



**The Actuarial Profession**

making financial sense of the future

## CMI Critical Illness Update

“Current Issues in Critical Illness”

7 December 2005

*Dave Grimshaw*

*Chairman, CMI Critical Illness Committee*

# CMI CI Investigation

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- Investigation started with 1998 data
  - Published results to members for 1998, 1999 & 2000 in 2003
  - Problems in collecting and analysing data for 2001-02:
    - Delays in some offices submitting data
    - A significant number of data re-submissions
    - Data issues forced us to exclude some offices whose data was used until 2000
  - Draft results for 2001, 2002 & quad included in talk last year
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# Agenda

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- **Progress in 2005**
- **Claim Dates / Claims Delays**
- **Overview of the 1999-2003 data**
- **Draft 2003 results**
- **Further work**
- **1999-2002 results revisited**
- **Conclusions**

# CMI CI – Progress in 2005

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- Full results for 2001, 2002 & quad released in May 2005
- Working Paper 14:
  - Detailed methodology underlying 1999-2002 results
  - Estimate of overall grossing-up factor
- 2003 / 4 Data Collection
- Working Paper 18:
  - Responses to feedback on WP14
  - Reasons for not graduating (yet)

# Decision not to graduate (yet)

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- **Very immature experience**
  - Normal approach is to graduate the ultimate experience and blend in select but much of our data is select!
  - We don't yet know the ultimate experience
- **Experience differs significantly by gender and smoking**
  - We would need to graduate a surface varying by age and duration for each sex/smoker status category
- **Limited age range**
  - Distinct lack of data below age 30 & above age 60
- **Do we graduate by cause separately or for all causes combined?**

# CMI CI – Progress in 2005

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- **Full results for 2001, 2002 & quad released in May 2005**
- **Working Paper 14:**
  - Detailed methodology underlying 1999-2002 results
  - Estimate of overall grossing-up factor
- **2003 / 4 Data Collection**
- **Working Paper 18:**
  - Responses to feedback on WP14
  - Reasons for not graduating (yet)
- **1999-2002 data available to CMI members**
- **Further work on grossing-up factors**
- **Discussions with Health Claims Forum re dates of claim**

# Claim Dates

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- CMI request 4 dates for each claim: Date of Diagnosis, Date of Notification, Date of Admittance & Date of Settlement
- Date of diagnosis matches exposure and matches the risk incurred by the office

- But:

- Offices only supply date of diagnosis for some claims. In other cases we estimate it from the dates we are given:

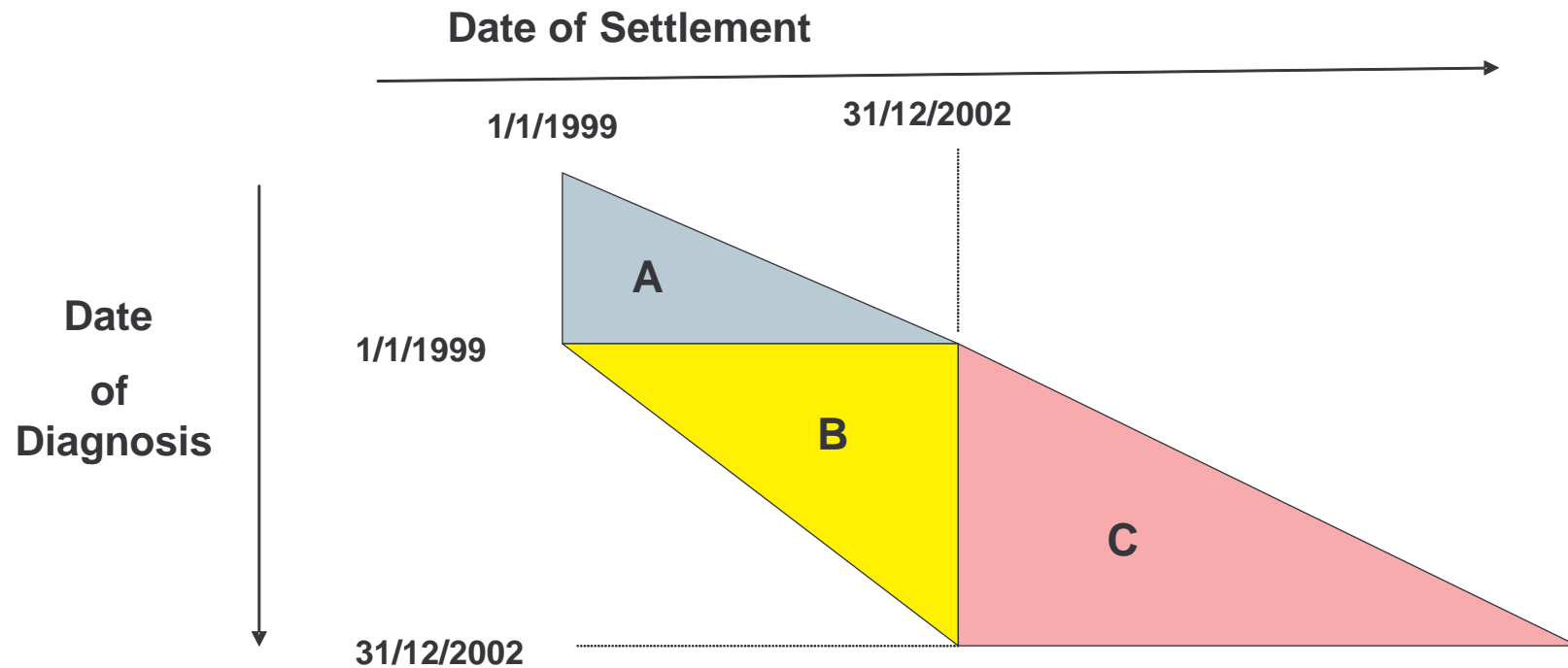
Actual Date of Diagnosis	64.2% (56.3%)
Estimated from Date of Settlement	35.4% (42.3%)
Estimated from Date of Admittance	0% ( 1.2%)
Estimated from Date of Notification	0.4% ( 0.2%)

2003 data (1999-2002 in brackets)

