Periodical Payment Orders working party update – GIRO 2012

Version date: 5 October 2012

Status: FOR RELEASE

Contents

Notice

A. Introduction

Periodic Payment Orders (PPOs) are now commonly used to settle catastrophic personal injury claims in the UK. Compensation is paid to claimants at regular intervals, rather than in a single lump sum. Typically, the regular payment is to cover the cost of care plus associated expenses with the remaining heads of damage (immediate costs, pain and suffering, and loss of future earnings) still paid in a lump sum. PPOs, as intended, transfers mortality and investment risk from the claimant to general insurers although claimants then take on the credit risk of the insurer defaulting at some time in the future when a payment is due.

This paper follows the 2010 and 2011 papers and aims to update the analysis and address some of the outstanding issues. So this paper should not be read in isolation but in conjunction with prior years' papers, which are available on the website of the Actuarial Profession at http://www.actuaries.org.uk.

In this paper we provide an update on industry experience. This shows stabilizing of the number and propensity of PPOs being awarded in the UK. It also shows stability in the quantum and other characteristics of PPO awards. We have conducted a more detailed survey this year compared to before, which enables us to show more characteristics that we hope are of interest to the reader. Our thanks go to the survey participants, including again this year the Motor Insurance Bureau (MIB).

Apart from the survey, we have explored areas of current interest as regards PPOs, including the latest developments on the main source of payment indexation, the Annual Survey of Hourly Earnings (ASHE). We also provide an update on our investigations into impaired life mortality and categorization of injury, including a look at comparisons with overseas territories for which such annuity-style payments are the norm.

Our thanks go to those who have assisted us this year. The working party members for 2011/12 have been:

- Clare Barley
- Nick Betteridge
- Antony Claughton
- Mark Cockroft (Chair)
- Dorian Hicks
- Sarah MacDonnell
- Christina Ruffle
- Peter Saunders
- Tony Stanger

B.   Industry survey

Survey contents

1. Contributors

1.1.   We have received data from 16 insurers, comprising 252 motor PPOs and 33 liability PPOs. These insurers include 9 out of the top 10 insurance groups as ranked by 2011 Motor Gross Earned Premium in the FSA returns and account for 94% of the FSA regulated market (based on 2011 gross premium volumes). There are an additional three companies which contribute to the survey but do not appear in the FSA returns (so the survey actually represents more than 94% of the FSA regulated market).

1.2.   The Motor Insurers' Bureau ("MIB") has also contributed to the study for the second year running. MIB claims account for an additional 90 motor PPOs. We have presented the results of the survey separately for the MIB and the motor insurers as the two subsets have different characteristics. Section 8 entitled 'MIB experience' shows the results for the MIB data.

1.3.   Similar studies were published by the PPO Working Party in 2010 and 2011. Each year the mix of insurers has changed slightly. Eleven of the insurers in this year's survey also contributed to last year's survey. Each year we ignore the data provided for previous studies and start again with a new full historic snapshot from each of the contributors. The data between surveys will not be directly comparable as a different mix of insurers will have contributed to each successive survey.

1.4.   The data provided contains details of all PPOs ever settled and so relates to accident years back as far as 1986. 14% of the PPOs in the survey have accident dates prior to 2000.

1.5.   We are very grateful to all the contributors without whom this survey would simply not be possible:

- Ageas
- Allianz Insurance
- Aviva
- AXA
- CFS
- Chartis
- Direct Line Group
- Ecclesiastical
- esure

- Groupama
- Liverpool Victoria
- MMA
- MIB
- NFU Mutual
- Provident
- RSA
- Zurich Insurance

