0153			
1999		1.7299	1.0473	1.0228	1.0124				
2000		1.8118	1.0817	1.0172					
2001		1.9545	1.0582						
2002		2.0466							
2003									

Table 4.16 - IBNR development ratios (amounts)

	Calendar Year						
Diagnosis Year	**1**	**2**	**3**	**4**	**5**	**6**	**7**
1995		1.5498	1.0590	1.0034	1.0392	1.0010	1.0032
1996		1.3083	1.0313	1.0025	1.0120	1.0141	1.0042
1997		1.2561	1.0198	1.0023	1.0167	1.0057	1.0000
1998		1.2444	1.0277	1.0179	1.0066	1.0139	
1999		1.2846	1.0250	1.0157	1.0084		
2000		1.2860	1.0308	1.0072			
2001		1.3204	1.0287				
2002		1.2050					
2003							

Combining the results from the different years of diagnosis leads to:

Table 4.17 – Individual development ratios (numbers and amounts)

	Lives		Amounts	
Calendar Year	**IBNS**	**IBNR**	**IBNS**	**IBNR**
Year 1 to 2	1.7669	1.2877	1.8572	1.2739
Year 2 to 3	1.0610	1.0352	1.0571	1.0286
Year 3 to 4	1.0223	1.0132	1.0175	1.0097
Year 4 to 5	1.0115	1.0119	1.0103	1.0124
Year 5 to 6	1.0127	1.0106	1.0109	1.0099
Year 6 to 7	1.0096	1.0058	1.0147	1.0018
Year 7 to 8	1.0079	1.0000	1.0089	1.0000
Year 8 to 9	1.0111	1.0000	1.0032	1.0000

Aggregating these one-year ratios by multiplying them consecutively as required gives numbers that can be applied to known diagnosed claims to project total claims.

Table 4.18 – Aggregate development ratios for estimating total experience

	Lives		Amounts	
Calendar Year	**IBNS**	**IBNR**	**IBNS**	**IBNR**
End Year 1 to ultimate	2.0198	1.3894	2.0954	1.3551
End Year 2 to ultimate	1.1431	1.0789	1.1283	1.0637
End Year 3 to ultimate	1.0774	1.0422	1.0673	1.0341
End Year 4 to ultimate	1.0539	1.0286	1.0490	1.0242
End Year 5 to ultimate	1.0419	1.0164	1.0383	1.0117
End Year 6 to ultimate	1.0289	1.0058	1.0271	1.0018
End Year 7 to ultimate	1.0191	1.0000	1.0122	1.0000
End Year 8 to ultimate	1.0111	1.0000	1.0032	1.0000
End Year 9 to ultimate	1.0000	1.0000	1.0000	1.0000

In the previous investigation the amounts based IBNR and IBNS factors all reduced slightly compared to the lives based factors, supporting the observation that largest claims seem to be settled quickly and the longest delays are for small claims.

This time the amounts based IBNR factors are again slightly less than the lives based factors and the amounts based IBNS factors are also slightly higher than the lives based factors for all calendar years except the 1st year where it is much higher. This is consistent with the observation that larger claims are seeing longer delays and that more of these claims are now only settled in the 2nd calendar year than before.

We considered the impact of inflation within the data on the amounts based IBNR and IBNS factors. The main inflationary pressure is from increases in Sums Assured over time. As this is not directly linked to year of diagnosis this doesn't directly affect the settlement pattern and it only has a very small secondary impact.

Changes in average claims are shown below.

Table 4.19 – Average Claim by Year of Diagnosis and Settlement

	1st year after Diagnosis	% change p.a.	Cumulative Claims	% change p.a.	Settlement Year	% change p.a.
1995	41,602		43,462		41,602	
1996	45,704	10%	43,074	-1%	45,187	9%
1997	43,453	-5%	45,669	6%	45,710	1%
1998	42,926	-1%	43,241	-5%	35,844	-22%
1999	42,695	-1%	41,206	-5%	36,057	1%
2000	47,868	12%	47,983	16%	29,284	-19%
2001	44,705	-7%	49,133	2%	54,159	85%
2002	50,508	13%	56,285	15%	42,097	-22%
2003	55,820	11%	55,820	-1%	43,491	3%
Overall	47,441	3.7%	48,399	3.2%	48,399	0.6%

Most direct writing offices in Ireland operate with reasonably low retentions. We suggest that the more cautious lives based factors are most appropriate for use when looking at IBNR and that the amounts based factors should be used for IBNS.

It seems likely that CI will suffer from (a) year on year fluctuations due to environmental factors and (more importantly) (b) trends over time. Therefore we suggest that use of triangles is a better method of reserving for IBNR than expected loss ratios. We strongly recommend the use of the factors above (or triangles derived from the offices' own experience) in establishing a reserve for IBNR.

4.4 Adjustments to the reported experience

In order to estimate the ultimate claims diagnosed within the investigation period two adjustments need to be made to the claims data:

- Claims diagnosed prior to the investigation period must be removed
- An estimate must be made for claims diagnosed during the investigation period but not yet settled i.e. IBNS claims.

For the full investigation there were 345 claims where the allocated diagnosis date was before 2001 and these claims have been excluded. We used the aggregate development ratios calculated in Table 4.14 above to estimate the IBNS.

The table below gives the number of claims from the exposure period split by year of assumed diagnosis and the expected development.

Table 4.20 – Expected total claims (numbers)

Year of Diagnosis	No of claims settled by 31.12.2003	No. of claims after prior period exclusions	Aggregate Development Ratio	Expected total experience
1990	1	0	0.0000	0.00
1991	0	0	0.0000	0.00
1992	0	0	0.0000	0.00
1993	0	0	0.0000	0.00
1994	3	0	0.0000	0.00
1995	4	0	1.0000	0.00
1996	6	0	1.0111	0.00
1997	6	0	1.0191	0.00
1998	15	0	1.0289	0.00
1999	42	0	1.0419	0.00
2000	268	0	1.0539	0.00
2001	609	609	1.0774	656.14
2002	615	615	1.1431	703.01
2003	392	392	2.0198	791.75
TOTAL	1,961	1,616		2,150.90

Therefore for the claims settled during the 2001-2003 investigation the aggregate experience should be increased by an overall average adjustment factor of 1.0968 (2,150.90 / 1,961) to exclude prior year claims and to allow for IBNS.

We then had to decide how to apply adjustments for each category of experience analysed. The aggregate adjustment factor of 1.0968 was agreed to be too crude an adjustment for all analyses. Although for some analyses, such as by distribution channel, the aggregate adjustment factor were fairly suitable, there were others, in particular for calendar year investigations where the effect of prior year claims were quite significant.

An example might best illustrate this. Table 4.21 illustrates the calculation of the adjustment factors for Female Stand Alone claims for each calendar year.

Table 4.21 – Calculation of the adjustment factors for female Stand Alone claims

Year	A No of claims settled	B No of claims diagnosed	C Aggregate Development Ratio	D Expected total experience B x C	E Implied Adjustment Factor D / A
2001	89	118	1.0774	127.13	1.43
2002	127	112	1.1431	128.03	1.01
2003	147	88	2.0198	177.74	1.21
TOTAL	363	318		432.90	1.19

The 2001 settled claims required an adjustment factor of 1.43 while the 2003 data needed a lower adjustment factor of 1.21. It is clear that the difference between claims settled in 2001 and diagnosed in 2001 (89 vs. 118) leads to a large adjustment factor (1.43) and a big change in the reported A/E ratio. However, when considering 2003 claims, the adjustment factor is smaller (1.21) but this factor considered in isolation masks the fact that in this case there are a sizeable number of cases (59) settled in 2003 relating to prior periods that just happens to approximately equal the estimated number of claims to be settled in the future arising from illnesses diagnosed in 2003.

We decided that we would calculate adjustment factors for each category within an investigation i.e. we would estimate the total overall claims per category as accurately as we could.

Therefore to adjust the settled claims:

- We grouped the claims into the categories being investigated by year of assumed diagnosis (e.g. for the analysis by duration we grouped the claims by sex, Accelerated or Stand Alone and by duration).
- To estimate the total claims, we applied the projection factors, calculated in Table 4.18, to each claim depending on its development year relative to the year 2003.
- In order to relate our estimated total claims to the settled claims reported in the CMI critical illness investigation we calculated the adjustment factors, which are the ratios of the estimated total claims to the settled claims. A large factor clearly indicates that the reported CMI result is premature and that the adjusted result allows for a significant run-off of claims not yet settled. On the other hand, a small factor close to 1 does not necessarily imply that there is little run-off remaining, just that the net effect of removing claims belonging to a prior period and adding estimated claims still to be settled is small.

See Appendix 2 for full details of the calculated adjustment factors.

4.5 Actual run-off of previous investigation's claims

The previous investigation produced IBNR and IBNS projections to estimate ultimate claims experience from all claims incurred between 1995 and 2000.

The chain-ladder method used was based on six calendar years for the most developed year of diagnosis (1995), which means the projected ultimate claims experience included claims estimates for settlements in calendar years 2001 to 2005.

As part of this investigation we could therefore compare the actual settlements between 2001 and 2003 in respect of claims diagnosed in the previous investigation period.

The calculations are similar to those described in Section 4.4 above except that individual development ratios are used for three years rather than the aggregate development ratio. The results are shown in the tables below for number of claims and claim amounts.

Table 4.22– Actual claims for 2001-2003 vs. projected (Lives)

Year of Diagnosis	No of claims settled by 2000	No of claims after prior year exclusions	Individual Development Ratios			Cumulative Projected claims to 2003	Claims for 2001-2003		
			2001	2002	2003		Expected	Actual	AvE
1992-4	21								
1995	148	122	1.0000	1.0000	1.0000	122.0	0.0	4	4.0
1996	210	196	1.0116	1.0000	1.0000	198.3	2.3	6	3.7
1997	307	307	1.0118	1.0116	1.0000	314.2	7.2	6	-1.2
1998	376	376	1.0220	1.0118	1.0116	393.3	17.3	15	-2.3
1999	437	437	1.0538	1.0220	1.0118	476.2	39.2	42	2.8
2000	273	273	1.7173	1.0538	1.0220	504.9	231.9	268	36.1
Total	1,772	1,711				2,008.9	297.9	341	43.1

Table 4.23 – Actual claims for 2001-2003 vs. projected (Amounts - €'000)

Year of Diagnosis	Claims settled by 31/12/2000	Claims after prior year exclusions	Individual Development Ratios			Cumulative Projected claims to 2003	Claims for 2001-2003		
			2001	2002	2003		Expected	Actual	AvE
1992-4	710								
1995	6,864	5,423	1.0000	1.0000	1.0000	5,423	0	259	259
1996	9,224	8,672	1.0010	1.0000	1.0000	8,681	9	285	276
1997	14,696	14,696	1.0064	1.0010	1.0000	14,806	110	316	206
1998	16,470	16,470	1.0121	1.0064	1.0010	16,794	324	618	294
1999	18,348	18,348	1.0451	1.0121	1.0064	19,531	1,183	1,449	266
2000	13,033	13,033	1.7335	1.0451	1.0121	23,897	10,863	12,886	2,023
Total	79,344	76,642				89,131	12,489	15,813	3,324

From these it can be seen that the IBNS factors from the previous analysis understated the actual paid claims experience (15% more claims than expected at a 27% higher than expected cost). The two main factors for these differences are:

a) additional claims on years assumed to be fully run-off; and

b) the overall increase in delays, particularly in settling larger claims. The percentage of ultimate claims settled in the 1st year has fallen from 54% in the previous investigation to 48% this time.

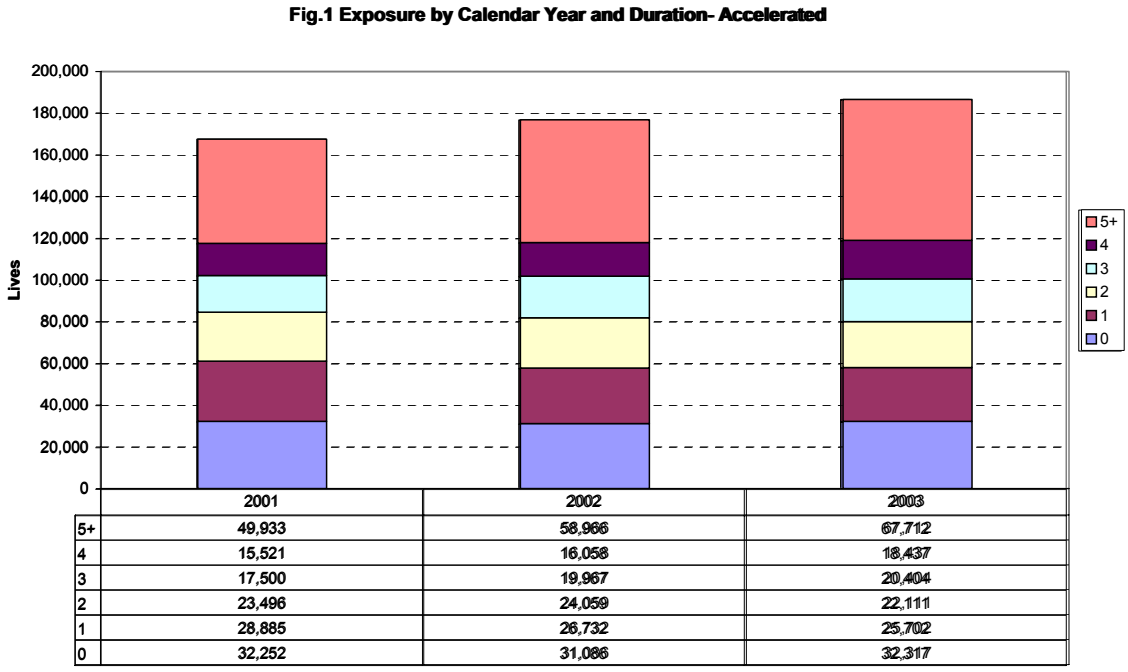
5 All Office Results and Commentary

5.1 Analysis of Exposure

The 2001-2003 investigation includes 530,000 years of Accelerated exposure and 450,000 years of Stand Alone exposure. There were 1,961 claims, of which 226 were death claims, 861 non-death Accelerated claims, and 874 Stand Alone claims.

Figure 5.1 shows the build up of the exposure over the three years of the investigation for Accelerated business.

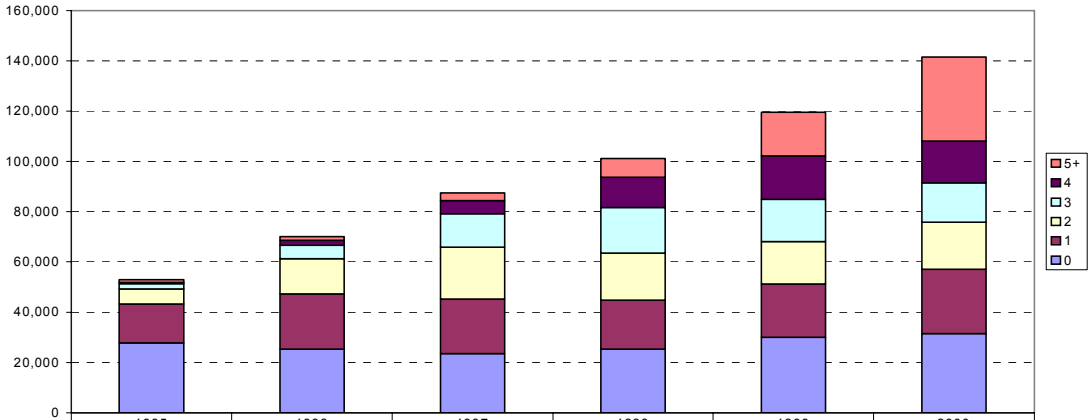
Figure 5.1 - Exposure by Calendar Year and Duration (Accelerated Lives)



	2001	2002	2003
5+	49,933	58,966	67,712
4	15,521	16,058	18,437
3	17,500	19,967	20,404
2	23,496	24,059	22,111
1	28,885	26,732	25,702
0	32,252	31,086	32,317

It is interesting to contrast this pattern with the same graph from the previous investigation.