- The claims we are analysing are those settled in the quad

# Date of Diagnosis v Date of Settlement

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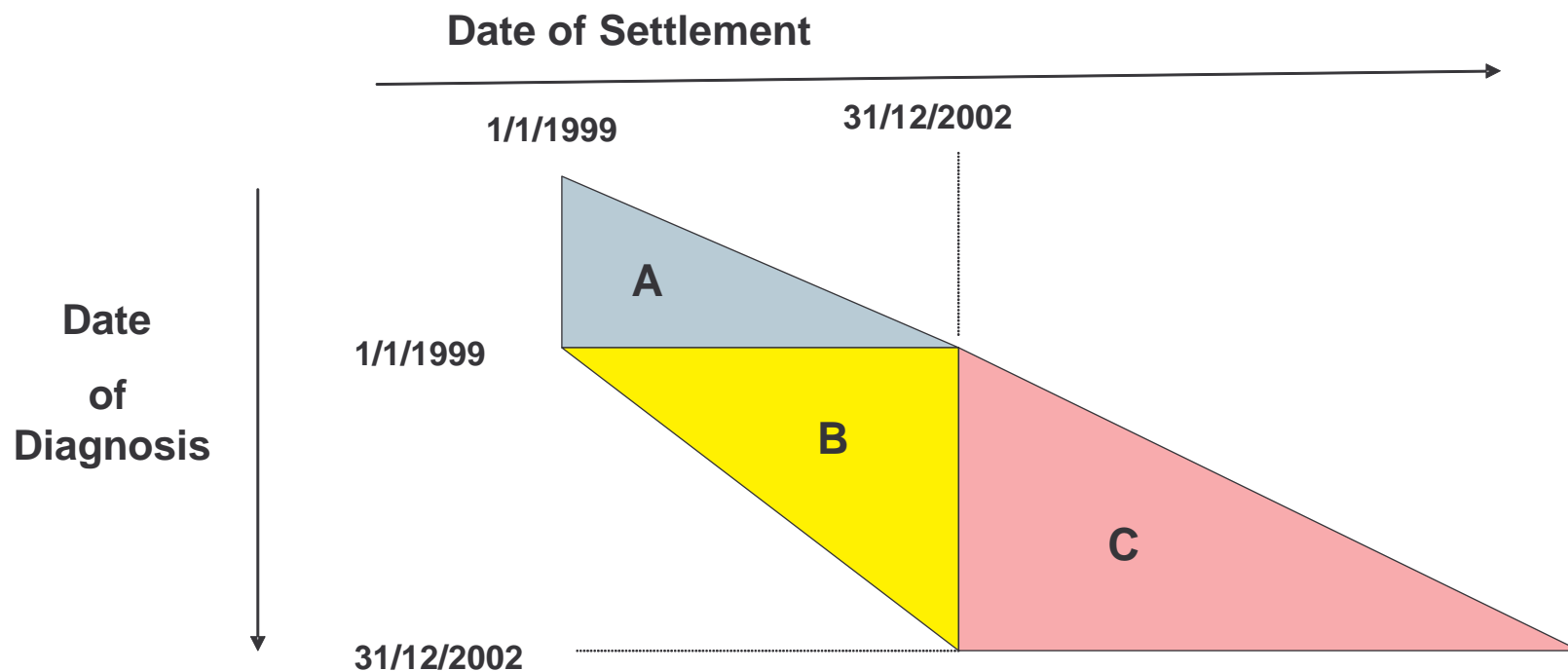
# Importance of Claim Dates

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- The date of diagnosis is used to correctly calculate the age and duration but not to re-allocate claims in or out of the analysis
- This would not be an issue with a stable portfolio
- **BUT VOLUMES HAVE INCREASED RAPIDLY**
- The effect of this is that CMI results are understated by a factor of the order of 15%
- This factor will vary between offices according to the growth rate in their claims portfolio

# Date of Diagnosis v Date of Settlement

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$$(A + B) \times (1 + \text{grossing-up factor}) = (B + C)$$

# Claims Delays

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- Approx. observed delays between claim dates:

- Date of Diagnosis



114 days

- Date of Notification



55 days

- Date of Admittance



7 days

- Date of Settlement

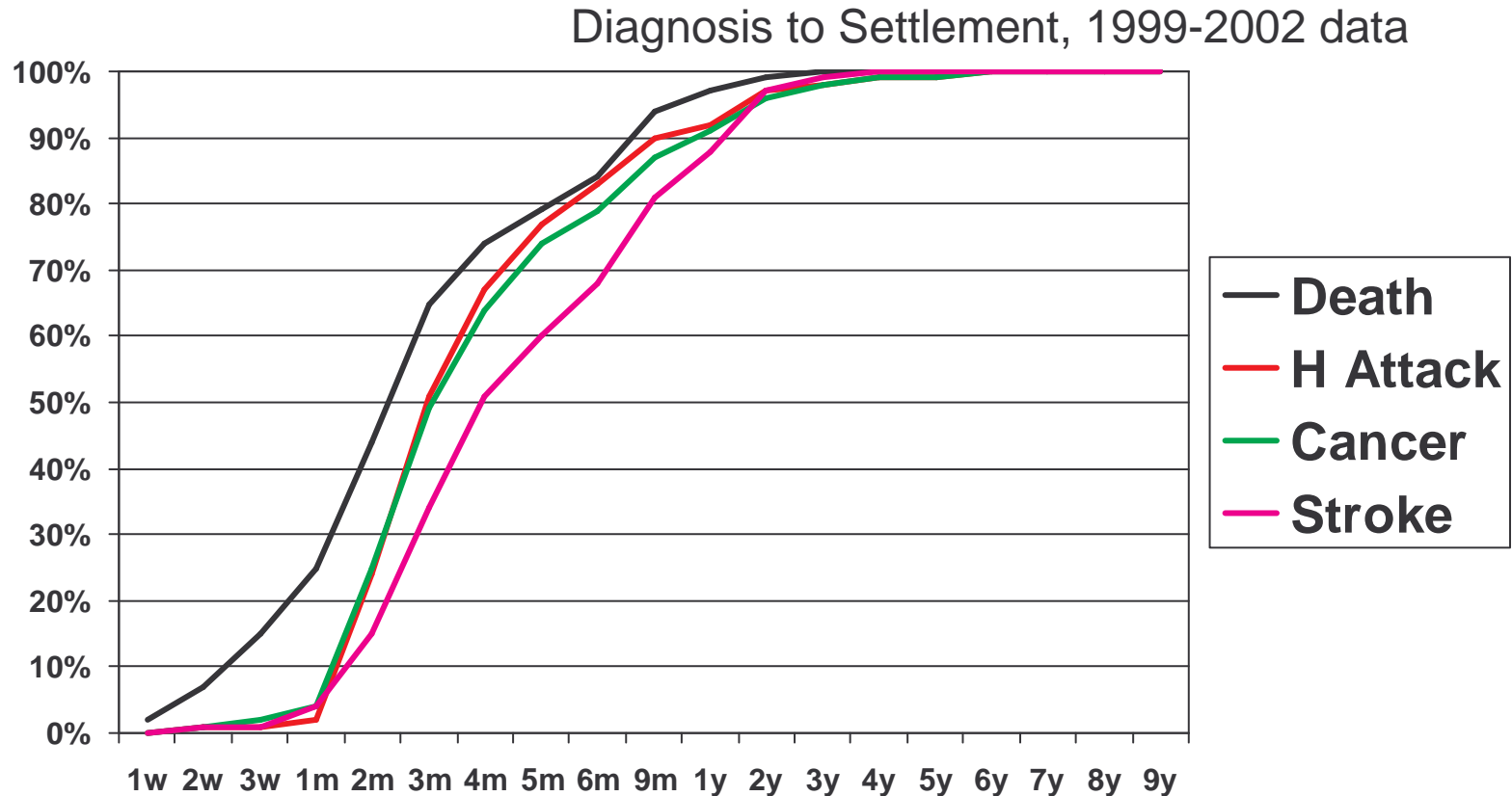
# Claims Delays

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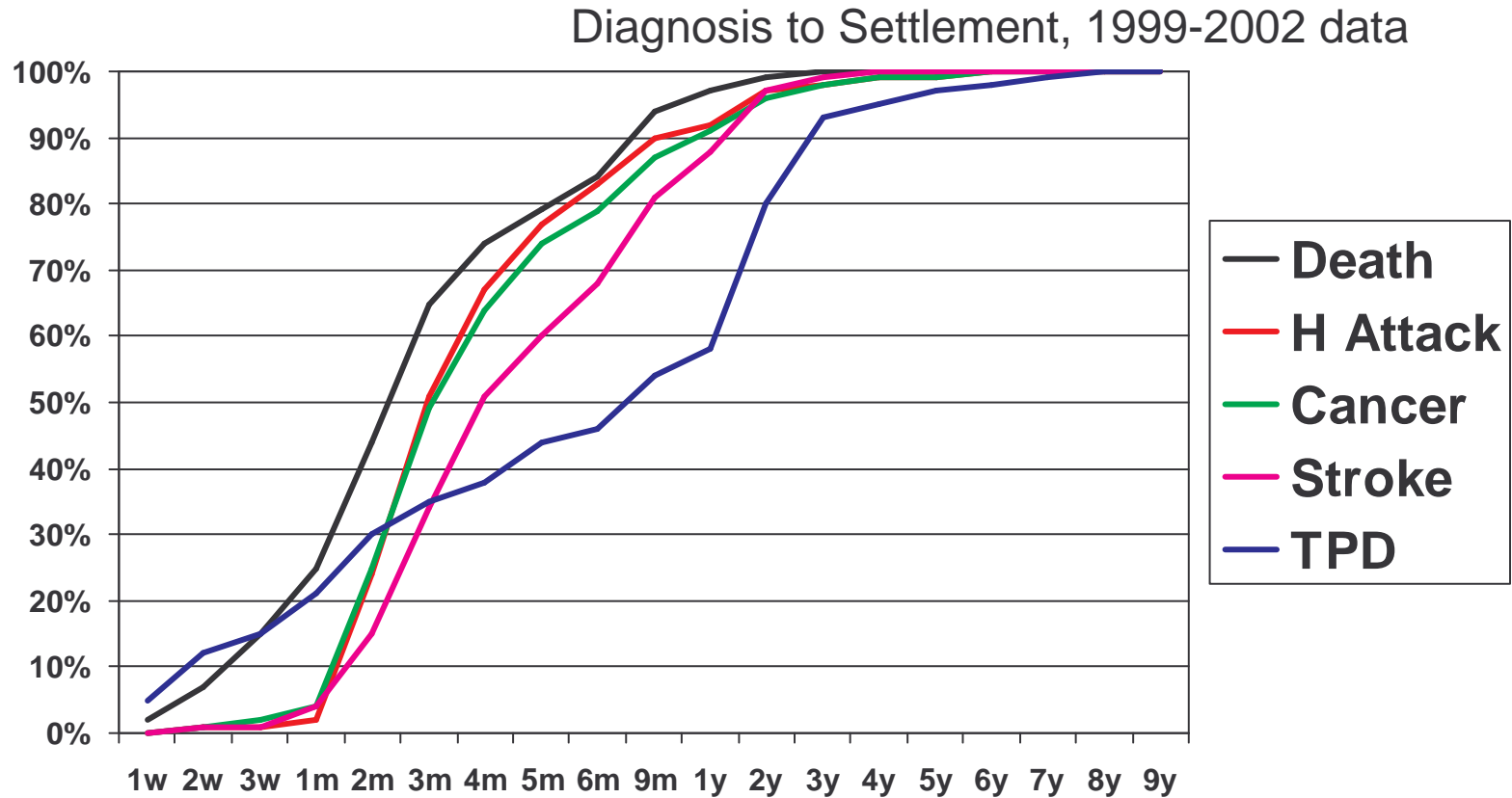
- Approx. observed delays between claim dates:

	Death	CI
• Date of Diagnosis	12 days	127 days
• Date of Notification	78 days	48 days
• Date of Admittance	10 days	5 days
• Date of Settlement		

# Observed claim delays by cause



# Observed claim delays by cause



# What do we mean by Date of Diagnosis?

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- **For some events it has a clear intuitive meaning, e.g. :**
  - Heart Attack
  - Surgery events
  - Death
- **For Cancer, is it the date symptoms are detected by the GP, or when a diagnosis is confirmed by the consultant?**

- **ABI definition of MS:**

A definite diagnosis by a Consultant Neurologist of Multiple Sclerosis which satisfies all of the following criteria:

- § There must be current impairment of motor or sensory function, which must have persisted for a continuous period of at least six months.
- § The diagnosis must be confirmed by diagnostic techniques current at the time of the claim.

**So is it when diagnosis obtained or after the 6 months?**

- **Definition may vary between offices or even between assessors within an office**

# Discussions with the Health Claims Forum

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- **Can we record Date of Diagnosis more often?**
- **Can we record Date of Diagnosis consistently?**



# Claim Delays

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- 1998-2000 analyses used an average delay of 155 days between diagnosis and settlement
- Average delay in 1999-2002 had lengthened to 176 days
- We expect it to continue to lengthen until number of claims stabilises. Our model suggests an underlying average delay of around 260 days
- A straight average over-simplifies these effects:
  - We are now differentiating between Death and CI
  - We apply an average based on duration of policy
- 2003 results use 1999-2002 adjustments

# Observed Claim Delays

(diagnosis to settlement, in days)

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Duration of policy at date of settlement	CI	Death
Up to 3 months	53	41
3 – 6 months	82	44
6 – 12 months	104	102
1 – 2 years	125	
2 – 3 years	154	
3 – 4 years	195	
4 – 5 years	234	
5 – 6 years	237	
6 – 7 years	261	
7 years +	298	

# Contributing Offices

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- Data from 15 offices for 2003 (so far!):

**AEGON**

**AXA**

**Bupa**

**Halifax Life**

**Legal & General**

**Nationwide Life**

**Scottish Provident**

**Swiss Life (UK)**

**Allied Dunbar**

**Barclays Life**

**CIS**

**HSBC**

**Liverpool Victoria**

**Royal Sun Alliance**

**Standard Life**

# Data volumes

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	<b>1999-2002</b>	<b>2003</b>
<b>Data from:</b>	<b>16 offices</b>	<b>15 offices</b>
<b>Life-years exposure</b>	<b>7.4m</b>	<b>2.7m</b>
<b>Accelerated cover</b>	<b>6.4m</b>	<b>2.3m</b>
<b>Stand-Alone cover</b>	<b>1.0m</b>	<b>0.4m</b>
<b>Claims</b>	<b>11,803</b>	<b>4,048</b>
<b>Accelerated cover</b>	<b>10,310</b>	<b>3,416</b>
	<b>(7,978 CI; 2,332 death)</b>	<b>(2,691 CI; 725 death)</b>
<b>Stand-Alone cover</b>	<b>1,493</b>	<b>632</b>

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# Split of the 1999-2003 data

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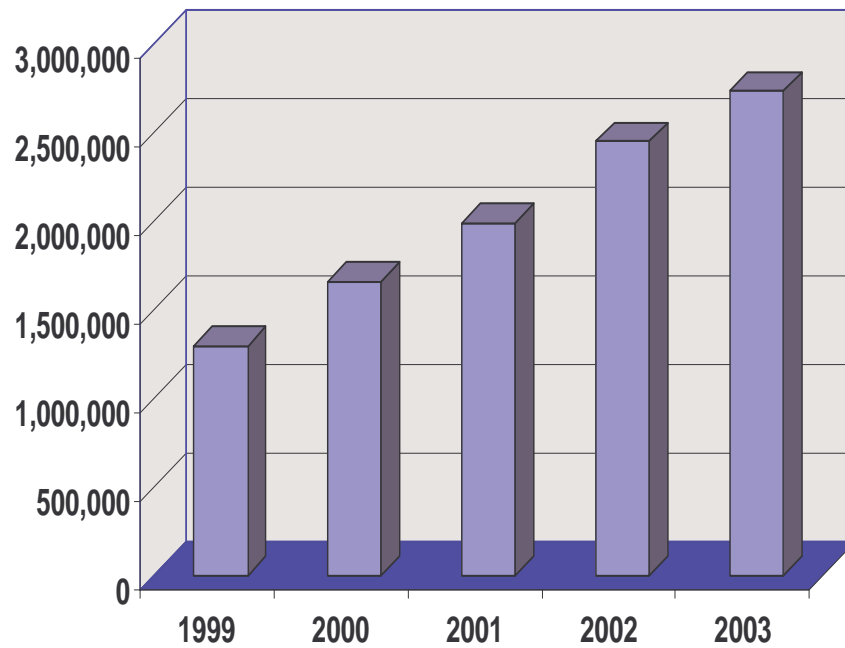
Split of exposure data (on lives basis):	1999-2002	2003
Accelerated cover	86%	87%
Stand-Alone cover	14%	13%
Single Life / Joint Life	45% / 55%	45% / 55%
Male / Female	53% / 47%	52% / 48%
Non-smoker / Smoker	80% / 19%	81% / 19%
<b>Sales Channel</b>		
Bancassurer	30%	31%
IFA	33%	36%
DSF	28%	22%
Other	6%	8%

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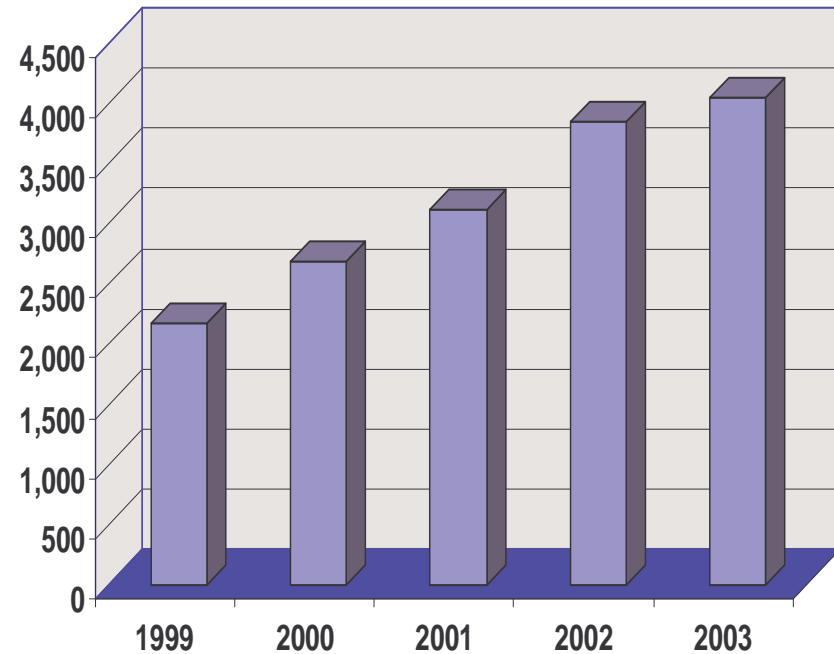
# 1999-2003: Distribution of Exposure and Claims by year