Figure 5.2 – Previous Investigation's Exposure by Calendar Year and Duration (Accelerated Lives)

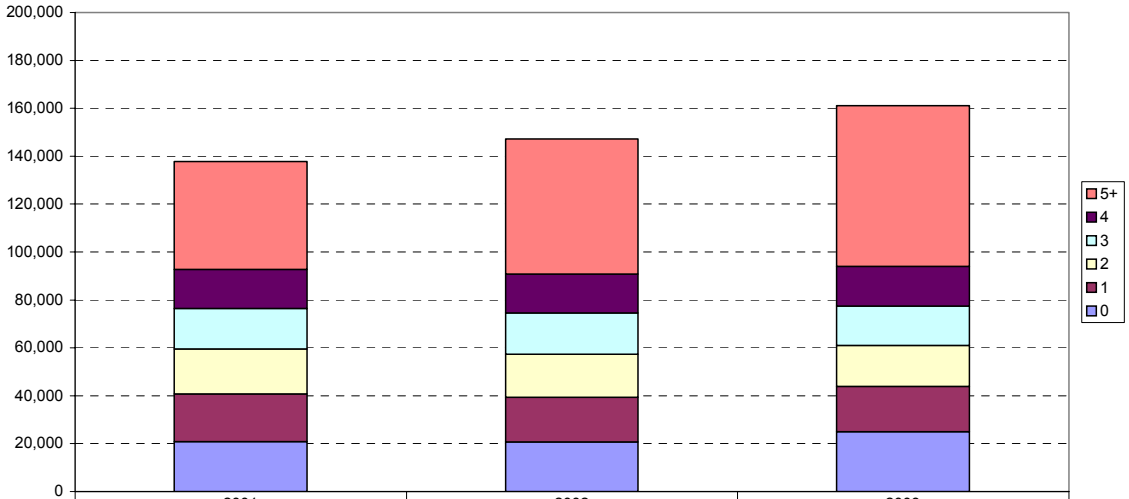


	1995	1996	1997	1998	1999	2000
5+	1,020	1,523	3,147	7,461	17,412	33,363
4	548	1,962	5,262	12,097	17,261	16,642
3	2,101	5,392	13,250	18,086	16,747	15,547
2	6,009	13,961	20,626	18,729	16,911	18,836
1	15,479	22,044	21,772	19,559	21,203	25,548
0	27,803	25,244	23,485	25,278	30,010	31,499

It is evident that the rapid rate of growth over the 1990's has now stabilised to about 5 to 6% per annum. However the proportion of exposure in the 5+ duration has continued to grow from the level of 23% in 2000 to 36% in 2003.

Figure 5.3 shows the corresponding graph for Stand Alone exposure.

Figure 5.3 - Exposure by Calendar Year and Duration (Stand Alone Lives)

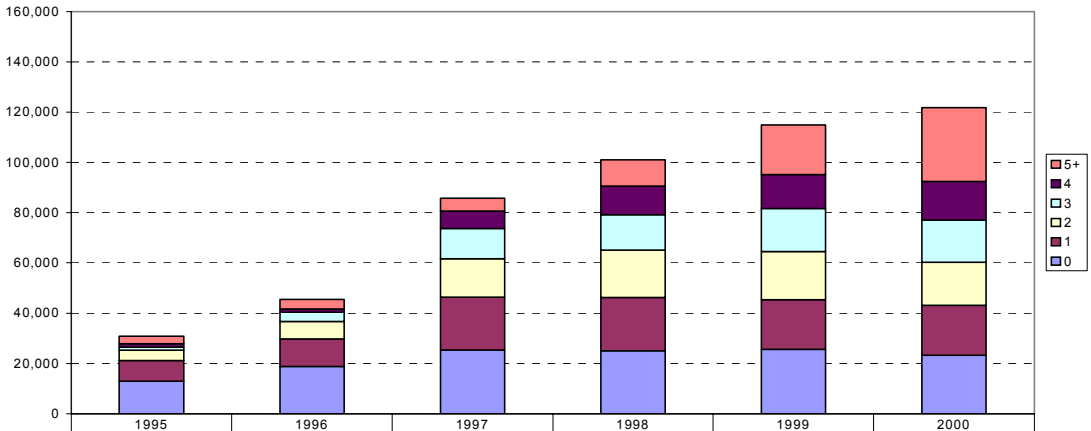


	2001	2002	2003
5+	45,082	56,495	67,062
4	16,251	16,255	16,539
3	16,860	17,215	16,501
2	18,865	17,988	17,081
1	19,903	18,703	18,850
0	20,849	20,651	25,039

Again we see a similar picture of the previous dramatic growth easing back. The average growth over the three year period was 8%. As for the Accelerated business the proportion of 5+ duration business has risen and in 2003 was 42% of the total.

Throughout the period Stand Alone exposure was slightly less than Accelerated, making up 46% of the total exposure.

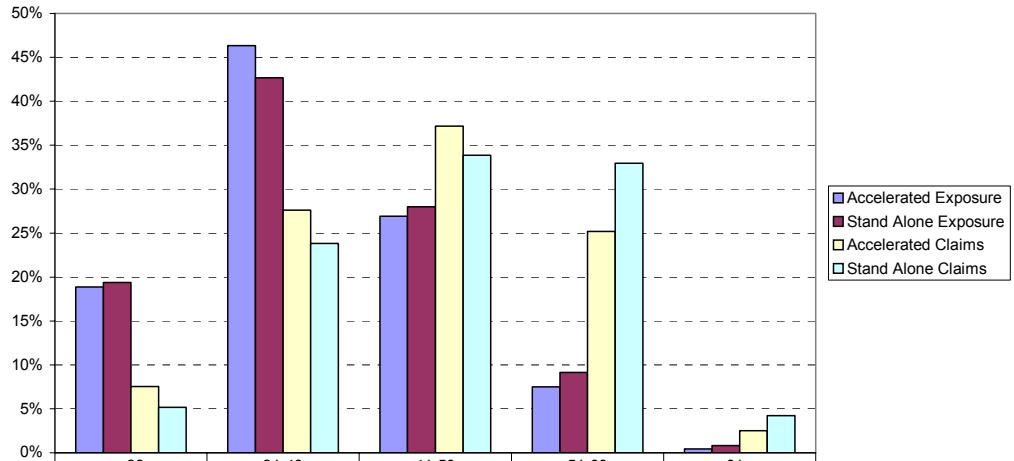
Figure 5.4 - Previous Investigation's Exposure by Calendar Year and Duration (Stand Alone Lives)



	1995	1996	1997	1998	1999	2000
5+	3,025	3,913	5,111	10,443	19,660	29,227
4	1,390	1,251	6,899	11,440	13,488	15,364
3	1,232	3,734	12,018	13,951	17,162	16,770
2	4,088	6,933	15,297	18,967	19,136	17,143
1	8,174	10,959	20,957	21,171	19,734	19,914
0	13,017	18,792	25,464	25,082	25,654	23,253

Figure 5.5 shows how exposure and actual claims are distributed by age for the 2001-2003 investigation.

Fig. 3 Distribution of Claims and Exposure by Age



	<30	31-40	41-50	51-60	61+
Accelerated Exposure	19%	46%	27%	7%	0%
Stand Alone Exposure	19%	43%	28%	9%	1%
Accelerated Claims	8%	28%	37%	25%	2%
Stand Alone Claims	5%	24%	34%	33%	4%

Age Band

As before there is very little exposure above age 60 and below age 20, so the graph can be broadly interpreted as showing four 10-year age bands. Exposure to date is centred around the 31-40 band, reflecting the fact that a large majority of new business is sold to people age 40 or younger. In contrast claims are centred around the 41-50 band, and there are significant claims at age 50 and over, especially on Stand Alone. Clearly experience at these ages will be an important factor influencing the ultimate profitability of this business. Unfortunately our conclusions are limited by the relative lack of exposure at these ages.

The fact that the majority of the underlying business is term based suggests that, after allowing for lapses, we cannot expect to have any reliable experience at the older ages for the foreseeable future.

The proportion of female lives in the total exposure is 48% for Accelerated and 45% for Stand Alone at the previous report the corresponding percentages were 46% and 43%. These proportions are quite stable when analysed by duration and calendar year. However there is a clear relationship with age, with younger ages having a higher proportion of female lives. For Accelerated business younger than age 30 females make up 51% of exposure, probably reflecting the prevalence of mortgage-related business in this category.

The proportion of smokers in each category is:

Table 5.1 – Smoker proportions

	Accelerated	Stand Alone
Male	25%	25%
Female	23%	21%

The following Table 5.2 shows how this proportion changes over time for Accelerated, Male Lives (including data from the last report).

Table 5.2 – Smoker proportions by calendar year / duration for Accelerated male lives

Duration	*1995*	*1996*	*1997*	*1998*	*1999*	*2000*	*2001*	*2002*	*2003*
0	31%	31%	30%	30%	29%	28%	28%	28%	26%
1	28%	28%	29%	29%	28%	28%	28%	27%	27%
2	25%	27%	27%	28%	28%	27%	27%	27%	26%
3	23%	24%	26%	27%	27%	27%	26%	26%	26%
4	24%	23%	24%	25%	26%	26%	27%	26%	25%
5+	20%	21%	21%	22%	24%	24%	25%	25%	25%

One would expect the diagonals of the table to show a consistent "cohort effect" from 1997 onwards. The consistent pattern of reduction along the diagonal seems to indicate that policies sold to smokers are experiencing heavier lapse rates. For example, 30% of the Duration 0 lives in 1997 were smokers, but by the time this cohort reaches Duration 3 in 2000 the proportion has fallen to 27%. One possible explanation is that smokers who give up may exhibit rational behaviour and lapse to re-enter as non-smokers with cheaper rates.

The top row of the table also shows that the proportion of new business sold to smokers continue to decline.

The total exposure was split by distribution channel as follows:

Table 5.3 – Split by distribution channel

	Previous Report	Current Report
Bancassurer	18%	21%
Direct sales	44%	39%
IFA	35%	35%
Other/unknown	3%	6%

The trend away from Direct Sales noticed in the previous report has continued but the effect is quite slow.

5.2 Comparison with CIBT93

5.2.1 Adjustment of reported results

These results are all based on figures adjusted for IBNS as detailed in the previous section. Unlike for the previous report we decided not to show results for the unadjusted numbers as they are clearly of limited value without the IBNS adjustment.

5.2.2 Results on Lives Basis

5.2.2.1 Overall results

The following table summarises the key results, comparing actual claims to expected claims from CIBT93:

Table 5.4 – Comparisons against CIBT93 (Lives)

	Result adjusted for IBNS					
	Current Study			Previous Study		
	Non-Smoker	Smoker	All	Non-Smoker	Smoker	All
Accelerated (all claims) Male	40%	87%	51%	46%	91%	57%
Accelerated (all claims) Female	52%	77%	58%	52%	72%	57%
Accelerated (excluding deaths) Male	44%	88%	53%	48%	86%	56%
Accelerated (excluding deaths) Female	50%	72%	55%	49%	68%	54%
Stand Alone Male	57%	93%	65%	55%	80%	60%
Stand Alone Female	69%	87%	72%	57%	83%	64%

Note that CIBT93 has separate base tables for male and female; therefore a result of (say) 52% for females and 46% for males does not imply that female experience has been heavier. The base table for each sex is an aggregate table that does not distinguish between smokers and non-smokers, so the non-smoker and smoker results can be compared directly.

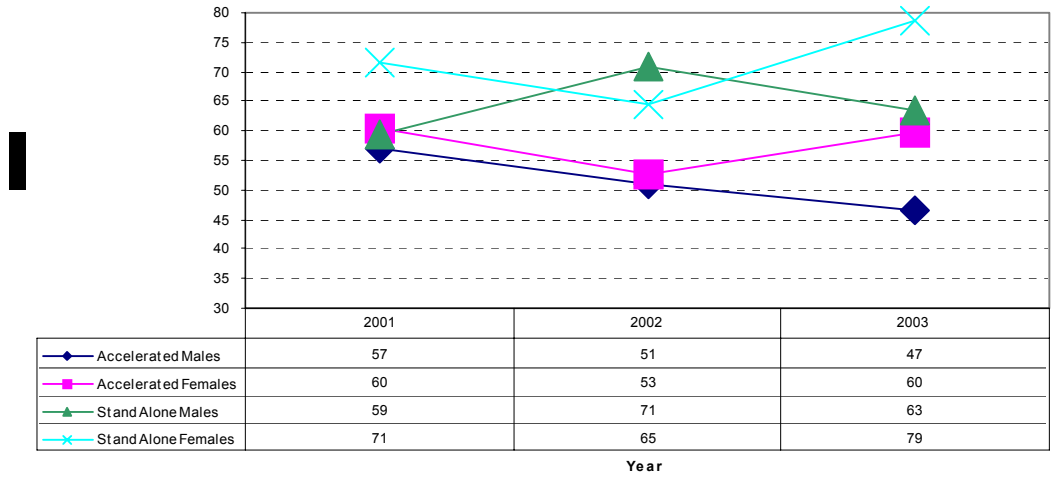
The result is very interesting showing that Accelerated business is broadly at the same levels as for the previous experience (some cells are up some down and there is no strong picture). Stand Alone by contrast shows marked disimprovement from the previous. Each cell is worse with perhaps a 10% overall worsening.

A possible reason for this pattern is discussed in Section 5.2.2.5.

5.2.2.2 Results by Calendar Year

Figure 5.6 shows the results for each individual calendar year.

Figure 5.6 - Adjusted results as % of CIBT93 (Lives) by calendar year



	2001	2002	2003
Accelerated Males	57	51	47
Accelerated Females	60	53	60
Stand Alone Males	59	71	63
Stand Alone Females	71	65	79

For accelerated this appears to show a downward trend but this is not supported by the comparison to the previous study and with relatively small sample sizes no conclusions can be drawn.

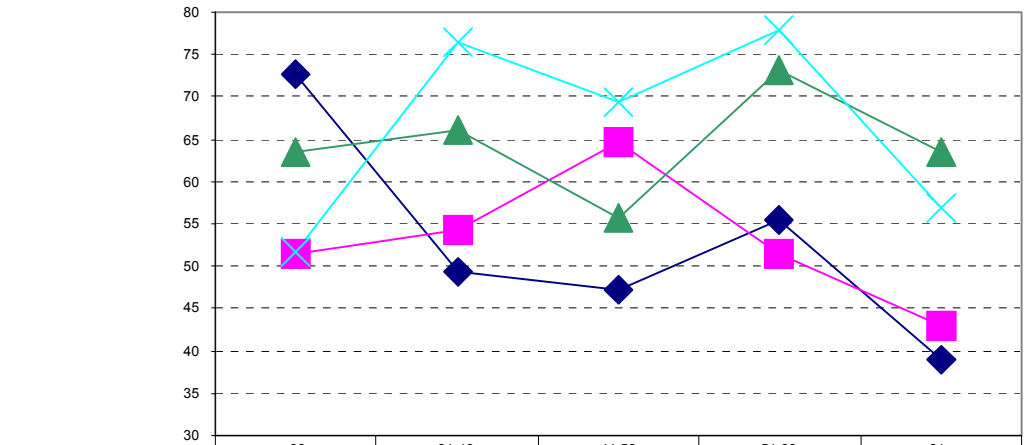
Conversely the Stand Alone shows not much deterioration within the period. However, when we compare the total 2001-2003 experience to the 1995-2000 experience then overall we can see a deterioration in experience.

From this all that can really be said for certain is that clear trends are not apparent and caution is needed as we are still working on relatively small numbers of claims and a maturing portfolio.

5.2.2.3 *Results by Age*

Figure 5.7 shows the results for each age band

Figure 5.7 - Adjusted Results as % of CIBT93 (Lives) by Age



	<30	31-40	41-50	51-60	61+
Accelerated Males	73	49	47	55	39
Accelerated Females	51	54	65	51	43
Stand Alone Males	64	66	56	73	63
Stand Alone Females	52	77	69	78	57

Age Band

The pattern of the results by age doesn't appear to show any marked trend but on closer examination some interesting features emerge. The accelerated male graph does show a marked fall with increasing age. Interestingly this is the same pattern as was seen in the previous study. It would suggest that a tilt to the standard tables is required.

The previous study showed very high claim rates for older females. This was noted and continued monitoring recommended. This has not been repeated at this study so the warnings about possible impact of breast screening programs appear to be unnecessary.

As before we must warn that data is sparse and these examinations split into sub-groups are therefore prone to fluctuation.

5.2.2.4 *Results by Smoker Status*

CIBT93 is an aggregate table that does not distinguish between smokers and non-smokers. We would therefore expect to see differences in experience according to smoker status. The following table shows the overall smoker / non-smoker ratios, based on the results adjusted for IBNS:

Table 5.5 – Smoker / non-smoker ratios adjusted for IBNS

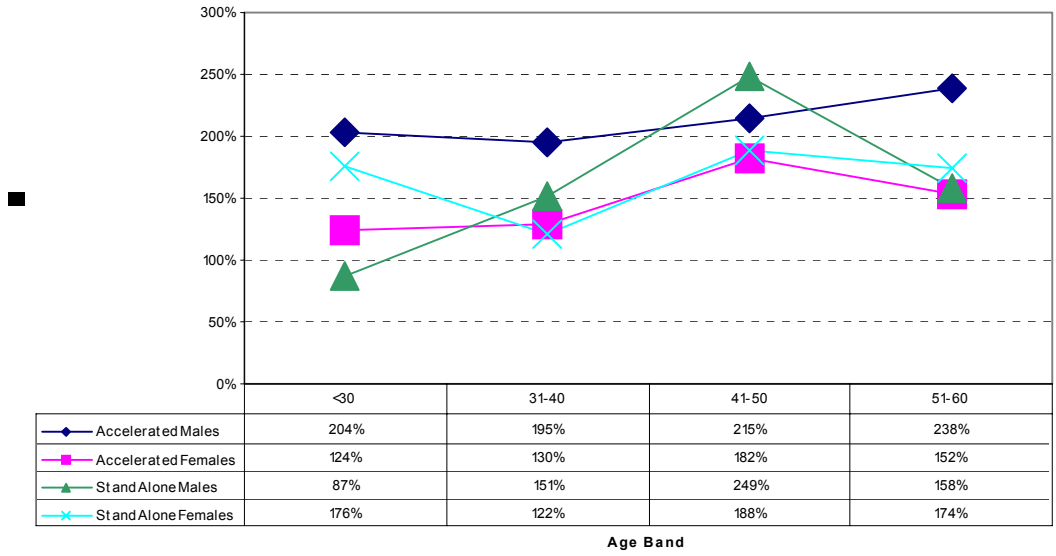
	Accelerated All Claims	**Accelerated Excluding Deaths**	**Stand Alone**
Male	216%	199%	163%
Female	148%	143%	126%

Experience is significantly heavier for smokers, particularly for males. The ratio is particularly high for death claims under Accelerated policies. All ratios except that for Female Stand Alone have worsened since the previous study.