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## Exposure



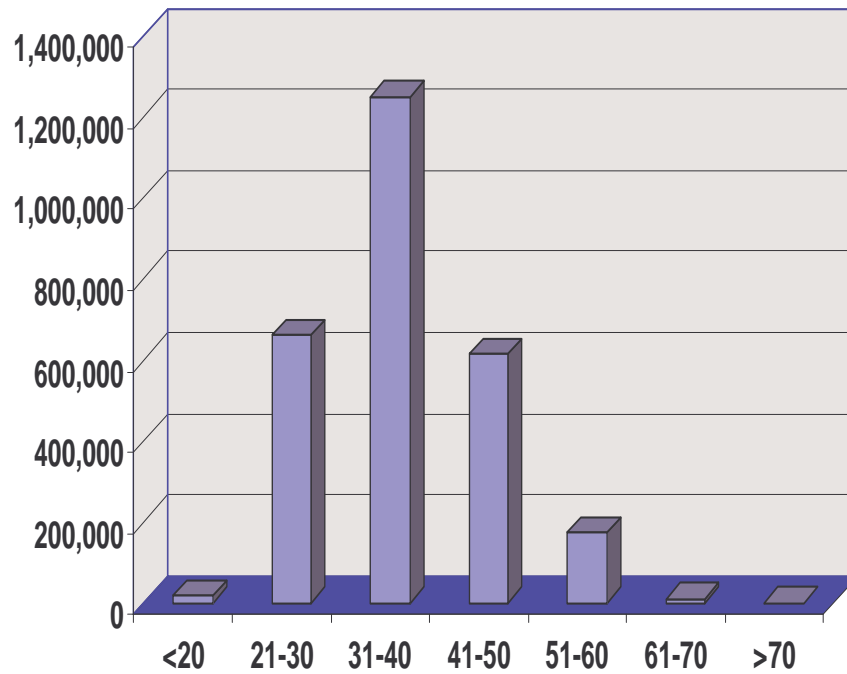
## Settled Claims



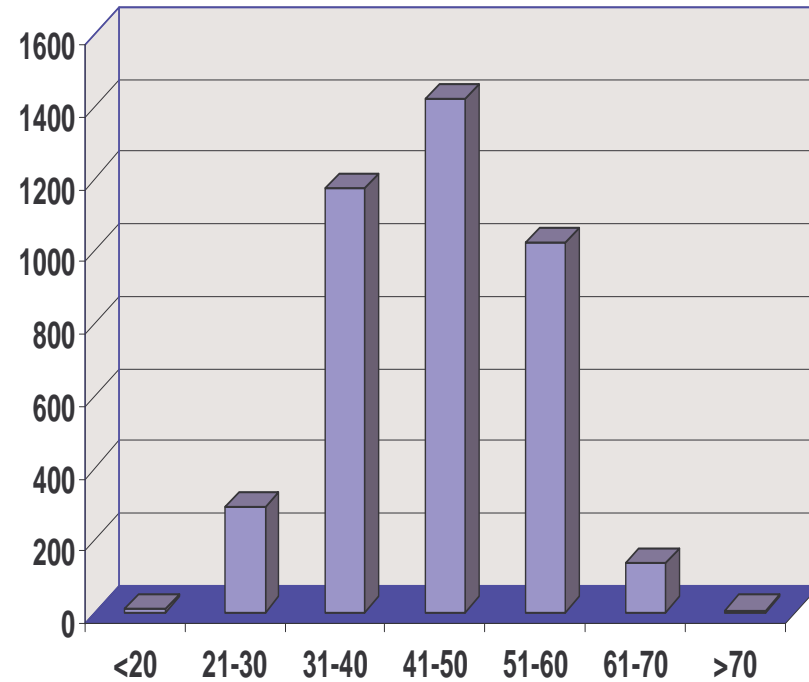
# 2003: Distribution of Exposure and Claims by age band

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## Exposure



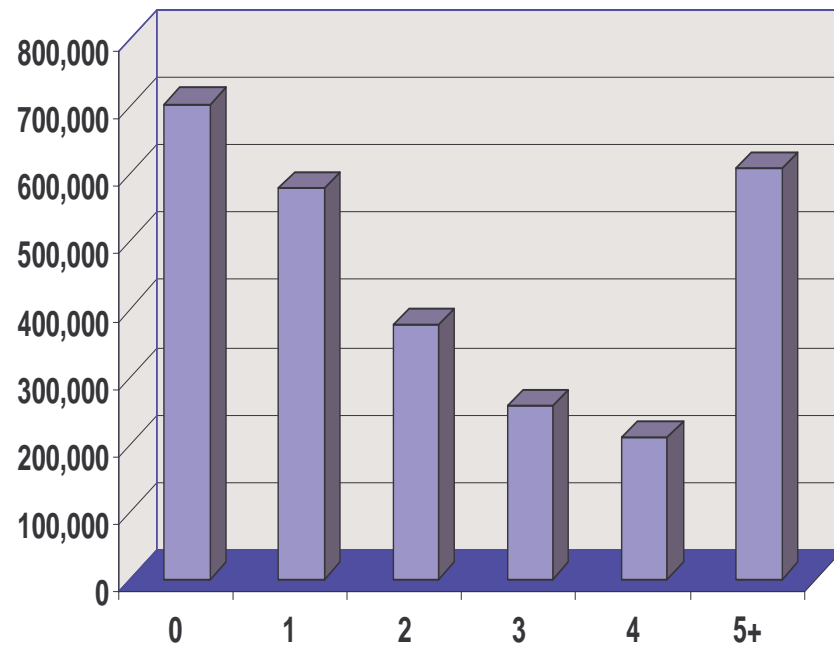
## Claims



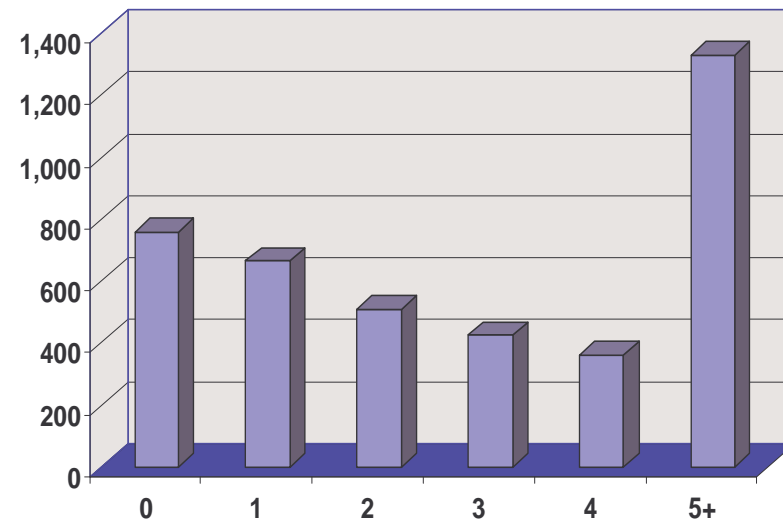
# 2003: Distribution of Exposure and Claims by duration

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## Exposure



## Claims





# Draft 2003 Aggregate results

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Accelerated v Stand-Alone, all ages, all durations, Lives v Amounts

		Accelerated	Stand-Alone
Male	Lives	36 (44)	48 (48)
	Amounts	35 (41)	51 (49)
Female	Lives	42 (47)	59 (52)
	Amounts	43 (45)	63 (56)

(100 A/E's, Expected based on CIBT93, 1999-2002 results in brackets)

# Results by Calendar Year

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## Accelerated business, all ages, all durations, Lives

		1999	2000	2001	2002	Quad	<b>2003 (DRAFT)</b>
Male	NS	40	39	39	35	38	<b>31</b>
	Sm	77	73	68	62	69	<b>54</b>
Female	NS	52	46	42	43	45	<b>40</b>
	Sm	58	55	57	56	57	<b>53</b>

(100 A/E's, Expected based on CIBT93)

# Draft 2003 Results by Duration

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## Accelerated business, all ages, all years, Lives

		Dn 0	Dn 1	Dn 2+	All
Male	NS	<b>27</b> (31)	<b>25</b> (37)	<b>35</b> (41)	<b>31</b> (38)
	Sm	<b>48</b> (64)	<b>44</b> (68)	<b>60</b> (71)	<b>54</b> (69)
Female	NS	<b>34</b> (41)	<b>37</b> (46)	<b>43</b> (46)	<b>40</b> (45)
	Sm	<b>51</b> (45)	<b>51</b> (60)	<b>55</b> (61)	<b>53</b> (57)

(100 A/E's, Expected based on CIBT93, 1999-2002 results in brackets)

# Draft 2003 Results by Age

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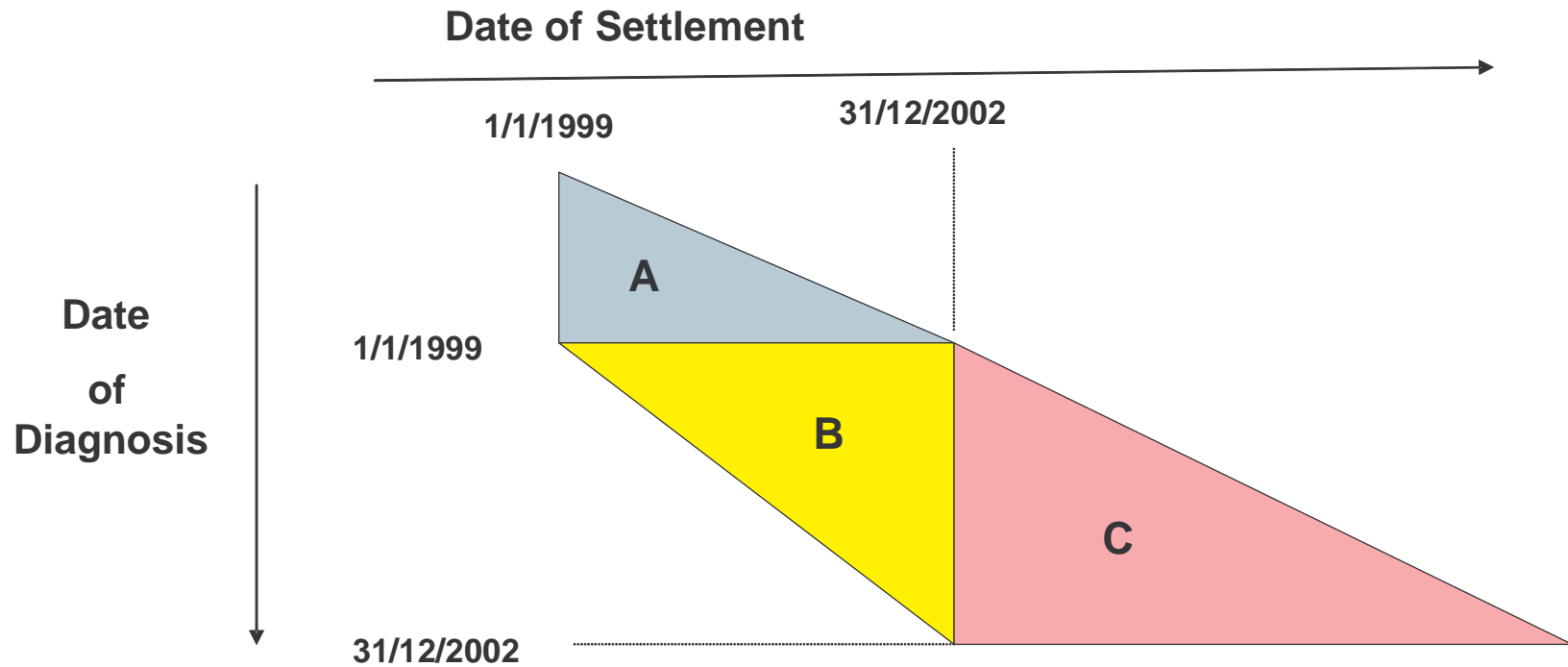
## Accelerated business, all durations, all years, Lives