Previous study	Accelerated All Claims	Accelerated Excluding Deaths	Stand Alone
Male	197%	180%	145%
Female	139%	139%	146%

Figure 5.8 shows how these ratios vary with age (age 61+ has been excluded as the volume of data is very small).

Figure 5.8 - Smoker / non-smoker ratio (Lives) by Age Band



	<30	31-40	41-50	51-60
Accelerated Males	204%	195%	215%	238%
Accelerated Females	124%	130%	182%	152%
Stand Alone Males	87%	151%	249%	158%
Stand Alone Females	176%	122%	188%	174%

The ratio generally increases with age, at least up to age 50. This trend does not seem to continue for older ages, and, although we need to bear in mind the small volume of data, the previous study showed the same feature.

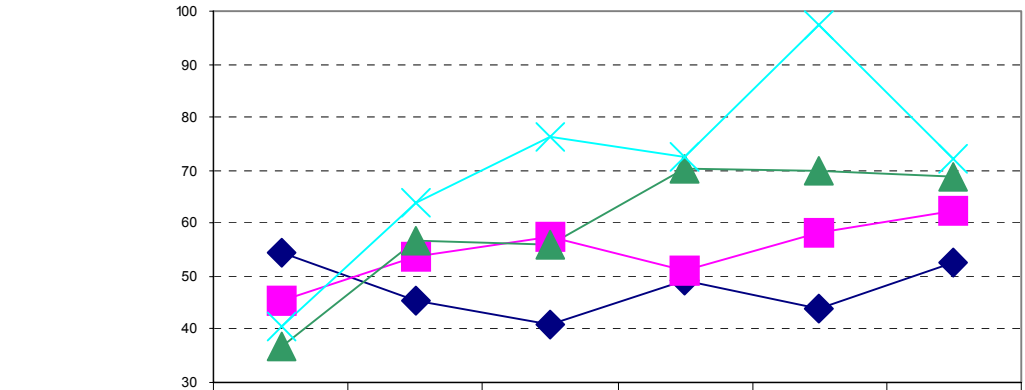
In the last study it was suggested that differentials in aggregate would increase because of the correlation between age and differential and the upward trend in age. The development mentioned above of the male differentials rising and female falling can scarcely be said to demonstrate this but the time period in question is very short. It is not clear from the age-specific ratios that the differential has widened, there may just be more people at higher differentials (i.e. older).

Given the limited exposure, we have again not attempted to produce age related smoker differentials as the starting point for the valuation recommendations.

Results by Duration

Figure 5.9 shows the relationship between experience and duration.

Figure 5.9 - Adjusted Results as % of CIBT93 (Lives) by Duration



	0	1	2	3	4	5
Accelerated Males	54	45	41	49	44	53
Accelerated Females	45	54	57	51	58	62
Stand Alone Males	37	57	56	70	70	69
Stand Alone Females	40	64	76	73	97	72

Duration

There is no clear consistent pattern here but it appears that Accelerated does not show the same selection effect as Stand Alone.

If this is the case it may explain why Stand Alone experience is worsening while Accelerated is not. The business in force is ageing by duration so the apparent worsening may simply be selection effects evapourating.

Reasons why Stand Alone may be more prone to selection are:-

- Accidental death may dilute the selection effect or mortality improvements may be offsetting selection
- Stand Alone may be less mortgage related and therefore more heavily underwritten. Notably there may be less “short app” policies for Stand Alone business
- Stand Alone policies are for older people on average so selection more important.

A few years ago there was concern that female cancers might be causing anti-selection but there is no more evidence for this than for the last study so we may regard that issue as closed.

5.2.2.5 Results by Distribution Channel

The following table shows the adjusted actual as a % of expected for the main distribution channels, the previous study figures are shown in brackets.

Table 5.6 – Adjusted Results by distribution channel

	Accelerated Male	Accelerated Female	Stand Alone Male	Stand Alone Female
Bancassurer	52%(51%)	40%(46%)	80%(57%)	76%(97%)
Direct sales	51%(67%)	60%(64%)	63%(70%)	70%(57%)
IFA	53%(51%)	66%(55%)	59%(50%)	74%(68%)

This reveals quite a different pattern than that at the last study. Then there was clear evidence of direct sales having worse experience than the other two channels. That has now disappeared with now no clear signal at all. Bancassurance has curious results with the Accelerated Female much lower than other channels but Stand Alone Male much higher. It seems hard to believe that this is anything other than random fluctuations.

5.2.3 Results on Amounts basis

The following table summarises the key results on an amounts (sum assured) basis, comparing actual claims to expected claims from CIBT93 after adjusting for IBNS:

Table 5.7 – Adjusted results by cohort (Amounts)

	Result adjusted for IBNS		
	Non-Smoker	**Smoker**	**All**
Accelerated (all claims) Male	42%	86%	51%
Accelerated (all claims) Female	51%	64%	54%
Accelerated (excluding deaths) Male	47%	89%	54%
Accelerated (excluding deaths) Female	50%	61%	51%
Stand Alone Male	55%	78%	59%
Stand Alone Female	70%	73%	71%

Comparing with the results on a Lives basis shown in table 5.4 gives the following ratio of Amounts experience to Lives experience:

Table 5.8 – Ratios of Amounts experience to Lives experience

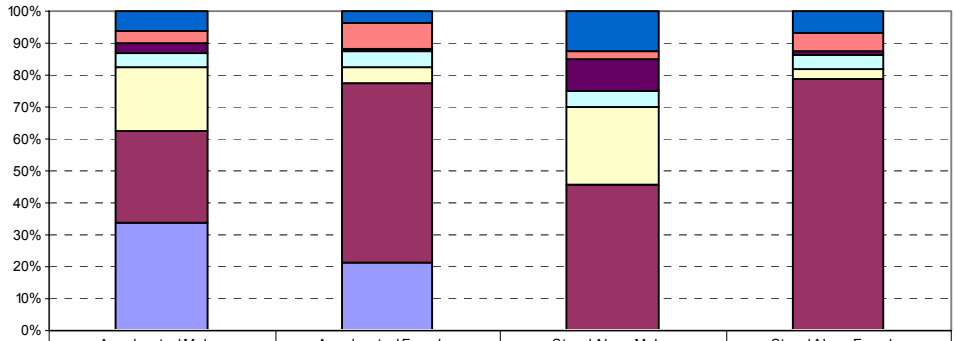
	Result adjusted for IBNS Amounts as % of Lives		
	Non-Smoker	**Smoker**	**All**
Accelerated (all claims) Male	104%	99%	99%
Accelerated (all claims) Female	99%	84%	93%
Accelerated (excluding deaths) Male	106%	100%	102%
Accelerated (excluding deaths) Female	100%	84%	94%
Stand Alone Male	96%	83%	91%
Stand Alone Female	102%	84%	99%

As for the previous report there is no clear picture emerging from this, with fluctuations obscuring any selection one way or another.

5.2.4 Results by Cause of Claim

Figure 5.10 shows the main causes of claims on a Lives basis.

Figure 5.10 - Distribution of claims by cause

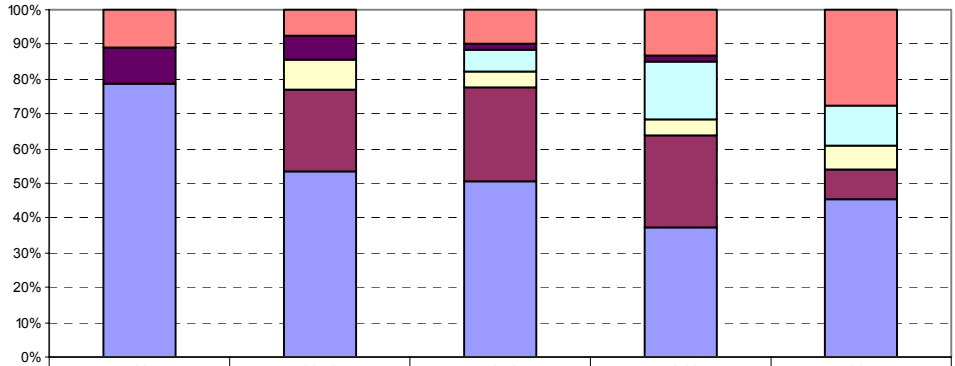


	Accelerated Males	Accelerated Females	Stand Alone Males	Stand Alone Females
Other	6%	4%	12%	7%
Multiple Sclerosis	4%	8%	3%	6%
CABG	3%	0%	10%	1%
Stroke	4%	5%	5%	5%
Heart Attack	20%	5%	24%	3%
Cancer	29%	57%	45%	79%
Death	33%	21%	0%	0%

For females the key illness is cancer, which accounted for three-quarters of the female non-death claims in the investigation. This figure being unchanged from the previous investigation. For males cancer is also important, as is heart attack and these two causes account for about two thirds of male non-death claims. CABG has fallen as a proportion as has heart attack. Other causes by contrast appear to be increasing but this is likely to be due to the claim allocation issues described in Section 3.4.

The distribution of claim causes varies significantly with age. To illustrate this, Figure 5.11 shows the distribution of male Stand Alone claims for each age group.

Figure 5.11 - Distribution of Claim Cause by Age for Male Stand Alone



	<30	31-40	41-50	51-60	61+
Other	11%	7%	10%	13%	27%
Multiple Sclerosis	11%	7%	2%	2%	0%
CABG	0%	0%	6%	17%	11%
Stroke	0%	9%	4%	4%	7%
Heart Attack	0%	23%	27%	27%	8%
Cancer	79%	54%	50%	37%	46%

Cancer is important at all ages, particularly the younger age bands. Circulatory causes are important from age 30 onwards; the low proportion at above age 60 probably being a statistical fluctuation rather than a definite feature and is probably explained by a number of these claims being included in the Other category due to the claim allocation issues described in Section 3.4.

Table 5.9 below summarises the main results (Actual as % of Expected, Lives Basis). Note that 'Other' and 'Unknown' claims are not shown as there is no Expected figure; however both are included in the "All" claims result as a significant number of the Other claims are actually claims from the main causes that had to be classified as Other due again to the claim allocation issues described in Section 3.4.

Table 5.9 – Adjusted results as % of CIBT93 (Lives) by cause of claim

	Accelerated Males	**Accelerated Females**	**Stand Alone Males**	**Stand Alone Females**
Cancer	47%	52%	51%	65%
Heart Attack	40%	49%	34%	23%
Stroke	18%	22%	14%	18%
CABG	35%	21%	76%	66%
Multiple Sclerosis	94%	86%	48%	60%
Kidney Failure	10%	32%	12%	63%
MOT	0%	25%	0%	95%
TPD	6%	0%	4%	0%
Death	44%	71%		
All	51%	58%	65%	72%

From this table and the more detailed results we can note the following points:

- Experience for all causes is lighter than CIBT93; this is to be expected as the table is derived from population data rather than insured lives.
- CABG for males was unusual in the previous report in having experience equal to or heavier than the base table. It was felt that this was not unexpected given the rapid growth in the practice of this procedure. This time however there appears to be a sharp differential between stand alone and accelerated. No reason for this is apparent.
- TPD experience is exceptionally light. This was a feature in the previous report also. One possible reason for this could be that TPD is likely to be caused by factors that are also CI claims under other definitions (e.g. heart attach or cancer). It will always be simpler to establish the claim under the specific cause rather than debating the level of disability so other claims types will take preference.
- MS appears to be relatively heavy, particularly on Accelerated business

6 Office by Office Analysis

6.1 Introduction

Undertakings were given to all participating offices that no confidential information, especially relating to actual experience, would be divulged to anyone. For this reason, almost all figures quoted here are proportions or percentages, without accompanying actual number of claims, expected number of claims or volumes of exposed to risk. Data on which this Section relies are included in Appendix 3.

No member of the Working Party has seen any individual office's output, other than their own, with this section having been prepared for the Working Party by the CMI.

6.2 Exposed to Risk 2001-2003 (Lives)

Because sales volumes are generally available from press releases, trade figures and regulatory returns, the following table does show actual total volumes of exposed to risk contributed to this study by each office.

Table 6.1 - Exposure 1995-2003 all types combined

	Total exposure (in life years) 000's		% of exposure	
Office	**1995-2000**	**2001-2003**	**1995-2000**	**2001-2003**
Irish Life	393.9	318.1	36.7%	32.6%
Canada Life	117.9	158.4	11.0%	16.2%
New Ireland	161.5	132.7	15.1%	13.6%
Lifetime	78.8	104.7	7.4%	10.7%
Eagle Star	47.7	77.3	4.5%	7.9%
Irish Progressive	154.8	70.0	14.4%	7.2%
Acorn Life	44.6	59.1	4.2%	6.1%
Friends First	44.2	56.8	4.1%	5.8%
Hibernian Life	28.9	n/a	2.7%	n/a
Standard Life	0.2	n/a	0.0%	n/a
Total	**1,072.5**	**977.1**	**100.0%**	**100.0%**

All offices are included in the 2001-3 submitted data for each of the years. This was not the case in 1995-2000 where some years were omitted. For both investigations some offices may have been unable to include all their critical illness business, but omissions were consistent on both exposure and claims.

The total annual exposure appears to have increased significantly since the last investigation as the latest investigation represents three years instead of six. This is due to the fact that some exposure years' data was missing for 1995-2000.

The above combines all policy and cover types, sexes and smoking statuses.

Standard Life did not participate in the investigation as they are no longer active in the protection/critical illness market. Hibernian did not participate due to involvement in a merger although have indicated that they plan to participate in future investigations.

6.3 Analysis of Exposed to Risk 2001-2003

Using sex, smoking status and type of critical illness benefit, the following proportions of total exposure based on life years are shown in Table 6.2

Table 6.2 – Distribution of exposure 2001-2003 (Lives)

	Accelerated				Stand alone			
	Male		Female		Male		Female	
Office	**N/S**	**Smoker**	**N/S**	**Smoker**	**N/S**	**Smoker**	**N/S**	**Smoker**
A	8%	3%	6%	2%	38%	12%	24%	7%
B	10%	5%	12%	3%	26%	11%	29%	5%
C	20%	7%	19%	6%	20%	7%	16%	5%
D	23%	8%	22%	7%	16%	6%	13%	5%
E	25%	10%	24%	9%	13%	4%	11%	3%
F	27%	8%	25%	7%	14%	3%	11%	3%
G	30%	10%	28%	9%	10%	3%	8%	2%
Overall 2001-2003	**21%**	**7%**	**20%**	**6%**	**20%**	**7%**	**16%**	**4%**
Overall 1995-2000	**21%**	**8%**	**18%**	**7%**	**20%**	**7%**	**14%**	**5%**

Table 6.2 has been sorted in increasing proportions of non-smoker male Accelerated business which has the largest volume of exposed lives of the 8 categories shown. One office that sells Accelerated business only has been omitted.

The overall figures from the 1995-2000 report are included for comparison. Note that the letters used to represent offices may differ from the previous report.

Table 6.2 can be re-expressed to provide the following summary data:

Table 6.3 – Summary distribution of exposure 1995-2000 (Lives)

	Total			Accelerated	Stand alone	Male	Female
Office	**Accelerated**	**N/S**	**Male**	**N/S**	**N/S**	**N/S**	**N/S**
A	19%	77%	61%	76%	77%	75%	78%
B	29%	77%	52%	73%	78%	74%	75%
C	52%	75%	54%	74%	75%	74%	75%
D	60%	74%	52%	75%	73%	74%	75%
E	68%	74%	52%	76%	78%	71%	85%
F	68%	78%	53%	77%	79%	78%	78%
G	77%	76%	53%	76%	77%	76%	76%
Overall 2001-2003	54%	75%	54%	75%	77%	75%	77%
Overall 1995-2000	**53%**	**73%**	**56%**	**73%**	**74%**	**73%**	**73%**

As with the 1995-2000 data, all the offices have very similar splits of smoker / non-smoker with the latter contributing about three-quarters of the exposure. The smoking split again seems similar for both Accelerated and Stand Alone critical illness cover and – as in 1995-2000 - is consistent for both sexes.

Overall, just over half the business is Accelerated. While most offices sell more of this type, two sell predominantly Stand Alone cover.