		<30	31-40	41-50	51-60	61+	All
Male	NS	<b>36</b> (50)	<b>30</b> (40)	<b>32</b> (36)	<b>32</b> (35)	<b>32</b> (39)	<b>31</b> (38)
	Sm	<b>47</b> (55)	<b>53</b> (60)	<b>56</b> (76)	<b>57</b> (77)	<b>38</b> (56)	<b>54</b> (69)
Female	NS	<b>38</b> (44)	<b>43</b> (48)	<b>39</b> (45)	<b>39</b> (41)	<b>32</b> (31)	<b>40</b> (45)
	Sm	<b>31</b> (49)	<b>44</b> (52)	<b>59</b> (59)	<b>68</b> (63)	<b>68</b> (91)	<b>40</b> (57)

(100 A/E's, Expected based on CIBT93, 1999-2002 results in brackets)

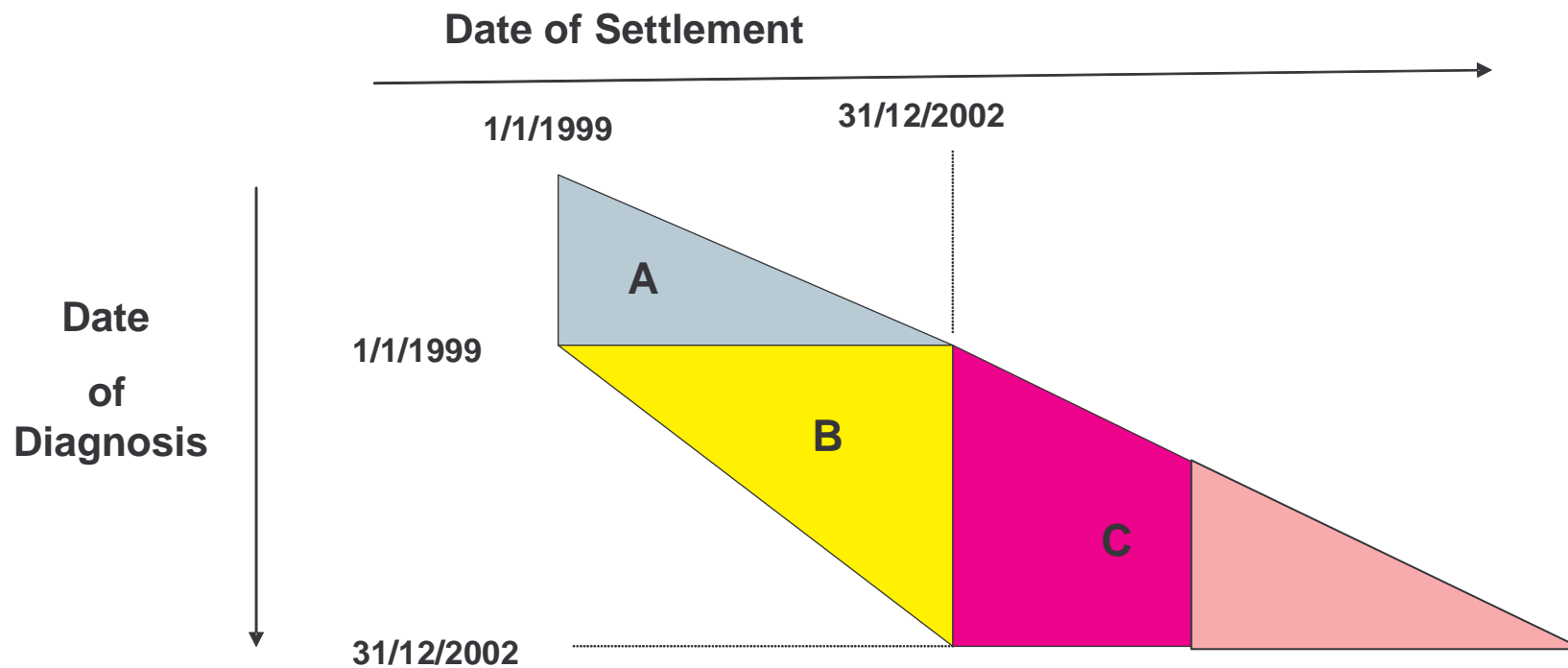
# Date of Diagnosis v Date of Settlement

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# Date of Diagnosis v Date of Settlement

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# Use of 2003 settled claims

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- Considerably reduces tail to be estimated
- Plus 2003 claims gives extra year's data from which to estimate development pattern
- Attempting to use only consistent data submissions
- And only claims where we know:
  - date of diagnosis, and
  - year of settlement
- Also allows us to consider subsets of the data

# Date of Diagnosis v Date of Settlement

	Year of Settlement				
	1999	2000	2001	2002	2003
1993	0	0	0	0	
1994	1	1	2	1	
1995	0	1	4	2	
1996	5	1	4	4	
1997	16	13	7	4	
1998	131	27	24	16	
1999	651	245	37	17	
2000		1081	445	66	
2001			1465	583	
2002				1905	
2003					



# Date of Diagnosis v Date of Settlement

	Year of Settlement				
	1999	2000	2001	2002	2003
1993	0	0	0	0	1
1994	1	1	2	1	0
1995	0	1	4	2	0
1996	5	1	4	4	1
1997	16	13	7	4	4
1998	131	27	24	16	7
1999	651	245	37	17	9
2000		1081	445	66	22
2001			1465	583	70
2002				1905	744
2003					1694

Year of Diagnosis

# Date of Diagnosis v Date of Settlement

	Year of Settlement				
	1999	2000	2001	2002	2003
1993	0	0	0	0	1
1994	1	1	2	1	0
1995	0	1	4	2	0
1996	5	1	4	4	1
1997	16	13	7	4	4
1998	131	27	24	16	7
1999	651	245	37	17	9
2000		1081	445	66	22
2001			1465	583	70
2002				1905	744
2003					1694

Year of Diagnosis

Year 2 ratio=

$$\frac{27+37+66+70}{131+245+445+583} = 14.2\%$$

# Date of Diagnosis v Date of Settlement

	Year of Settlement				
	1999	2000	2001	2002	2003
1993	0	0	0	0	1
1994	1	1	2	1	0
1995	0	1	4	2	0
1996	5	1	4	4	1
1997	16	13	7	4	4
1998	131	27	24	16	7
1999	651	245	37	17	9
2000		1081	445	66	22
2001			1465	583	70
2002				1905	744
2003					1694