Most offices sell just over half their business to male lives assured. That this is around 50% is not surprising, as over two-thirds of all business is joint or dual life.

Table 6.4 - Average sums assured (Amount in Euros)

	Male		Female		Male		Female	
Office	**Accelerated**		**Accelerated**		**Stand alone**		**Stand alone**	
	N/S	**Smoker**	**N/S**	**Smoker**	**N/S**	**Smoker**	**N/S**	**Smoker**
A	66,346	60,040	62,130	53,226	72,331	62,155	62,226	51,156
B	91,527	75,358	71,580	66,438	77,767	63,950	59,224	51,562
C	88,034	72,149	75,382	62,415	72,358	57,200	61,250	50,073
D	72,491	60,014	65,671	52,961	60,289	45,908	52,766	40,360
E	89,627	80,079	82,768	73,131	81,783	67,066	70,924	54,553
F	104,137	88,225	96,658	79,593	93,516	77,557	76,959	61,429
G	66,575	57,601	76,433	53,374	82,254	69,750	63,978	52,889
Overall 2001-2003	**80,201**	**67,706**	**71,190**	**59,732**	**72,370**	**58,483**	**59,864**	**47,887**
Overall 1995-2000	**58,743**	**50,298**	**52,156**	**44,911**	**59,109**	**47,694**	**49,112**	**39,570**

Note: The sums assured quoted here were calculated by dividing the total exposure in amounts during 2001-2003 by the corresponding life year exposure. They are therefore not exactly average sums assured at inception, but reflect indexations and other changes that may have occurred since sale.

This shows that for most offices male sums assured exceed female ones by close to the average of about 13% for accelerated and 21% for stand-alone business. The exception is Office G where for non-smokers, female sums assured exceed males.

There is also little variation between offices in comparing sums assured for non-smokers with smokers. For accelerated business, sums assured are higher for non-smokers by about 19%, and for stand-alone business by about 24%.

Table 6.5 - Product type analysis with lives and sums assured

	% mix of life years exposure			Average Sum Assured			
Office	**Single**	**Joint**	**Dual**	**Single**	**Joint**	**Dual**	**Overall**
(i)	46%	34%	20%	89,033	101,240	84,307	92,271
(ii)	29%	32%	39%	90,686	80,784	72,323	80,402
(iii)	27%	14%	59%	84,488	99,451	58,907	71,465
(iv)	36%	64%	0%	78,319	66,002	0	70,418
(v)	29%	0%	71%	85,614	93,222	63,540	69,879
(vi)	49%	43%	8%	71,629	56,426	76,583	65,430
(vii)	24%	10%	66%	76,990	46,743	60,661	63,291
(viii)	24%	40%	36%	71,425	65,813	48,759	60,929
Overall 2001-2003	31%	29%	41%	79,197	70,367	59,550	68,649
Overall 1995-2000	32%	15%	53%	63,691	58,036	44,856	52,888

The numbering of offices in this table does not match to that in Tables 6.2 to 6.4.

Because their mix of distribution channels is a clear identifier for a number of offices, no analysis of exposure by sales channels is shown here.

There has been a shift from dual life cases to joint life since the last investigation. Overall the proportion of single life cases has remained the same, while the average sum assured has increased in all cases.

6.4 Analysis of Results

The Working Party did not start with an expectation but were open to the possibility that certain patterns might be detected when scrutinising results at individual office level. Some offices might have consistently different results to their competitors. These might be based on offices utilising different underwriting practices, or different sales channels or marketing approaches. Alternatively, certain patterns might be noticed in (almost) all offices, thereby confirming as real a feature that might otherwise be considered just a random outcome, if only considered at the overall level.

However, no clear patterns emerged where any office displayed significantly different results from the rest. The main reason for this remains the relatively small size of most offices' portfolios, which means that the variability of results is simply too large to enable any real differences in underlying experience to emerge.

The following data and analyses are shown in the hope that they prove of interest and somewhat informative to readers.

6.4.1 Overall results:

The data supporting most of these analyses are in Appendix 3. They come directly from the CMI reports to individual offices as well as the overall study. All figures quoted are as produced by the CMI and in particular have NOT been adjusted for any IBNS / IBNR effects as described in Section 4 and as carried out for most studies in Section 5.

All comparisons of claims against a standard table in this analysis use CIBT93.

In this Section, results shown are mainly based on Lives rather than Amounts, and relate to aggregate results without showing the underlying smoker / non-smoker split. Amounts and smoking status are both addressed briefly

Please note that office designations are the same throughout sections 6.4.1 to 6.4.5 and in the underlying tables in Appendix 3, i.e. Office 1 is the same office throughout, but is not related in any particular way to Office A or Office (i) in the tables shown earlier in this Section. The offices are sorted in ascending 100A/E aggregate result for 2001 - 2003 for male Accelerated business, which has the biggest exposure of the four sex / cover combinations, on a lives basis.

Zero entries indicate an exposure but no claim.

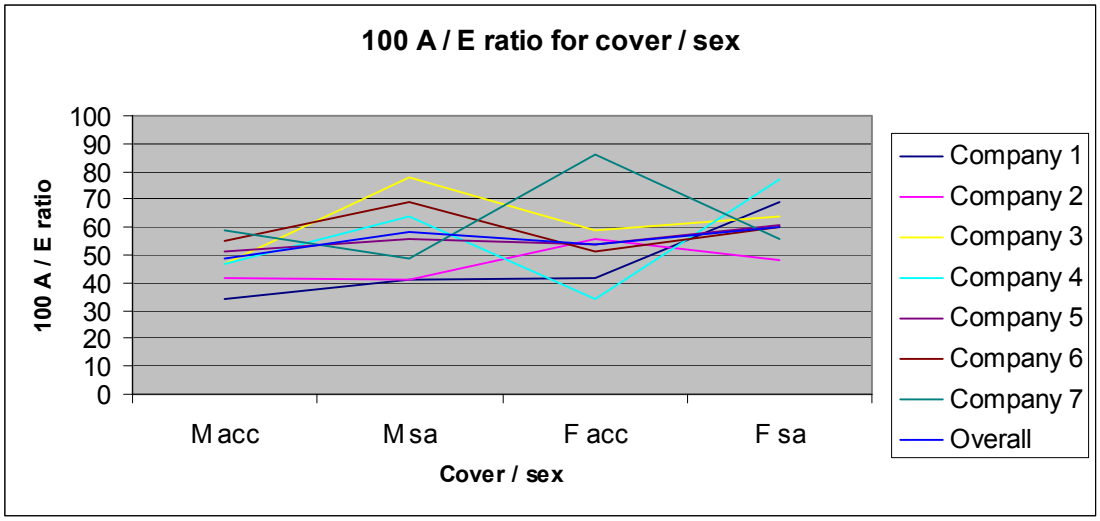
Considering Tables A3.1 to A3.4 in Appendix 3, one can see that the ratios for any given office vary a lot between smoker status, cover type, sex and calendar year. To help spot any trends in relative office performance, we can consider its ranking rather than the 100A/E ratio. Tables A3.9 to A3.12 are Tables A3.1 to A3.4 with rankings in place of 100A/E, with a ranking of 1 indicating the lightest experience among all the offices for a given column.

Table 6.6 - Average ranking from Tables A3.9 to A3.12 in Appendix 3

Year	2001-03	2001-03	2001-03	2001	2002	2003
Smoking status	**N/S**	**Sm**	**Agg**	**Agg**	**Agg**	**Agg**
Office 1	2.75	3	2.5	3.25	3	2.75
Office 2	2	3.75	2.25	3	2.5	4.75
Office 3	5.25	4.25	5.25	4.75	4.75	4
Office 4	4.5	4.25	4	4.25	3.25	4.25
Office 5	3	5	4.25	5.25	2.5	4.25
Office 6	5.25	4	4.5	3	5.25	4
Office 7	4.75	3.5	4.75	4.25	5.5	3.75

The above table simply averages (arithmetically) the 100A/E ratios of the 4 corresponding entries in Tables A3.9 to A3.12 in Appendix 3. No weightings are allowed for, despite the exposures clearly being different for the four sex / cover combinations.

Figure 6.1 - Graph of 2001-2003 aggregate 100A/E ratios



We can also consider Figure 6.1 based on the 2001 - 2003 aggregate 100A/E ratios in Tables A3.1 to A3.4.

At first glance, one might think that Office 1 is enjoying consistently light experience, with Office 7 (and perhaps 3) incurring consistently heavier experience. However, underlying many of the data points, which are point estimates for the underlying performance rate of the offices, is a relatively small and not fully credible exposure. In the above cases, none of the points shown for an individual office is actually significantly different from the overall mean result for the group of offices for that sex / cover combination (at a 5% significance level) when proper allowance is made for the actual portfolio size and estimated variation.

The variability of the results is not surprising when one considers the following for a hypothetical office: - A typical result for a medium-sized office for the full period 2001 - 2003 for males accelerated might be an exposed to risk of 120,000 lives, 450 expected claims with 250 actual, giving an A/E ratio of 56%. An approximate 95% confidence interval for the A/E ratio is about 34%-78%.

6.4.2 Results by duration and calendar year

Given this amount of variability at the office level for an entire contract type for 2001 - 2003, there seems little point in sub-dividing the data even further into duration or into calendar years. The variation would be expected to be much greater, and also the impact of IBNS would weigh most heavily in the interpretation of those two groupings, especially with different offices having differing levels of sales growth and portfolio maturity.

Therefore no analyses of this type are shown here, although the Working Party confirms that the divisions were considered and no unusual results found outside of the expected variability.

6.4.3 Smoking status

Every office shows heavier experience for smokers compared with non-smokers, with overall smoker/non-smoker ratios at office level falling into a range from 130 to 192%. In some cases, offices experienced lighter 100A/E ratios for smokers than non-smoker for some sex / cover combinations, but there is little consistency to these occurrences which are likely to reflect the small datasets. The possible exception to this is office 2, which had noticeable lighter experience for smokers than non-smokers for both males and females for stand-alone business, however these are based on low numbers of actual and expected claims.

6.4.4 Amounts

Table 6.7 - Amounts vs. lives

	Male acc	Fem acc	Male SA	Fem SA
Overall	**94%**	**89%**	**90%**	**88%**
Office 1	88%	100%	100%	93%
Office 2	86%	79%	93%	119%
Office 3	132%	81%	78%	64%
Office 4	102%	85%	97%	79%
Office 5	88%	100%	113%	84%
Office 6	115%	90%	97%	110%
Office 7	76%	71%	76%	89%
Overall 2001-2003	**94%**	**89%**	**90%**	**88%**
Overall 1995-2000	**94%**	**102%**	**91%**	**93%**

Figure 6.2 - Amounts vs. lives

Table 6.7 and Figure 6.2 indicate the results obtained when the Amounts results from the 2001-2003 aggregate columns in Tables A3.9 to A3.12 in Appendix 3 are divided by their counterparts in Tables A3.1 to A3.4.

Overall the experience tends to be slightly lighter on an Amounts basis compared to a Lives basis. Although it does not apply to all categories for all offices, the variations may result from statistical fluctuations.

Male experience has remained relatively stable since the last investigation, while female experience has been lighter on an Amounts basis, most notably for accelerated business.

The aggregate 100A/E ratio for each office was also compared with its corresponding average sum assured and the following correlation coefficients calculated:

- Male Accelerated - 0.34
- Female Accelerated - 0.03
- Male Stand Alone - 0.48
- Female Stand Alone +0.09

A negative result implies a lighter claims experience for higher sums assured. These results are similar to those in 1995-2000 when it was noted that these give further support for the idea that higher sums assured among males are associated with lighter experience, whereas the results for females are less conclusive.

6.4.5 Cause of claim

Tables A3.17 to A3.20 in Appendix 3 analyse Critical illness claims by major cause grouping.

Many of the numbers are supported by small amounts of data making it difficult to draw clear conclusions. However it does again appear that some of the patterns of the overall study are replicated across offices, for example relatively low A/E's for Stroke and higher values for MS.

As in the previous report we have “re-indexed” the results to try to make it easier to highlight variations within the same offices (both over the different causes within one cover type and also across cover types). Individual entries for a cause within a sex / cover type have been divided by the overall 100 A/E ratio for that office for the particular sex / cover combination. The final column of entries now becomes a norm of one for each office. Entries of greater than one mean that RELATIVE to that office’s overall results a particular cause is over-represented and values under one imply under-representation. The re-indexed results are in Tables A3.21 to A3.24 of Appendix 3.

Multiple sclerosis seems to experience heavier 100 A/E ratios than the overall result. This is particularly evident for accelerated benefits. The experience has been quite variable with very high ratios in some offices and no claims in other offices. Similar results can be seen for stand alone multiple sclerosis and CABG benefits.

Heart attack and stroke appear to be under represented, particularly for stand alone females. Stroke appears to have the lightest experience across all benefits with no stand alone claims in the majority of the offices.

6.4.6 Sales Channels

Many of the offices would be readily identified if their full results were shown for all their sales channels.

However, most offices use both direct sales and IFA’s, and the subset of results for them are in Table 6.8:

Table 6.8 - Sales channel (100A/E aggregate for lives)

	Male Accelerated		Female Accelerated		Male Stand Alone		Female Stand Alone	
	DS	**IFA**	**DS**	**IFA**	**DS**	**IFA**	**DS**	**IFA**
Overall	**51**	**51**	**60**	**57**	**55**	**54**	**58**	**61**
Office 1	21	38	29	40	36	39	50	69
Office 2	32	57	74	68	42	50	29	69
Office 3	66	35	33	56	79	47	76	46
Office 4	54	53	58	61	56	59	60	71
Office 5	41	65	58	45	70	67	51	70
Office 6	71	48	94	80	48	50	61	49

(The office codes here are NOT related to those in other tables.)

Again, it is almost impossible to discern a clear pattern.

For male Accelerated business, the overall experience is the same for the two channels, but the results for individual offices vary significantly. For female Accelerated business, direct sales has the heavier overall experience, but three of the six individual offices show lighter direct sales results.

For male Stand Alone policies, the overall experience is again very similar and this is reflected in the results of most of the individual offices. For female Stand Alone business, IFA has slightly heavier overall experience, but the comparison for individual offices varies significantly.

One must continue to remember that the volume of data supporting many of these results is small.

7 Comparison of UK and Irish Results

7.1 Introduction

In the UK, the CMI is examining the experience of UK assured lives. Results for years up to 2003 have been released to CMI member offices, but only high-level results have been published in presentations to seminars (for example, see http://www.actuaries.org.uk/files/pdf/cmi/seminar/cici_dec05.pdf).

However, the CMI has kindly provided us with UK results for the years 1999-2002, which has allowed us to consider differences in experience between the two markets. In view of other differences between the two markets, we do not think that any material discrepancy arises between comparing Irish results for 2001-3 with UK results for 1999-2002.

The comparisons below make no allowance for IBNS. As described in Section 4.5 there are two adjustments required. Claims diagnosed prior to the investigation period must be removed and an estimate made for IBNS.

For the UK, the CMI investigation suffers from the fact that date of diagnosis is frequently not provided, and needs to be estimated from other dates using claims where it is known. The basis for estimation has changed since the 1999 results that were included in the previous report were released. As well as the uncertainty this introduces into the results reported, it also makes the estimation of IBNS more difficult. The CMI has estimated that the overall adjustment required is to inflate A/E's by 15%, i.e. to multiply by 1.15. However the adjustments vary between subsets of the data and whilst the CMI has shown some estimates, work is continuing on the estimation of these factors.

Consequently, the comparisons between the two investigations, whilst interesting, should nevertheless be taken as points of interest rather than indicative of true differences.

7.2 Exposure and Data

A crude comparison of the data from both investigations shows that for Accelerated policies over the two periods the UK investigation has 12.0 times the exposure and 9.5 times the claims whilst, for Stand Alone, the UK investigation has 2.3 times the Irish level of exposure with 1.7 times the number of claims.

Unlike the Irish market, which is evenly split between Stand Alone and Accelerated, the UK data is heavily weighted towards Accelerated policies (often sold in connection with a mortgage), with Stand Alone accounting for only 14% of the business.

The table below sets out some summary figures on the exposure and claims for the current periods. The figures for 1998-9 included in the previous report are also included for comparison. This clearly illustrates the substantial relative growth in the UK investigation since the previous period - in particular there was a large increase in data volumes from 1998 to 1999 to 2000, reflecting offices joining the investigation. There has been steadier growth in exposure subsequently

Table 7.1 – Summary exposure and claims data

	Latest Period*	**1998-1999**
Exposure (years 000's)		
Ireland Accelerated	531	220
UK Accelerated	6,389	1,433
Ireland Stand Alone	446	216
UK Stand Alone	1,008	186
Number of Claims		
Ireland Death Claims	246	131
UK Death Claims	2,332	634
Ireland Accelerated Non-Death Claims	841	283
UK Accelerated Non-Death Claims	7,978	1,515
Ireland Stand Alone Claims	874	367
UK Stand Alone Claims	1,493	246

* Latest period = 2001-2003 for Ireland and 1999-2002 for the UK

7.2.1 Males and Females

The division of data between males and females for both exposure and claims is similar for both investigations. Broadly speaking, males make up nearly 55% of the data based on lives and a slightly higher % when based on amounts. The table below shows the proportion of males in terms of exposure and claims for both lives and amounts data.

Table 7.2 – Proportion of males in exposure

	Exposure Lives	**Exposure Amounts**	**Claims Lives**	**Claims Amounts**
Ireland 2001-3	*54%*	*57%*	*59%*	*62%*
UK 1999-2002	*53%*	*56%*	*57%*	*62%*

These figures are very similar to those in the previous report for 1998-9.

7.2.2 Smoker / Non-Smoker Split

Smokers make up 25% of the lives included in the Irish investigation compared to only 19% in the UK investigation. On an amounts basis, the proportion of smokers is lower in both investigations (Ireland 21%, UK 17%). The figures are all slightly lower than shown in the previous report.

Table 7.3 - Smokers as a % of Exposure

	Ireland	UK
Lives		
Smokers as a % of Exposure	25%	19%
Sums Assured		
Smokers as a % of Exposure	21%	17%

7.2.3 Exposure by Duration

Table 7.4 below compares the exposure by duration which shows that the UK data is less mature than the Irish data. For both Ireland and the UK, the data has matured considerably compared to the previous report, especially if one looks at durations 5+.

Table 7.4 - Distribution of Exposure by Duration for years 1998 and 1999

Duration	Ireland Accelerated	UK Accelerated		Ireland Stand-Alone	UK Stand-Alone
0	18%	26%		15%	28%
1	15%	20%		13%	21%
2	13%	15%		12%	15%
3	11%	12%		11%	12%
4	9%	9%		11%	9%
5+	33%	19%		38%	16%

This is likely to have a significant impact on crude claim rates and makes simple comparisons between the UK and the Irish experiences difficult.

7.2.4 Distribution of Exposure and Claims by Age

Table 7.5 - Distribution of Claims and Exposure by Age for years 1998 and 1999 combined

Age	<30	31-40	41-50	51-60	61+
Ireland Accelerated Exposure	19%	46%	27%	7%	0%
Ireland Stand Alone Exposure	19%	43%	28%	9%	1%
Ireland Accelerated Claims	8%	28%	37%	25%	2%
Ireland Stand Alone Claims	5%	24%	34%	33%	4%
UK Accelerated Exposure	27%	45%	21%	6%	0%
UK Stand Alone Exposure	21%	46%	25%	7%	1%
UK Accelerated Claims	10%	31%	33%	23%	3%
UK Stand Alone Claims	6%	27%	35%	29%	3%

Unsurprisingly, given that the UK experience appears less mature, the distribution by age is also younger, although the 31-40 age band contains nearly half the exposure for both Ireland and the UK. Unsurprisingly, the claims are weighted more towards the older ages, reflecting claim rates increasing with age. Neither investigation has any real volume of data beyond age 60.

7.2.5 Exposure and claims by Calendar Year

Table 7.6 below compares the exposure and claims by calendar year.

Table 7.6 – Comparison of exposure and number of claims by calendar year

Year	1999	2000	2001	2002	2003	Total
Ireland Accelerated Exposure			167,584	176,865	186,680	531,129
Ireland Stand Alone Exposure			137,807	147,304	161,068	446,179
Ireland Accelerated Claims			366	334	387	1,087
Ireland Stand Alone Claims			218	312	344	874
UK Accelerated Exposure	1,140,222	1,440,053	1,714,952	2,093,590		6,388,817
UK Stand Alone Exposure	156,780	218,887	277,557	354,326		1,007,550
UK Accelerated Claims	1,924	2,350	2,770	3,266		10,310
UK Stand Alone Claims	245	329	349	570		1,493

This clearly demonstrates the larger scale of the UK investigation and the more rapid growth, which has been generated by companies joining the CMI investigation, as well as by genuine market growth.

7.3 Comparison with CIBT93

7.3.1 Overall

Overall the results would suggest that UK experience is lighter than Irish experience. This might reflect its relative immaturity but it is important to note that the impact of IBNS for both investigations will also be different.

Table 7.7 sets out the range of results for each investigation across the two periods combining both Accelerated and Stand Alone business (e.g. for male non-smokers the Irish results over 2001-3 fall between 37% and 55% of CIBT93).

Table 7.7 - Range of Results as a % of CIBT93

	Ireland	**UK**
Male non-smokers	37% - 55%	35% - 49%
Male smokers	72% - 99%	58% - 78%
Females non-smokers	43% - 63%	39% - 58%
Female smokers	59% - 84%	24% - 70%

The corresponding ranges in the previous report appeared to indicate that for all categories Irish experience was heavier than that in the UK investigation for 1998-1999. The position for the more recent periods shows considerable overlap between the equivalent ranges. But in all cases both the lower and upper end of the range are lower for the UK than for Ireland.

Table 7.8 summarises the results from each year.

Table 7.8 - Summary of as a % of CIBT93 by year

	Male Non-Smoker	Male Smoker		Female Non-Smoker	Female Smoker
Accelerated					
Ireland 2001 Lives	45%	99%		47%	84%
Ireland 2002 Lives	37%	74%		47%	59%
Ireland 2003 Lives	37%	72%		52%	70%
UK 1999 Lives	40%	70%		51%	60%
UK 2000 Lives	39%	69%		47%	52%
UK 2001 Lives	39%	67%		40%	60%
UK 2002 Lives	35%	58%		42%	55%
Ireland / UK Lives	103%	117%		109%	125%
Ireland / UK Amounts	103%	118%		107%	108%
Stand Alone					
Ireland 2001 Lives	42	73		43	80
Ireland 2002 Lives	53	97		63	70
Ireland 2003 Lives	55	81		62	78
UK 1999 Lives	49	58		58	55
UK 2000 Lives	47	75		51	24
UK 2001 Lives	38	65		39	57
UK 2002 Lives	44	78		58	70
Ireland / UK Lives	116%	114%		110%	133%
Ireland / UK Amounts	107%	89%		93%	102%

The results above suggest that UK experience is only marginally lighter than Irish experience. However, a recent paper, “A Critical Table”, highlighted the poor UK experience on policies with a sum assured less than £10,000 and calculated that overall UK experience would be 10% lighter if such policies were excluded. There are very few such policies in the Irish exposure so this would suggest that like for like UK experience could be materially lighter but we have to stress that at least part of the difference could easily be accounted for by the greater maturity of the Irish business and the adjustments for IBNS.

7.3.2 Smoker Differentials

Smoker / non-smoker differentials are not dissimilar for both investigations overall. Both show significantly higher differentials for males than for females. Differentials in Ireland appear to be falling, whereas the picture is less clear in the UK.

Table 7.9 - Smoker Differentials; A/E for smokers as % of A/E for non-smokers

	Accelerated		Stand Alone	
	Males	**Females**	**Males**	**Females**
Ireland 2001	220%	179%	174%	186%
Ireland 2002	200%	126%	183%	111%
Ireland 2003	195%	135%	147%	126%
UK 1999	175%	118%	118%	95%
UK 2000	177%	111%	160%	47%
UK 2001	172%	150%	171%	146%
UK 2002	166%	131%	177%	121%

7.3.3 Durational Effect

Table 7.10 looks at the results by duration. For practical reasons, only the statistics for male non-smokers are shown.

Table 7.10 - Results by Duration as a % of CIBT93 for Male Non-Smokers

	Ireland			UK		
Duration	**Accelerated incl. Mort**	**Accelerated excl. Mort**	**Stand Alone**	**Accelerated incl. Mort**	**Accelerated excl. Mort**	**Stand Alone**
0	42%	45%	35%	31%	33%	36%
1	41%	46%	54%	37%	42%	45%
2	46%	48%	37%	43%	49%	48%
3	39%	44%	57%	41%	45%	57%
4	30%	31%	56%	37%	40%	44%
5+	38%	42%	52%	41%	43%	42%
All	39%	43%	51%	38%	41%	44%

The Irish results appear to indicate heavier experience than the UK in the early years for accelerated business, but lighter experience at longer durations. The effect of selection therefore superficially at least, appears to be quite different.

The pattern of results for stand-alone business is less clear, reflecting the volumes of business. Both the Irish and UK results appear to show lighter experience at duration 0, with no clear pattern thereafter.

These are crude results however and need adjustment for IBNS. It is inappropriate to draw conclusions from the figures in Table 7.9, without a proper IBNS adjustment. We noted earlier that the CMI is still undertaking work on developing adjustments for subsets of the 1999-2002 data, but figures presented at the 'Current Issues in Critical Illness' seminar at Staple Inn, illustrate the issue:

Duration	0	1	2	3	4	5+
Grossing-up Factor	12.7%	11.7%	13.9%	16.2%	18.3%	23.5%

These figures compare to an overall factor of 15.3%.

7.3.4 Data and Results by Channel

Table 7.11 below shows the split of exposure for each market by distribution channel. The share of IFA business is similar in both markets, but bancassurers make up a larger proportion of the UK market than in Ireland.

Table 7.11 - Breakdown of Exposure By Channel

	Ireland	UK
Bancassurers	21%	38%
Direct	39%	21%
IFA	35%	33%

Table 7.12 below shows the results for each market by distribution channel. These results are for accelerated business on a lives basis. The raw results differ markedly between the markets. In the UK, business sold by IFAs appears to have lighter experience, whilst business sold through bancassurers and direct sales forces are similar. In Ireland, business sold through bancassurers appears lighter with the other two channels similar. As with other raw results, there is the possibility that different adjustments for IBNS are needed, indeed in both markets the Direct Sales Force business will be the most mature, so may require the lowest adjustment.

Table 7.12 - Results by Distribution Channel

	Male Non-Smoker	Male Smoker	Female Non-Smoker	Female Smoker
Ireland				
Bancassurers	43%	54%	38%	32%
Direct	41%	83%	53%	81%
IFA	39%	94%	50%	81%
UK				
Bancassurers	39%	77%	47%	59%
Direct	39%	65%	49%	58%
IFA	37%	62%	40%	52%

7.3.5 Cause of Claim

Table 7.13 below sets out the proportion of claims by cause based on number of claims. Death claims have been excluded to make the figures more directly comparable (as there is a larger percentage of accelerated business in the UK). Two Irish offices were unable to provide an accurate split of its claims by cause and so all their claims are categorised as “unknown”. The adjusted figures show the impact of re-distributing the “unknown” claims in proportion across the other causes; they can then be more easily compared to the UK figures.

The distribution of claims by cause is broadly similar for both investigations. There appear to be relatively more claims for claims due to circulatory disease (Heart Attack, Stroke and CABG) in Ireland, which may reflect the slightly older profile of the business, and for TPD in the UK, but in all cases the differences are based on relatively low numbers of claims.

Table 7.13 - Distribution of Claim Numbers by Cause

	Ireland 2001 – 2003		UK 1999 - 2002
	Raw	**Adjusted**	
Cancer	42%	56%	57%
Heart Attack	12%	17%	14%
Stroke	5%	7%	6%
CABG	3%	5%	3%
MS	5%	6%	6%
Kidney	0%	0%	1%
MOT	0%	0%	0%
TPD	1%	1%	5%
Unknown	26%	n/a	2%
Other	6%	8%	7%

Table 7.14 compares Irish experience by cause as a percentage of CIBT93 with the equivalent UK experience. In many cases, there are too few claims (particularly in the Irish investigation) to draw any firm conclusions about the relative levels of claim by cause in the two markets. It should also be noted that as claims categorised as 'Other' or 'Unknown' are excluded (as there is no basis for Expected) this will distort the comparison, due to the higher proportion of 'Unknown' claims in the Irish experience.

However, areas where the Irish experience appears high in comparison with the UK are:

- Female Heart Attack and Stroke claims;
- CABG claims on smokers, which could be indicative of a different philosophy in the respective health services.

Table 7.14 - Irish Experience by Cause / UK Experience by Cause

	Cancer	Heart Attack	Stroke	CABG	MS	Kidney	MOT	TPD	Death	All
Lives										
Acceleration										
Males										
Non-smokers	75%	108%	65%	87%	106%	30%	0%	21%	103%	103%
Smokers	100%	85%	90%	186%	112%	0%	0%	53%	120%	117%
Females										
Non-smokers	81%	100%	140%	66%	129%	111%	375%	17%	139%	109%
Smokers	116%	204%	150%	105%	109%	0%	0%	0%	104%	125%
Stand Alone										
Males										
Non-smokers	71%	81%	58%	96%	117%	0%	-	10%	-	116%
Smokers	58%	92%	79%	195%	23%	150%	-	64%	-	114%
Females										
Non-smokers	77%	83%	162%	171%	85%	227%	-	33%	-	110%
Smokers	108%	89%	32%	246%	45%	-	-	0%	-	133%
Amounts										
Acceleration										
Males										
Non-smokers	63%	83%	56%	83%	132%	10%	0%	44%	107%	103%
Smokers	79%	94%	106%	121%	112%	0%	0%	37%	146%	118%
Females										
Non-smokers	79%	78%	129%	27%	136%	67%	400%	10%	170%	107%
Smokers	104%	174%	100%	94%	73%	0%	0%	0%	119%	108%
Stand Alone										
Males										
Non-smokers	74%	75%	61%	56%	141%	0%	-	23%	-	107%
Smokers	46%	90%	71%	80%	43%	86%	-	28%	-	89%
Females										
Non-smokers	68%	150%	93%	400%	71%	194%	-	14%	-	93%
Smokers	85%	64%	80%	566%	29%	-	-	0%	-	102%

- Note: 0% indicates there are no Irish claims in the cell. A dash indicates there are no UK claims (or may mean no UK or Irish claims).

8 Qualifications to results

8.1 Introduction

When looking at the information in this paper, and drawing any conclusions from the results, it is important to consider all of the following. We have attempted to remove elements which could introduce large distortions or invalidate the analysis. Nevertheless the following points, which were all identified by the previous working party and still apply, need to be considered.

8.2 Qualifications to results

8.2.1 Definition of Date of Claim

The claim data requested from the participating offices included date of diagnosis/death, notification date, admission date and settlement date. In general it was felt that the date of diagnosis/death was the most suitable date to use as the claim date since it best indicated the duration from the policy commencement date to the incidence of the claim. The dates held by the participating offices varied and some offices were unable to provide all of the requested dates but the vast majority of claims did include the most important date of diagnosis/death. In the small number of cases where date of diagnosis/death was not reported, it was estimated using one of the other dates.

8.2.2 Claims Incurred But Not Reported

This is covered at length in Section 4.

8.2.3 Critical Illness Definitions

No attempt was made to separately calculate the exposure for each critical illness according to whether they were covered by participating offices. This was felt to be an unnecessary complication, particularly where offices have different generations of policies and in some cases have retrospectively extended cover. It was also anticipated that the vast majority of claims would be attributable to the "core" conditions, covered by all offices.

Furthermore, no allowance was made for any differences in the definitions of the various events. We feel that, with the possible exception of TPD, variations between offices' definitions are minor and unlikely to significantly impact on their claims experience. In addition, the definitions used for some events would have changed during the investigation period.

8.2.4 Underwriting and Claim Practices

Underwriting and claim practice is likely to vary among the participating offices and possibly by distribution channels. There are no immediate divisions of the data that were thought necessary, especially as short form underwriting, which could give the most marked differences was not prevalent over the period for these products.

8.2.5 Rated Lives

For ease of analysis and to avoid data complications, rated lives are excluded from both the exposure and the experience.

8.2.6 Lives with multiple policies

In the investigation the results are referred to as being on a “lives” basis. This is not strictly correct because, although offices reported both lives in Joint and Dual life policies, in general, multiple lives were reported where a life assured has more than one policy for the purpose of calculating exposure. Multiple claims on a life assured are reported as one claim. This will lead to some level of distortion of the results. This does not impact the analysis of claims on an “amounts” basis.

8.2.7 Participating offices

All of the participating offices submitted data for the whole 3 year period under investigation. However, two offices who had submitted data to the previous investigation did not participate in this investigation. We do not believe this had any material impact on the comparability of results from both investigations.

8.2.8 Insurability options

There may be a small distortion in the overall results, as benefits taken up under insurability options have not been excluded. This is unlikely to be significant.

8.2.9 Type of business sold

The portfolios being analysed may contain heterogeneous types of business, such as mortgage-related and non-mortgage business or guaranteed and non-guaranteed business. If these are not in constant proportions throughout the analysis there may be trends, which are due to changing business mix, rather than any true underlying features of the data.

8.2.10 Different Benefit Levels

In some products certain critical illnesses or events may be subject to a lower level of benefit than the full benefit on the policy. These were excluded, and the claim recorded on the event which brought the cumulative payment up to 100% of the sum assured.

8.2.11 Limited Age Range

There is very little exposure outside the age ranges 16 to 70, so the investigation was limited to these age ranges. There were no claims reported outside this range. Exposure at either edge of this range was also limited and should be viewed with caution.

8.2.12 Children’s Critical Illness Claims

Although most policies include children’s critical illness cover, claims on children are excluded from the investigation because there is no corresponding measure of exposure.