Year of Diagnosis

Year 2 ratio=

$$\frac{27+37+66+70}{131+245+445+583} = 14.2\%$$

Estimate of claims diagnosed in 2002, settled in 2004=

$$14.2\% \times 744 = 106 \text{ claims}$$

# Use of 2003 settled claims

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- **Considerably reduces tail to be estimated**
  - 6495 claims diagnosed in 1999-2002 and settled in 1999-2002
  - 845 claims diagnosed in 1999-2002 and settled in 2003
  - 188 claims diagnosed in 1999-2002 estimated to be settled in 2004
  - 266 claims diagnosed in 1999-2002 estimated to be settled in 2005+
- **Overall grossing-up factor estimated at 15.3%**
- **Also allows us to consider subsets of the data**

# Grossing-up factors for subsets of data

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- **Methodology can be applied to data subsets**
- **But do we vary the development pattern for the sub-groups?**
- **Still uncertainty arising from estimating date of diagnosis on 40% of claims**
- **Work in Progress – not yet reviewed by CI Committee**

# Grossing-up factors for subsets of data

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- Overall grossing-up factor estimated at **15.3%**
- Using the same development pattern across data subsets gives:

- Males 14.9%                      Females 15.8%
- Non-smoker 15.6%                      Smoker 14.4%
- Accelerated 14.1%                      Stand-Alone 25.1%

- Age:

	<b>&lt;30</b>	<b>31-40</b>	<b>41-50</b>	<b>51-60</b>	<b>61+</b>
	<b>10.8%</b>	<b>16.9%</b>	<b>15.4%</b>	<b>15.9%</b>	<b>15.9%</b>

- Duration

	<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5+</b>
	<b>12.7%</b>	<b>11.7%</b>	<b>13.9%</b>	<b>16.2%</b>	<b>18.3%</b>	<b>23.5%</b>

- Calendar Year

	<b>1999</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>
	<b>20.7%</b>	<b>21.9%</b>	<b>12.4%</b>	<b>12.2%</b>

# Grossing-up factors for subsets of data

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- Overall grossing-up factor estimated at **15.3%**
- Using the same development pattern across data subsets gives:

- Males 14.9% Females 15.8%
- Age:

<30	31-40	41-50	51-60	61+
10.8%	16.9%	15.4%	15.9%	15.9%

- Using the development pattern calculated for that sub-group:

- Males 14.5% Females 16.3%
- Age:

<30	31-40	41-50	51-60	61+
8.1%	23.1%	14.1%	14.0%	15.4%

- Work in Progress – not yet reviewed by CI Committee

# Draft Adjusted 1999-2002 results

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Accelerated v Stand-Alone, all ages, all durations, Lives v Amounts

		Accelerated	Stand-Alone
Male	Lives	50 (44)	60 (48)
	Amounts	Not analysed yet	
Female	Lives	54 (47)	67 (52)
	Amounts	Not analysed yet	

(100 A/E's, Expected based on CIBT93, Raw 1999-2002 results in brackets)



# Draft Adjusted 1999-2002 results by Calendar Year

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## Accelerated business, all ages, all durations, Lives

		1999	2000	2001	2002	Quad
Male	NS	<b>47</b> (40)	<b>47</b> (39)	<b>44</b> (39)	<b>40</b> (35)	<b>44</b> (38)
	Sm	<b>95</b> (77)	<b>84</b> (73)	<b>78</b> (68)	<b>66</b> (62)	<b>78</b> (69)
Female	NS	<b>61</b> (52)	<b>59</b> (46)	<b>45</b> (42)	<b>49</b> (43)	<b>52</b> (45)
	Sm	<b>89</b> (58)	<b>69</b> (55)	<b>62</b> (57)	<b>62</b> (56)	<b>66</b> (57)

(100 A/E's, Expected based on CIBT93, Raw 1999-2002 results in brackets)

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# Draft Adjusted 1999-2002 results by Duration

---

## Accelerated business, all ages, all years, Lives

		Dn 0	Dn 1	Dn 2+	All
Male	NS	<b>34</b> (31)	<b>41</b> (37)	<b>49</b> (41)	<b>44</b> (38)
	Sm	<b>72</b> (64)	<b>75</b> (68)	<b>82</b> (71)	<b>78</b> (69)
Female	NS	<b>46</b> (41)	<b>52</b> (46)	<b>55</b> (46)	<b>52</b> (45)
	Sm	<b>54</b> (45)	<b>70</b> (60)	<b>71</b> (61)	<b>66</b> (57)

(100 A/E's, Expected based on CIBT93, Raw 1999-2002 results in brackets)

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# Draft Adjusted 1999-2002 results by Age

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Accelerated business, all durations, all years, Lives

		<30	31-40	41-50	51-60	61+	All
Male	NS	<b>55</b> (50)	<b>46</b> (40)	<b>42</b> (36)	<b>41</b> (35)	<b>44</b> (39)	<b>44</b> (38)
	Sm	<b>62</b> (55)	<b>69</b> (60)	<b>85</b> (76)	<b>88</b> (77)	<b>65</b> (56)	<b>78</b> (69)
Female	NS	<b>50</b> (44)	<b>56</b> (48)	<b>51</b> (45)	<b>48</b> (41)	<b>39</b> (31)	<b>52</b> (45)
	Sm	<b>53</b> (49)	<b>64</b> (52)	<b>69</b> (59)	<b>73</b> (63)	<b>102</b> (91)	<b>66</b> (57)

(100 A/E's, Expected based on CIBT93, Raw 1999-2002 results in brackets)

# Further Work

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- **Analysis of 1999-2002**
  - Ongoing work into grossing-up factors to adjust raw results
  - Attempting to track maturing 1999-2002 experience using claims settled in 2004
  - Hope to produce individual age rates relative to CIBT93
  - “Blue Book” report will provide more detailed analysis
  - Seeking consistency of claim recording
- **2003 Final Results – coming soon!**
- **Graduation**
  - Aim to produce a standard table for use in pricing and reserving
  - But when?

# Conclusions

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- **Draft 2003 results show improvement over 1999-2002**
- **Need to collect date of diagnosis, and seek consistency on recording**
- **Claims are subject to considerable delays**
- **Offices must make allowance for IBNS**
- **Grossing-up factor is of the order of 15%**
  - **But depends on offices' growth in claims**
  - **Also varies for subsets of the data**



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making financial sense of the future

# CMI Critical Illness Update

“Current Issues in Critical Illness”

7 December 2005

*Dave Grimshaw*

*Chairman, CMI Critical Illness Committee*