9 Valuation Survey Results and Recommendations on Reserving

9.1 Introduction

A short questionnaire was sent to 7 insurers to survey current practice in reserving for critical illness business. The survey contained the following questions :

- What valuation method are you using for critical illness statutory reserving (net premium, discounted cashflow, both, other)? Please subdivide between guaranteed and non guaranteed contracts.
- What base morbidity table are you using? IC94, CIBT93, reinsurers rates, charging rates, other.
- What loadings are you applying to the table Please subdivide between smokers and non smokers?
- What deterioration rate are you using?
- Do you have an IBNR/IBNS? How do you calculate the IBNR and IBNS.

All 7 companies responded to the survey. A summary of the responses is set out below. The summary contains a comparison (in brackets) with the last survey (of 2003) which had eight responses.

9.2 Summary of Responses and Observations

In response to the question on basic valuation method, the following responses were received.

Table 9.1 – Basic critical illness valuation methodology

	Guaranteed	Non Guaranteed
Net premium valuation	1 (2)	0 (0)
Discounted cashflow	3 (5)	5 (7)
Both	0 (0)	0 (1)
Total	4 (7)	5 (8)

The discounted cashflow method is used almost universally. Only two offices are using the net premium valuation for guaranteed rates. Under current valuation regulations, all offices have to test that the reserves are at least as high under the net premium valuation.

The following sources were used for the base table of mortality rates:

Table 9.2 – Sources of base morbidity rates

	Guaranteed	Non Guaranteed
IC94	4 (5)	1 (2)
Reinsurance rates	0 (2)	2 (6)
Both (depending on product)	0 (0)	0 (0)
Rates charged	0 (0)	2 (0)
Total	4 (7)	5 (8)

Despite developments over the years, there is still a great loyalty to the IC94 table for guaranteed business. For non guaranteed business, there has been a drift away from IC94 and reinsurance rates to the rates charged to policyholders. This may be to allow for an additional margin of prudence over reinsurers rates (i.e. allowing for a step change in rates similar to that which occurred in 2003/2004). It is interesting to note that no offices are using CIBT93, despite it being more recent than IC94.

The loading applicable to the base table varied as follows:

Table 9.3 – Morbidity table valuation loadings

	IC94 Guaranteed	IC94 Non Guaranteed	Reins/Ph Charging
No loading	0 (0)	0 (0)	2 (2)
+10% to +20%	0 (0)	0 (0)	1 (1)
+20% to +50%	3 (3)	0 (2)	0 (2)
+50% upwards	1 (2)	1 (0)	1 (1)
Total	4 (5)	5 (2)	4 (6)

There has been no significant movement in the proportion of the base table used. However the movement from reinsurance rates to charging rates implicitly allows for a movement (likely to be of the order of 10% to 20%) of the base table.

Offices were also asked if they made any allowance for the future trends in claims experience, expressed as a % annual deterioration.

Table 9.4 – Allowances for critical illness claims deterioration

	Guaranteed	Non Guaranteed
None	0 (2)	5 (6)
+1% p.a.	1 (1)	0 (1)
+2% p.a.	2 (3)	0 (1)
+3% p.a.	1 (1)	0 (0)
Total	4 (7)	0 (8)

All respondents were using deterioration for guaranteed business. The rates of deterioration are broadly stable since 2003. For non guaranteed business, no deterioration is being used. This may reflect the belief that reinsurance and charging rates already reflect deteriorations within the rates or that offices believe that they can change the rates if deteriorations occur.

The survey also asked what smoker or non smoker percentages were used. There were few respondents to this question so it has been left out of this paper.

Finally, the survey asked what approach was being used for IBNR and IBNS. Nearly all respondents replied that they were using the development patterns described in the previous working party paper.

9.3 International Developments

Since the last paper was produced several countries have changed their approach to setting reserves and/or capital requirements to “percentile methods”.

The UK has seen the introduction of ICAs with associated stress tests at the 99.5th percentile over 1 year. While the UK regime requires offices to calibrate their own stress tests, we understand that many of the stress tests have involved an immediate movement of morbidity of 20% to 25% above the realistic rate. Some UK offices may also apply a stress test as a change in the morbidity trend. The Netherlands and Sweden have also considered similar bases.

In addition, the proposed parameters for Solvency II Solvency Capital Requirements (SCR) have also been based on the 99.5th percentile over 1 year. The parameters are outlined in the latest Quantitative Impact Survey (QIS3) from CEIOPS.

CEIOPS has proposed a “disability” stress test calibrated to a short term “shock” of an increase in rates of 35% for 1 year followed by a permanent increase of 25%. These changes are calibrated to the 99.5th percent change of the technical provision (which is the “best estimate” rate plus the risk margin). It is not known whether CEIOPS had critical illness business (rather than PHI) in mind in calibrating these results.

This stress test is part of a wider framework whereby shocks are tested for a number of different risk factors. The risks are grouped by risk type: market, default risk, life underwriting etc. Hence the disability stress test is tested alongside similar tests for mortality, longevity, lapse etc.

From a capital point of view the stress tests proposed by QIS3 may or may not have a material impact on the overall reserving requirements for life companies. The overall SCR requirement will depend on the correlation of these risk groups and the level of capital required for each group. Initial results appear to indicate that the SCR is weighted towards the main 2 or 3 risk factors for each company. A similar situation occurs within the risk groups. Hence if disability risk is the key risk and the SCR for life underwriting will be weighted towards that risk. If following on from this that market risk far outweighs this risk then it may not materially impact the overall SCR requirement.

Another area of concern for Irish life companies is counterparty default risk, particularly around reinsurer default given the amount of CI exposure that the Irish market has to reinsurers. CEIOPS have formulated a scenario whereby capital is required based on the replacement cost of reinsurance in the event of default. Given the fact that the price of reinsurance could rise significantly as a result of one reinsurer defaulting, this scenario could potentially lead to quite onerous capital requirements.

We have confined our reserving recommendations below in section 9.4 to the existing Solvency I regime as this is expected to be the applicable local standard for the short to medium term.

9.4 Observations and Reserving Recommendations

9.4.1 Observations

While comparability is difficult from the measures above, it would appear that for guaranteed business, the rates being used by offices are quite prudent [note : assuming that experience is at or around IC94] relative to these measures. However, we note that most offices are only retaining a small proportion of the underlying risk so it may well be that net of reinsurance reserves are quite prudent but we cannot comment on the overall gross reserve strength as this will ultimately be dependent on the reinsurers reserving approach. It is extremely difficult to say how prudent the rates are for non guaranteed business without more detail on the reinsurers and charging rates.

9.4.2 Margin for Variation

The previous working party had concluded that that the suggested reserving basis of 150% of IC94 (Factor X from the 1994 paper "Reserving for Critical Illness Guarantees") was now overly prudent and the results of our latest investigation confirm their conclusions. They recommended a loading of 25 to 35% over best estimate as a margin for variation and we see no reason to change that range. The stability of the Accelerated business experience does suggest that offices could look at their own experience and consider using a factor towards the bottom of the range. However, the deterioration of the Stand Alone experience suggests that offices should be considering a separate factor for this business which may be closer to the top of this range.

We recommend all offices should use separate rates for smokers/non-smokers as our latest results confirm significant experience differences.

As to the starting point for the best estimate, offices should examine how their experience compares with the average. As ever, natural caution suggests being a little slower to take credit for good experience than to provide for adverse.

For market experience as a whole we point to Tables 5.4 in Section 5 and A2.3 in Appendix 2 for CIBT93 and IC94 respectively. Acceptable starting points for a valuation table, before the addition of the margin for variation, might be the factors given therein rounded up to the nearest multiple of 5%, which would give the following table.

Table 9.5 – Suggested valuation critical illness table assumptions before variation margins

		Males		Females	
		Non-smoker	**Smoker**	**Non-smoker**	**Smoker**
CIBT 93	Accelerated	45%	90%	55%	80%
	Stand Alone	60%	95%	70%	90%
ICA 94	Accelerated	70%	150%	80%	115%
	Stand Alone	100%	165%	105%	130%

9.4.3 Deterioration

The results of the investigation by calendar year (see Figure 5.6 in Section 5) suggest no material deterioration in experience for Accelerated business since the 1995-2000 investigation. The population is still, however, relatively immature with considerable uncertainty surrounding experience at the older ages. The unknown impact of medical advances on existing portfolios together with the long term nature of our projections in respect of a population increasing in age can only increase this uncertainty. In addition we note that work done in the past in the UK by the Trends Working Party shows that medical evidence suggests a rising trend for some conditions but a falling trend for others. As a result we recommend the continuation of allowances for deteriorating experience in Accelerated business and the Factor Y in the 1994 Reserving Paper of 1% to 3% per annum deterioration remains desirable.

The results of the investigation by calendar year (see Figure 5.6 in Section 5) suggest some significant evidence of deteriorating experience for Stand Alone business. We have suggested that may be due to a different selection pattern for Stand Alone business compared to Accelerated but have no proof of our theory. However, the experience has clearly deteriorated for Stand Alone and as a result we recommend that offices should apply a separate factor to their Stand Alone business. We recommend choosing an allowance for deteriorating experience on Stand Alone business from a higher range of 2% to 4% per annum.

We agree that there is some trade off between Factors X and Y with a high degree of conservatism in one area permitting less caution in the other.

9.4.4 Use of Reinsurers' Rates

Using reinsurers' rates has clear advantages when substantial proportions of business are reinsured. However it is not sufficient to assume that reinsurers' pricing for profit is an adequate margin for prudence. The prudence level needs to be checked.

There is a further complication in that even for the risk reinsured it may be necessary to carry out an explicit valuation. Reinsurers are not immune to credit risk and if significant amounts of critical illness business are reinsured then determination of the credit risk is desirable in examining the financial condition of the direct writing office.

9.4.5 IBNR

In addition to the reserving recommendations above, it is important to allow for IBNR claims.

IBNR and IBNS factors have increased since the last investigation due to increased claim settlement delays. We have not been able to identify any specific causes for these increases this could represent a trend and we therefore recommend that offices should carefully examine their own experience and consider an allowance for IBNR and IBNS deterioration factors. Based on the average increase in factors over the three years between the two investigations we recommend offices consider an IBNS deterioration factor in the range of 0.5% to 1.5% per annum or an IBNR deterioration factor in the range of 0% to 0.25% per annum if the office is already reserving explicitly for notified claims.

10 What Next?

10.1 Annual exercise

In theory, 2004-2006 data should now be available and we could follow the existing approach to produce an updated report which could significantly improve our understanding of critical illness experience in Ireland, particularly the development of IBNR and IBNS. However, the working party are conscious that it has taken over 3 years to gather, analyse and report on the 2001-2003 experience. We are aware that all the contributing companies are extremely busy at present on several different projects and our experience is that it is difficult to generate momentum. This means that next set of results on this basis are, realistically, still several years away.

We suggest that the Life Committee should consider the merits of a 'light' approach to gathering the most recent experience which would be designed to give a very quick annual turnaround of certain key indicators. This could involve simply comparing notified claims in any one year against a standard table, perhaps in a small number of broad categories. We would also suggest gathering summary data on the reporting and settlement delays on all claims actually settled in that year to monitor how reporting and settlement delays are progressing.

The use of this 'light' approach would not preclude repeating the more detailed investigation on a less regular basis, particularly if the 'light' approach had identified any significant change in underlying experience. We would recommend that if the full approach is being used in future that the progress of the data gathering should be monitored by just one member with the main working party only being formed when the data gathering has been completed.

We also recommend that any future full investigation continues to be processed using the CMI facilities described in this paper. We would like to stress that none of the data or analysis delays experienced were due to the CMI and reiterate that this paper would not have been completed without their dedicated help.

Last but not least, we recommend the annual gathering of a simple persistency measure for in-force portfolios. This would apply equally if the 'light' or full approach was being used as the rate of growth of the in force portfolio appears to be slowing and this could be very relevant for any subsequent analysis.

10.2 Trends analysis and Critical Illness assured lives table

The previous working party had concluded that, due to a lack of data and in the time available, they could not improve upon CIBT93 as a shape upon which to base any assessment of results. We, unfortunately, must agree with their conclusion. In practice this lack of data will continue to be a real issue for the Irish investigation for many years to come and means it will be some considerable time before an Irish insured lives experience table can be produced.

However, the UK has a similar critical illness market with large business volumes and there has been some significant work ongoing in the UK using their latest insured experience and population medical data to fit a new table. An updated version of CIBT93, known as CIBT02, was presented to the Staple Inn Actuarial Society in December 2006 in the draft paper "Exploring the Critical Path". The new draft table reflects changes in the shape and level of rates arising both through trends and the greater depth of information now available. In addition, the recent report "A Critical Table" describes the production and verification of a new insured lives critical illness table (CIIT00) for the UK market based on the draft rates from CIBT02, reshaped to reflect the UK CMI experience data for 1999-2002.

The working party believes that the most practical option to produce an Irish insured lives table would be for a future working party to take the then latest UK tables and produce an adjustment factor that reflects the experience differences between Ireland and the UK, as discussed in Chapter 7.

10.3 Sponsors and contributors

Finally, we are grateful for the support of the offices in providing data, and to the other sponsors who contributed financially to enable this work to be done. We hope that this support will continue to enable this assessment to be a regular one, in whatever future format is agreed with the Life Committee.

11 References

"A Critical Review" by the Critical Illness Healthcare Study Group, 14 March 2000

"Reserving for Critical Illness Guarantees" by the Society of Actuaries in Ireland Working Party, 30 November 1994

"Irish Critical Illness Experience 1995-2000" by the Society of Actuaries in Ireland Working Party, 3rd November 2003

"Exploring the Critical Path" (Robjohns, Neil; Galloway, Hamish; Morris, Richard; Reid, Scott K; Wells, Joanne) presented to the Staple Inn Actuarial Society in December 2006

"A Critical Paper" published by Paul Brett and Johann DuToit in 2007 and available on the Gen Re LifeHealth UK website (www.genre.com/page/0,1019,ref%3DLifeHealthUKCriticalIllness-en,00.html.)

Appendix 1. Practical Operation

A1.1 Co-operating Offices

There are different categories of support for this investigation comprising data contributors, reinsurers, and others. Each office is listed below, with a short description of the role played.

A1.1.1 Data Contributors

Data contributors were:

- Acorn Life
- Canada Life
- Eagle Star
- Friends First
- Irish Life
- Irish Progressive
- Lifetime
- New Ireland

Data contributors contributed their own data to the analysis, and receive both their individual office analysis, and the "All Offices" reports.

Each also made a financial contribution to the analysis.

A1.1.2 Reinsurers

All reinsurers writing critical illness business in Ireland were approached, and both Partner Re and Revios (now SCOR Life) agreed to support our investigation and make a financial contribution. Both received the "All Offices" analysis.

A1.1.3 And Other Financial Contributors

- Ark Life
- Hibernian Life

At the time of initiating this analysis, Ark Life indicated a willingness to support the Working Party financially. Hibernian also agreed to support the investigation, despite the fact that their subsequent merger with Ark Life meant that they had to miss out on contributing data to this particular investigation. Both received the "All Offices" analysis.

A1.2 Data analysed

Our analysis covered the period 2001 – 2003 and the CMI also helped us by providing further data on a combined basis from 1995 – 2003.

A1.3 Role of CMI

The CMI acted as a consultant to the Society of Actuaries providing data processing services.

These included the following:

- Data cleaning processes
- Calculation of claim rates subdivided by a range of factors
- Comparison with standard tables (Both CBT93 and IC94)

The Society was able to access the CMI processing capability developed specifically for the UK critical illness investigation. In addition, the CMI also kindly produced Chapters 6 & 7 which maintained the anonymity of individual office data .

A1.4 Data ownership

The data is the property of the Society of Actuaries, and has been received from the individual offices on the understanding that any analysis will not reveal the results of any single office.

The CMI does not have any rights over the data, and can only make use of the data with the permission of the Society.

The Working Party has been given the right to carry out this analysis on behalf of the Society, and to review the “All Offices” results for the Society.

The Working Party was also asked to look at trends within the data, including differences between offices, with a view to making valuation basis recommendations.

Appendix 2. Tabulated Results with Adjustment Factors

A2.1 Methodology

To adjust the settled claims, we grouped the claims into the categories being investigated by year of assumed diagnosis (e.g. for the analysis by duration we grouped the claims by sex, Accelerated or Stand Alone and by duration).

To estimate the total claims, we applied the aggregate development ratios, calculated in Section 4 (and shown below), to each claim depending on its development year relative to the year 2000. Note that the aggregate development ratio for claims diagnosed before 1995 is zero (to exclude them from the estimated total claims).

Table A2.1 – Aggregate Development Ratios for estimating total experience

	Lives		Amounts	
Calendar Year	**IBNS**	**IBNR**	**IBNS**	**IBNR**
End Year 1 to ultimate	2.0198	1.3894	2.0954	1.3551
End Year 2 to ultimate	1.1431	1.0789	1.1283	1.0637
End Year 3 to ultimate	1.0774	1.0422	1.0673	1.0341
End Year 4 to ultimate	1.0539	1.0286	1.0490	1.0242
End Year 5 to ultimate	1.0419	1.0164	1.0383	1.0117
End Year 6 to ultimate	1.0289	1.0058	1.0271	1.0018
End Year 7 to Ultimate	1.0191	1.0000	1.0122	1.0000
End Year 8 to Ultimate	1.0111	1.0000	1.0032	1.0000
End Year 9 to Ultimate	1.0000	1.0000	1.0000	1.0000

In order to relate our estimated total claims to the settled claims reported in the CMI critical illness investigation we calculate the adjustment factors, which are the ratios of the estimated total claims to the settled claims

A2.2 Adjustment Factors for the investigations

We calculated adjustment factors for the following investigations:

Tables A2.2 – A2.3	Overall Results - Lives (by benefit type, sex, and smoker status)
Table A2.4	Results by Calendar Year - Lives
Tables A2.5 – A2.6	Results by Age - Lives
Table A2.7	Results by Duration - Lives
Table A2.8	Results by Distribution Channel - Lives
Table A2.9	Overall Results - Amounts (by benefit type, sex, and smoker status)
Tables A2.10 – A2.13	Results by Cause of Claim - Lives

Table A2.2 – Overall results (Lives vs CIBT93)

Unadjusted Result (100A/E)			
	Non-smoker	**Smoker**	**Aggregate**
Accelerated Males	39	81	49
Accelerated Females	49	71	54
Accelerated excl deaths Males	43	82	51
Accelerated excl deaths Females	49	70	53
Stand Alone Males	51	84	58
Stand Alone Females	57	76	60
Number of Settled Claims			
	Non-smoker	**Smoker**	**Aggregate**
Accelerated Males	394	241	635
Accelerated Females	319	133	452
Accelerated excl deaths Males	296	165	461
Accelerated excl deaths Females	271	111	382
Stand Alone Males	349	162	511
Stand Alone Females	273	90	363
Number of Diagnosed Claims adjusted for IBNS			
	Non-smoker	**Smoker**	**Aggregate**
Accelerated Males	405.50	258.37	663.86
Accelerated Females	337.59	144.24	481.83
Accel excl deaths Males	305.83	177.68	483.51
Accel excl deaths Females	278.90	114.43	393.33
Stand Alone Males	392.22	180.08	572.31
Stand Alone Females	329.87	103.03	432.90
Adjustment Factors			
	Non smoker	**Smoker**	**Aggregate**
Accelerated Males	1.03	1.07	1.05
Accelerated Females	1.06	1.08	1.07
Accel excl deaths Males	1.03	1.08	1.05
Accel excl deaths Females	1.03	1.03	1.03
Stand Alone Males	1.12	1.11	1.12
Stand Alone Females	1.21	1.14	1.19
Adjusted Result (100A/E)			
	Non smoker	**Smoker**	**Aggregate**
Accelerated Males	40	87	51
Accelerated Females	52	77	58
Accel excl deaths Males	44	88	53
Accel excl deaths Females	50	72	55
Stand Alone Males	57	93	65
Stand Alone Females	69	87	72

Table A2.3 - Overall results (Lives vs IC94)

Unadjusted Result (100A/E)			
	Non-smoker	**Smoker**	**Aggregate**
Accelerated Males	67	139	84
Accelerated Females	71	103	78
Accelerated excl deaths Males	74	141	88
Accelerated excl deaths Females	71	101	77
Stand Alone Males	88	146	100
Stand Alone Females	85	113	89

Adjusted Result (100A/E)			
	Non-smoker	**Smoker**	**Aggregate**
Accelerated Males	69	149	88
Accelerated Females	75	111	83
Accelerated excl deaths Males	76	152	92
Accelerated excl deaths Females	73	104	79
Stand Alone Males	99	162	113
Stand Alone Females	102	129	106

The calculation of the adjustment factors does not depend on the base table, therefore only the Unadjusted and Adjusted results are shown here.

Table A2.4 – Results by calendar year (Lives vs CIBT93)

Unadjusted Result (100A/E)			
	2001	**2002**	**2003**
Accelerated Males	58	45	45
Accelerated Females	56	50	56
Stand Alone Males	49	63	60
Stand Alone Females	50	64	65
Number of Settled Claims			
	2001	**2002**	**2003**
Accelerated Males	226	196	213
Accelerated Females	140	138	174
Stand Alone Males	129	185	197
Stand Alone Females	89	127	147
Number of Diagnosed Claims adjusted for IBNS			
	2001	**2002**	**2003**
Accelerated Males	221.95	221.76	220.15
Accelerated Females	150.84	145.17	185.82
Stand Alone Males	156.22	208.04	208.04
Stand Alone Females	127.13	128.03	177.74
Adjustment Factors			
	2001	**2002**	**2003**
Accelerated Males	0.98	1.13	1.03
Accelerated Females	1.08	1.05	1.07
Stand Alone Males	1.21	1.12	1.06
Stand Alone Females	1.43	1.01	1.21
Adjusted Result (100A/E)			
	2001	**2002**	**2003**
Accelerated Males	57	51	47
Accelerated Females	60	53	60
Stand Alone Males	59	71	63
Stand Alone Females	71	65	79

Table A2.5 – Results by age (Lives vs CIBT93)

Unadjusted Result (100A/E)					
	<30	**31-40**	**41-50**	**51-60**	**61+**
Accelerated Males	74	46	45	53	40
Accelerated Females	48	55	57	48	51
Accelerated excl deaths Males	92	53	47	51	43
Accelerated excl deaths Females	53	57	56	44	40
Stand Alone Males	74	62	50	64	45
Stand Alone Females	59	64	56	66	44
Number of Settled Claims					
	<30	**31-40**	**41-50**	**51-60**	**61+**
Accelerated Males	54	153	219	190	19
Accelerated Females	28	147	185	84	8
Accelerated excl deaths Males	33	107	166	140	15
Accelerated excl deaths Females	24	128	159	66	5
Stand Alone Males	25	99	163	196	28
Stand Alone Females	20	109	133	92	9
Number of Diagnosed Claims adjusted for IBNS					
	<30	**31-40**	**41-50**	**51-60**	**61+**
Accelerated Males	53.11	164.34	229.23	198.67	18.51
Accelerated Females	30.02	145.10	209.94	90.05	6.73
Accelerated excl deaths Males	29.75	120.27	175.39	142.96	15.14
Accelerated excl deaths Females	24.70	125.25	173.12	66.90	3.36
Stand Alone Males	21.47	105.58	181.71	224.11	39.44
Stand Alone Females	17.56	130.36	164.85	108.49	11.64
Adjustment Factors					
	<30	**31-40**	**41-50**	**51-60**	**61+**
Accelerated Males	0.98	1.07	1.05	1.05	0.97
Accelerated Females	1.07	0.99	1.13	1.07	0.84
Accelerated excl deaths Males	0.90	1.12	1.06	1.02	1.01
Accelerated excl deaths Females	1.03	0.98	1.09	1.01	0.67
Stand Alone Males	0.86	1.07	1.11	1.14	1.41
Stand Alone Females	0.88	1.20	1.24	1.18	1.29
Adjusted Result (100A/E)					
	<30	**31-40**	**41-50**	**51-60**	**61+**
Accelerated Males	73	49	47	55	39
Accelerated Females	51	54	65	51	43
Accelerated excl deaths Males	83	60	50	52	43
Accelerated excl deaths Females	55	56	61	45	27
Stand Alone Males	64	66	56	73	63
Stand Alone Females	52	77	69	78	57

Table A2.6 - Results by age (Lives vs IC94)

Unadjusted Result (100A/E)					
	<30	**31-40**	**41-50**	**51-60**	**61+**
Accelerated Males	124	81	73	94	70
Accelerated Females	61	79	87	77	75
Accelerated excl deaths Males	155	94	77	90	75
Accelerated excl deaths Females	67	82	85	71	59
Stand Alone Males	139	98	78	119	82
Stand Alone Females	77	91	87	116	66

Adjusted Result (100A/E)					
	<30	**31-40**	**41-50**	**51-60**	**61+**
Accelerated Males	122	87	77	98	68
Accelerated Females	65	78	98	83	63
Accelerated excl deaths Males	139	105	81	92	76
Accelerated excl deaths Females	69	80	93	72	40
Stand Alone Males	119	105	87	136	115
Stand Alone Females	67	109	108	137	86

The calculation of the adjustment factors does not depend on the base table, therefore only the Initial and Adjusted results are shown here.

Table A2.7 – Results by duration (Lives vs. CIBT93)

Unadjusted Result (100A/E)						
	0	**1**	**2**	**3**	**4**	**5**
Accelerated Males	56	41	50	48	39	48
Accelerated Females	51	54	52	59	60	52
Stand Alone Males	41	53	60	69	65	57
Stand Alone Females	49	63	73	62	85	53
Number of Settled Claims						
	0	**1**	**2**	**3**	**4**	**5**
Accelerated Males	90	75	70	62	48	290
Accelerated Females	54	53	48	51	50	196
Stand Alone Males	31	37	44	55	58	286
Stand Alone Females	29	35	43	39	59	158
Number of Diagnosed Claims adjusted for IBNS						
	0	**1**	**2**	**3**	**4**	**5**
Accelerated Males	87.49	82.98	57.41	63.66	53.98	318.34
Accelerated Females	48.13	52.70	52.90	44.14	48.47	235.49
Stand Alone Males	27.73	39.64	40.92	56.00	62.38	345.64
Stand Alone Females	23.89	35.47	44.89	45.64	67.57	215.44
Adjustment Factors						
	0	**1**	**2**	**3**	**4**	**5**
Accelerated Males	0.97	1.11	0.82	1.03	1.12	1.10
Accelerated Females	0.89	0.99	1.10	0.87	0.97	1.20
Stand Alone Males	0.89	1.07	0.93	1.02	1.08	1.21
Stand Alone Females	0.82	1.01	1.04	1.17	1.15	1.36
Adjusted Result (100A/E)						
	0	**1**	**2**	**3**	**4**	**5**
Accelerated Males	54	45	41	49	44	53
Accelerated Females	45	54	57	51	58	62
Stand Alone Males	37	57	56	70	70	69
Stand Alone Females	40	64	76	73	97	72

Table A2.8 - Results by distribution channel (Lives vs. CIBT93)

Unadjusted Result (100A/E)				
	Bancassurer	**Direct Sales**	**IFA**	**Other**
Accelerated Males	45	51	51	32
Accelerated Females	37	60	57	42
Stand Alone Males	72	55	54	58
Stand Alone Females	65	58	61	52
Number of Settled Claims				
	Bancassurer	**Direct Sales**	**IFA**	**Other**
Accelerated Males	91	275	243	26
Accelerated Females	49	205	173	25
Stand Alone Males	110	221	170	10
Stand Alone Females	68	170	118	7
Number of Diagnosed Claims adjusted for IBNS				
	Bancassurer	**Direct Sales**	**IFA**	**Other**
Accelerated Males	105.93	275.40	252.59	29.95
Accelerated Females	53.51	203.80	199.49	25.03
Stand Alone Males	121.80	253.65	185.08	11.78
Stand Alone Females	79.09	204.34	142.82	6.66
Adjustment Factors				
	Bancassurer	**Direct Sales**	**IFA**	**Other**
Accelerated Males	1.16	1.00	1.04	1.15
Accelerated Females	1.09	0.99	1.15	1.00
Stand Alone Males	1.11	1.15	1.09	1.18
Stand Alone Females	1.16	1.20	1.21	0.95
Adjusted Result (100A/E)				
	Bancassurer	**Direct Sales**	**IFA**	**Other**
Accelerated Males	52	51	53	37
Accelerated Females	40	60	66	42
Stand Alone Males	80	63	59	68
Stand Alone Females	76	70	74	49

Table A2.9 - Overall Results (Amounts Basis vs. CIBT93)

Unadjusted Result (100A/E)			
	Non-smoker	**Smoker**	**Aggregate**
Accelerated Males	38	77	46
Accelerated Females	46	57	48
Accelerated excl deaths Males	42	76	48
Accelerated excl deaths Females	46	56	47
Stand Alone Males	48	71	52
Stand Alone Females	52	58	53
Settled Claims (Amount in EUR)			
	Non smoker	**Smoker**	**Aggregate**
Accelerated Males	25,158,952	12,624,111	37,783,063
Accelerated Females	17,871,580	5,264,448	23,136,028
Accelerated excl deaths Males	18,706,879	8,125,082	26,831,961
Accelerated excl deaths Females	14,861,763	4,328,876	19,190,639
Stand Alone Males	21,076,329	6,703,136	27,779,465
Stand Alone Females	13,086,827	2,842,455	15,929,282
Diagnosed Claims Adjusted for IBNS (Amount in EUR)			
	Non-smoker	**Smoker**	**Aggregate**
Accelerated Males	27,610,406	14,128,979	41,739,385
Accelerated Females	19,954,306	5,947,422	25,901,728
Accelerated excl deaths Males	20,968,383	9,479,801	30,448,184
Accelerated excl deaths Females	16,218,059	4,689,648	20,907,707
Stand Alone Males	24,273,737	7,330,809	31,604,546
Stand Alone Females	17,686,791	3,585,819	21,272,610
Adjustment Factors			
	Non smoker	**Smoker**	**Aggregate**
Accelerated Males	1.10	1.12	1.10
Accelerated Females	1.12	1.13	1.12
Accelerated excl deaths Males	1.12	1.17	1.13
Accelerated excl deaths Females	1.09	1.08	1.09
Stand Alone Males	1.15	1.09	1.14
Stand Alone Females	1.35	1.26	1.34
Adjusted Result (100A/E)			
	Non smoker	**Smoker**	**Aggregate**
Accelerated Males	42	86	51
Accelerated Females	51	64	54
Accelerated excl deaths Males	47	89	54
Accelerated excl deaths Females	50	61	51
Stand Alone Males	55	78	59
Stand Alone Females	70	73	71

Table A2.10 - Results by cause of claim (Lives vs. CIBT93) Accelerated Male

Accelerated, Male										
	Cancer	**Heart Attack**	**Stroke**	**CABG**	**MS**	**Kidney failure**	**MOT**	**TPD**	**Death**	**All**
Non-smokers										
<30	42%	0%	0%	0%	0%	0%	0%	0%	49%	56%
31-40	66%	11%	4%	34%	59%	33%	0%	10%	21%	40%
41-50	33%	26%	18%	27%	35%	0%	0%	0%	28%	37%
51-60	38%	42%	21%	0%	184%	0%	0%	0%	47%	45%
61+	34%	0%	0%	117%	0%	0%	0%	0%	10%	32%
All	42%	28%	15%	20%	61%	14%	0%	2%	32%	40%
Smokers										
<30	109%	158%	0%	0%	370%	0%	0%	76%	94%	116%
31-40	60%	56%	33%	89%	179%	0%	0%	0%	67%	77%
41-50	66%	91%	45%	63%	202%	0%	0%	0%	72%	81%
51-60	42%	102%	17%	137%	0%	0%	0%	57%	137%	104%
61+	146%	0%	0%	0%	0%	0%	0%	0%	129%	82%
All	64%	84%	32%	93%	188%	0%	0%	22%	84%	87%
Aggregate										
<30	61%	44%	0%	0%	102%	0%	0%	21%	62%	73%
31-40	64%	24%	13%	50%	94%	24%	0%	7%	34%	49%
41-50	40%	41%	25%	35%	74%	0%	0%	0%	39%	47%
51-60	39%	53%	20%	24%	150%	0%	0%	10%	63%	55%
61+	49%	0%	0%	100%	0%	0%	0%	0%	26%	39%
All	47%	40%	18%	35%	94%	10%	0%	6%	44%	51%

Due to the amount of detail involved, we have presented only the final results after adjusting for IBNS.

Table A2.11 - Results by cause of claim (Lives vs. CIBT93) Accelerated Female

Accelerated, Female										
	Cancer	**Heart Attack**	**Stroke**	**CABG**	**MS**	**Kidney failure**	**MOT**	**TPD**	**Death**	**All**
Non-smokers										
<30	41%	0%	54%	0%	174%	0%	0%	0%	44%	59%
31-40	42%	0%	12%	0%	62%	0%	87%	0%	38%	47%
41-50	50%	39%	19%	0%	71%	133%	0%	0%	72%	57%
51-60	55%	18%	23%	0%	37%	0%	0%	0%	83%	49%
61+	18%	0%	0%	0%	0%	0%	0%	0%	124%	33%
All	48%	22%	20%	0%	74%	42%	32%	0%	61%	52%
Smokers										
<30	33%	0%	0%	0%	0%	0%	0%	0%	31%	29%
31-40	70%	0%	0%	1100%	213%	0%	0%	0%	72%	76%
41-50	73%	229%	52%	0%	34%	0%	0%	0%	146%	91%
51-60	18%	168%	69%	0%	154%	0%	0%	0%	175%	65%
61+	244%	0%	0%	0%	0%	0%	0%	0%	0%	113%
All	62%	150%	30%	105%	123%	0%	0%	0%	107%	77%
Aggregate										
<30	38%	0%	40%	0%	130%	0%	0%	0%	40%	51%
31-40	49%	0%	10%	255%	99%	0%	66%	0%	46%	54%
41-50	56%	82%	26%	0%	63%	103%	0%	0%	89%	65%
51-60	48%	46%	31%	0%	58%	0%	0%	0%	100%	51%
61+	46%	0%	0%	0%	0%	0%	0%	0%	109%	43%
All	52%	49%	22%	21%	86%	32%	25%	0%	71%	58%

Due to the amount of detail involved, we have presented only the final results after adjusting for IBNS.

Table A2.12 - Results by cause of claim (Lives vs. CIBT93) Stand Alone Male

Stand Alone, Male										
	Cancer	**Heart Attack**	**Stroke**	**CABG**	**MS**	**Kidney failure**	**MOT**	**TPD**	**Death**	**All**
Non-smokers										
<30	70%	0%	0%	0%	88%	0%	0%	0%	0%	57%
31-40	39%	21%	10%	0%	59%	0%	0%	13%	0%	65%
41-50	48%	18%	9%	20%	39%	0%	0%	0%	0%	43%
51-60	53%	45%	13%	97%	127%	0%	0%	0%	0%	67%
61+	48%	0%	0%	0%	0%	0%	0%	0%	0%	50%
All	49%	26%	10%	55%	63%	0%	0%	2%	0%	57%
Smokers										
<30	0%	0%	0%	0%	0%	0%	0%	0%	0%	82%
31-40	45%	38%	26%	0%	0%	0%	0%	0%	0%	66%
41-50	81%	71%	20%	99%	0%	145%	0%	0%	0%	100%
51-60	62%	66%	46%	215%	0%	0%	0%	0%	0%	101%
61+	25%	94%	154%	512%	0%	0%	0%	122%	0%	143%
All	59%	63%	33%	162%	0%	45%	0%	8%	0%	93%
Aggregate										
<30	50%	0%	0%	0%	63%	0%	0%	0%	0%	64%
31-40	41%	26%	15%	0%	42%	0%	0%	9%	0%	66%
41-50	56%	30%	12%	38%	30%	34%	0%	0%	0%	56%
51-60	54%	49%	19%	118%	103%	0%	0%	0%	0%	73%
61+	44%	15%	24%	82%	0%	0%	0%	20%	0%	63%
All	51%	34%	14%	76%	48%	12%	0%	4%	0%	65%

Due to the amount of detail involved, we have presented only the final results after adjusting for IBNS.

Table A2.13 - Results by cause of claim (Lives vs. CIBT93) Stand Alone Female

Stand Alone, Female										
	Cancer	**Heart Attack**	**Stroke**	**CABG**	**MS**	**Kidney failure**	**MOT**	**TPD**	**Death**	**All**
Non-smokers										
<30	16%	0%	0%	0%	47%	0%	0%	0%	0%	34%
31-40	45%	22%	6%	0%	69%	121%	0%	0%	0%	69%
41-50	68%	0%	9%	0%	83%	0%	0%	0%	0%	69%
51-60	74%	18%	80%	55%	0%	0%	490%	0%	0%	77%
61+	58%	0%	49%	0%	0%	0%	0%	0%	0%	51%
All	61%	10%	23%	26%	63%	50%	82%	0%	0%	69%
Smokers										
<30	23%	0%	0%	0%	0%	588%	1089%	0%	0%	104%
31-40	116%	0%	0%	0%	38%	0%	0%	0%	0%	102%
41-50	65%	71%	0%	602%	87%	0%	0%	0%	0%	72%
51-60	82%	156%	0%	0%	0%	0%	0%	0%	0%	87%
61+	184%	0%	0%	0%	0%	0%	0%	0%	0%	106%
All	83%	79%	0%	256%	47%	107%	149%	0%	0%	87%
Aggregate										
<30	18%	0%	0%	0%	35%	149%	276%	0%	0%	52%
31-40	61%	17%	4%	0%	62%	95%	0%	0%	0%	77%
41-50	67%	14%	8%	120%	84%	0%	0%	0%	0%	69%
51-60	76%	40%	67%	45%	0%	0%	409%	0%	0%	78%
61+	71%	0%	45%	0%	0%	0%	0%	0%	0%	57%
All	65%	23%	18%	66%	60%	63%	95%	0%	0%	72%

Due to the amount of detail involved, we have presented only the final results after adjusting for IBNS.

Appendix 3. Office by Office Analysis

This Appendix contains the details of various CMI reports analysed at office level. Previous comments about anonymity still apply here, so tables include only Actual / Expected (A/E) ratios or rankings of the relative individual A/E ratios. (In all rankings 1 represents the office with the lightest experience within the category being considered.)

A3.1 CMI Report BA (comparison with CIBT93) 2001-2003 Lives & 100A/E, split by calendar year

Table A3.1 - Acceleration, All Claims (incl. mortality) Males

Year	2001-3	2001-3	2001-3	2001	2002	2003
Smoking status	N/S	Sm	Agg	Agg	Agg	Agg
	39	**81**	**49**			
Office 1	27	60	34	53	30	25
Office 2	24	93	42	51	33	43
Office 3	44	59	47	49	63	29
Office 4	45	54	47	53	40	46
Office 5	38	93	51	58	48	48
Office 6	46	87	55	42	50	69
Office 7	49	84	59	109	58	20

Table A3.2 - Acceleration, All Claims (incl. mortality) Females

	49	**71**	**54**			
Office 1	38	57	42	46	47	36
Office 2	41	98	56	69	54	49
Office 3	55	72	59	68	47	61
Office 4	25	68	34	35	16	52
Office 5	47	76	54	54	47	61
Office 6	52	45	51	39	73	40
Office 7	85	91	86	117	81	68

Table A3.3 - Stand Alone Males

Office 1	36	73	41	46	52	29
Office 2	43	32	41	32	10	76
Office 3	70	108	78	63	83	85
Office 4	55	111	64	91	32	70
Office 5	46	90	56	56	52	60
Office 6	57	114	69	60	94	52
Office 7	45	60	49	26	61	57

Table A3.4 - Stand Alone Females

Office 1	66	79	69	36	79	82
Office 2	55	22	48	0	58	75
Office 3	58	89	64	71	69	54
Office 4	72	96	77	69	95	67
Office 5	53	87	61	76	52	59
Office 6	58	67	60	39	65	72
Office 7	55	60	56	27	69	68

A3.2 CMI Report CA (comparison with CIBT93) 2001-2003 Amounts & 100A/E, split by calendar year

Table A3.5 - Acceleration, All Claims (incl. mortality) Males

Year	2001-3	2001-3	2001-3	2001	2002	2003
Smoking status	N/S	Sm	Agg	Agg	Agg	Agg
Office 1	23	64	30	47	31	20
Office 2	19	96	36	38	31	39
Office 3	64	54	62	79	68	43
Office 4	46	57	48	56	38	52
Office 5	35	86	45	38	46	49
Office 6	54	103	63	40	56	84
Office 7	39	66	45	96	46	11

Table A3.6 - Acceleration, All Claims (incl. mortality) Females

Office 1	41	49	42	36	42	47
Office 2	32	81	44	52	42	40
Office 3	54	24	48	61	18	65
Office 4	22	58	29	30	19	40
Office 5	53	60	54	45	58	59
Office 6	49	34	46	43	66	32
Office 7	59	71	61	84	44	58

Table A3.7 - Stand Alone Males

Office 1	36	74	41	36	54	34
Office 2	40	27	38	24	10	72
Office 3	59	69	61	63	55	64
Office 4	57	90	62	122	27	41
Office 5	59	82	63	62	50	74
Office 6	61	100	67	61	93	47
Office 7	33	55	37	23	39	46

Table A3.8 - Stand Alone Females

Office 1	58	95	64	24	103	59
Office 2	64	22	57	0	58	95
Office 3	40	45	41	38	38	45
Office 4	57	85	61	32	78	72
Office 5	46	70	51	58	36	57
Office 6	70	49	66	32	54	100
Office 7	51	46	50	31	59	57

A3.3 CMI Report BA (comparison with CIBT93) 2001-2003 Lives & Rankings, split by calendar year

Table A3.9 - Acceleration, All Claims (incl. mortality) Males

Year	2001-3	2001-3	2001-3	2001	2002	2003
Smoking status	N/S	Sm	Agg	Agg	Agg	Agg
Office 1	2	3	1	4	1	2
Office 2	1	6	2	3	2	4
Office 3	4	2	3	2	7	3
Office 4	5	1	3	4	3	5
Office 5	3	6	5	6	4	6
Office 6	6	5	6	1	5	7
Office 7	7	4	7	7	6	1

Table A3.10 - Acceleration, All Claims (incl. mortality) Females

Office 1	2	2	2	3	2	1
Office 2	3	7	5	6	5	3
Office 3	6	4	6	5	2	5
Office 4	1	3	1	1	1	4
Office 5	4	5	4	4	2	5
Office 6	5	1	3	2	6	2
Office 7	7	6	7	7	7	7

Table A3.11 - Stand Alone Males

Office 1	1	3	1	3	3	1
Office 2	2	1	1	2	1	6
Office 3	7	5	7	6	6	7
Office 4	5	6	5	7	2	5
Office 5	4	4	4	4	3	4
Office 6	6	7	6	5	7	2
Office 7	3	2	3	1	5	3

Table A3.12 - Stand Alone Females

Office 1	6	4	6	3	6	7
Office 2	2	1	1	1	2	6
Office 3	4	6	5	6	4	1
Office 4	7	7	7	5	7	3
Office 5	1	5	4	7	1	2
Office 6	5	3	3	4	3	5
Office 7	2	2	2	2	4	4

A3.4 CMI Report CA (comparison with CIBT93) 2001-2003 Amounts & Rankings, split by calendar year

Table A3.13 - Acceleration, All Claims (incl. mortality) Males

Year	2001-3	2001-3	2001-3	2001	2002	2003
Smoking status	N/S	Sm	Agg	Agg	Agg	Agg
Office 1	2	3	1	4	1	2
Office 2	1	6	2	1	1	3
Office 3	7	1	6	6	7	4
Office 4	5	2	5	5	3	6
Office 5	3	5	3	1	4	5
Office 6	6	7	7	3	6	7
Office 7	4	4	3	7	4	1

Table A3.14 - Acceleration, All Claims (incl. mortality) Females

Office 1	3	3	2	2	3	4
Office 2	2	7	3	5	3	2
Office 3	6	1	5	6	1	7
Office 4	1	5	1	1	2	2
Office 5	5	4	6	4	6	6
Office 6	4	2	4	3	7	1
Office 7	7	6	7	7	5	5

Table A3.15 - Stand Alone Males

Office 1	2	4	3	3	5	1
Office 2	3	1	2	2	1	6
Office 3	5	3	4	6	6	5
Office 4	4	6	5	7	2	2
Office 5	5	5	6	5	4	7
Office 6	7	7	7	4	7	4
Office 7	1	2	1	1	3	3

Table A3.16 - Stand Alone Females

Office 1	5	7	6	2	7	4
Office 2	6	1	4	1	4	6
Office 3	1	2	1	6	2	1
Office 4	4	6	5	4	6	5
Office 5	2	5	3	7	1	2
Office 6	7	4	7	4	3	7
Office 7	3	3	2	3	5	2

A3.5 CMI Report DA (comparison with CIBT93) 2001-2003 Cause of claim, aggregate lives & 100A/E

Table A3.17 - Acceleration, All Claims (incl. mortality)Males

Cause	Cancer	Heart Attack	Stroke	CABG	Multiple sclerosis	Kidney failure	MOT	TPD	Death	All
	45	**38**	**18**	**49**	**73**				**43**	**49**
Office 1	34	19	9	28	138				46	34
Office 2	24	30	47	106	0				56	42
Office 3	0	0	0	0	0				29	47
Office 4	69	33	27	36	158				41	47
Office 5	58	53	20	53	59				50	51
Office 6	0	0	0	0	0				33	55
Office 7	70	54	39	100	99				45	59

Table A3.18 - Acceleration, All Claims (incl. mortality) Females

	48	**46**	**26**		**85**				**56**	**54**
Office 1	44	31	11		78				36	42
Office 2	69	79	15		106				36	56
Office 3	0	0	0		0				85	59
Office 4	31	42	37		69				45	34
Office 5	55	61	35		107				68	54
Office 6	0	0	0		0				71	51
Office 7	90	71	65		110				67	86

Table A3.19 - Stand Alone Males

	41	**30**	**15**	**60**	**58**				**n/a**	**58**
Office 1	49	40	0	35	252				n/a	41
Office 2	34	42	0	173	0				n/a	41
Office 3	0	0	0	0	0				n/a	78
Office 4	64	35	37	0	370				n/a	64
Office 5	63	39	35	92	69				n/a	56
Office 6	0	0	0	0	0				n/a	69
Office 7	57	46	13	81	37				n/a	49

Table A3.20 - Stand Alone Females

	52	**22**	**18**		**50**				**n/a**	**60**
Office 1	76	0	68		55				n/a	69
Office 2	52	0	0		238				n/a	48
Office 3	0	0	0		0				n/a	64
Office 4	97	72	0		173				n/a	77
Office 5	69	44	24		52				n/a	61
Office 6	0	0	0		0				n/a	60
Office 7	69	16	24		54				n/a	56

A3.6 CMI Report DA (comparison with CIBT93) 2001-2003 Cause of claim, aggregate lives re-indexed

Table A3.21 - Acceleration, All Claims (incl. mortality) Males

Cause	Cancer	Heart Attack	Stroke	CABG	Multiple sclerosis	Kidney failure	MOT	TPD	Death	All
	0.92	**0.78**	**0.37**	**1.00**	**1.49**				**0.88**	**1.00**
Office 1	1.00	0.56	0.26	0.82	4.06				1.35	1.00
Office 2	0.57	0.71	1.12	2.52	0.00				1.33	1.00
Office 3	0.00	0.00	0.00	0.00	0.00				0.62	1.00
Office 4	1.47	0.70	0.57	0.77	3.36				0.87	1.00
Office 5	1.14	1.04	0.39	1.04	1.16				0.98	1.00
Office 6	0.00	0.00	0.00	0.00	0.00				0.60	1.00
Office 7	1.19	0.92	0.66	1.69	1.68				0.76	1.00

Table A3.22 - Acceleration, All Claims (incl. mortality) Females

	0.89	**0.85**	**0.48**		**1.57**				**1.04**	**1.00**
Office 1	1.05	0.74	0.26		1.86				0.86	1.00
Office 2	1.23	1.41	0.27		1.89				0.64	1.00
Office 3	0.00	0.00	0.00		0.00				1.44	1.00
Office 4	0.91	1.24	1.09		2.03				1.32	1.00
Office 5	1.02	1.13	0.65		1.98				1.26	1.00
Office 6	0.00	0.00	0.00		0.00				1.39	1.00
Office 7	1.05	0.83	0.76		1.28				0.78	1.00

Table A3.23 - Stand Alone Males

	0.71	**0.52**	**0.26**	**1.03**	**1.00**				**n/a**	**1.00**
Office 1	1.20	0.98	0.00	0.85	6.15				n/a	1.00
Office 2	0.83	1.02	0.00	4.22	0.00				n/a	1.00
Office 3	0.00	0.00	0.00	0.00	0.00				n/a	1.00
Office 4	1.00	0.55	0.58	0.00	5.78				n/a	1.00
Office 5	1.13	0.70	0.63	1.64	1.23				n/a	1.00
Office 6	0.00	0.00	0.00	0.00	0.00				n/a	1.00
Office 7	1.16	0.94	0.27	1.65	0.76				n/a	1.00

Table A3.24 - Stand Alone Females

	0.87	**0.37**	**0.30**		**0.83**				**n/a**	**1.00**
Office 1	1.10	0.00	0.99		0.80				n/a	1.00
Office 2	1.08	0.00	0.00		4.96				n/a	1.00
Office 3	0.00	0.00	0.00		0.00				n/a	1.00
Office 4	1.26	0.94	0.00		2.25				n/a	1.00
Office 5	1.13	0.72	0.39		0.85				n/a	1.00
Office 6	0.00	0.00	0.00		0.00				n/a	1.00
Office 7	1.23	0.29	0.43		0.96				n/a	1.00

Appendix 4. Features of IBNR

Table A4.1 - Analysis IBNR by Critical Illness or Death

	Number	Mean	Standard Deviation	Median	Inter Quartile Range
Critical Illness	1,591	140	297	49	89
Death	122	37	88	20	27

Table A4.2 - Analysis of IBNR by critical illness claim type group

	Number	Mean	Standard Deviation	Median	Inter Quartile Range
Cancer	684	109	222	47	68
Heart Disease	203	70	139	32	45
CABG	59	109	272	33	77
Multiple Sclerosis	71	150	255	63	124
Stroke	85	160	284	46	148
Other	489	212	411	69	181
Total	1,591	140	297	49	89

Table A4.3 Analysis of IBNR by Accelerated or Stand Alone

	Number	Mean	Standard Deviation	Median	Inter Quartile Range
Accelerated	771	156	323	55	99
Stand Alone	820	125	269	45	82