2. Number of PPOs and Propensity

Number of PPOs by settlement quarter

2.1.   The graph below shows the number of PPOs settled in each quarter from 2005. It shows data up to the end of the first quarter 2012. However it should be noted that the number of PPOs settled in 2012 Q1 could be understated as some insurers may have used a cut-off date earlier than 31 March 2012 when providing data for this survey.
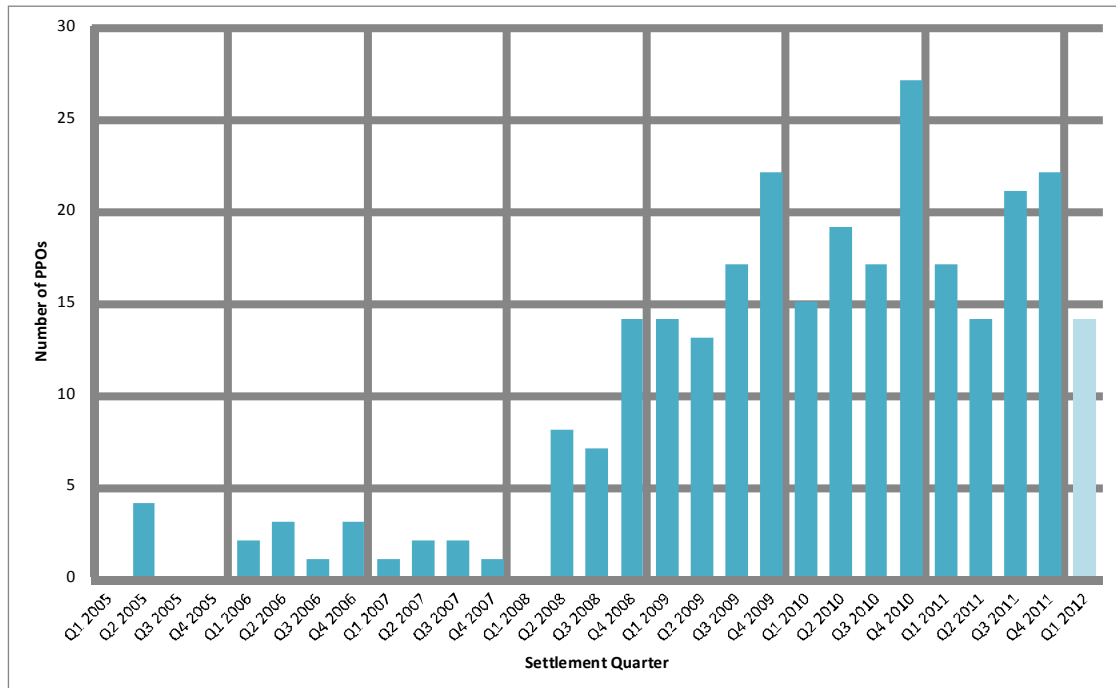
2.2.   If we look at these figures on an annualised basis it can be seen that the number of PPOs settled each year appears to be stabilising.
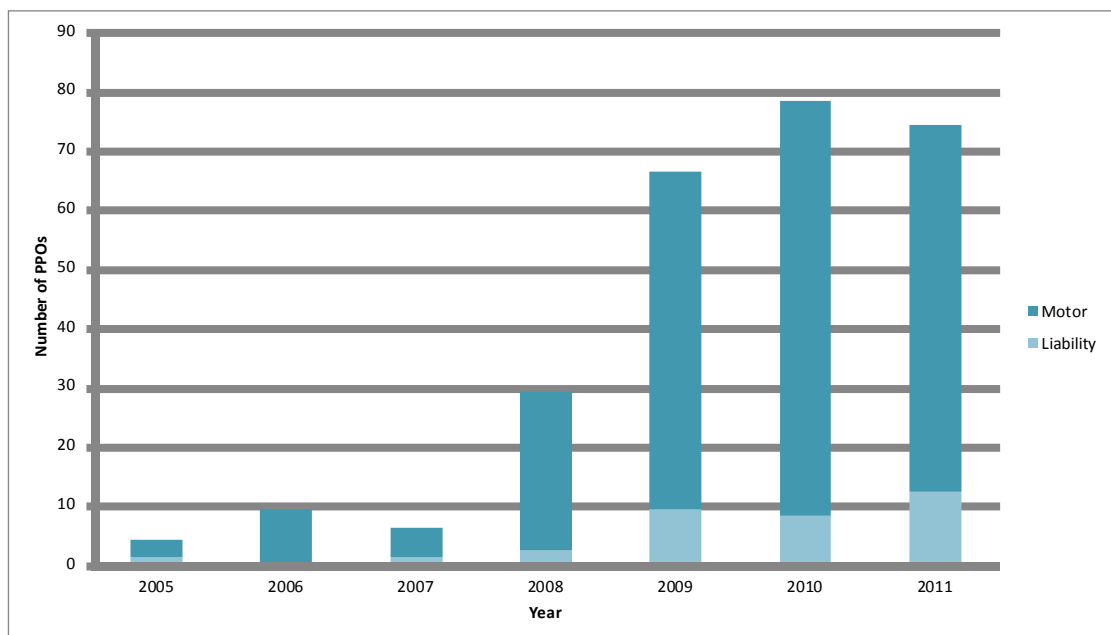
2.3.   The Lord Chancellor announced a review of the discount rate used in the Ogden tables in November 2010. It is possible that this announcement may have led to deferment of settlement for some large claims whilst the outcome of the decision is awaited.

2.4.   Further to this, the Ministry of Justice announced a consultation on how the discount rate should be set in August 2012 with the deadline for consultations being 23 October 2012. The figures in this survey predate the publication of this consultation paper.

2.5.   The Ogden 7 tables were published in October 2011. It is possible there may have been a delay in PPO settlements just prior to this date as parties waited until the new tables were available.

2.6.   The following graph shows the same data but grouped by settlement quarter. This suggests there may be some seasonality in the settlement of PPO claims with more PPOs being settled later in the calendar year.

2.7.   The relatively lower number of claims seen in quarter 4 of 2011, when compared to previous years, can be seen to be down to the fewer number of PPOs arising solely from commercial motor coverages rather than private cover – this is shown in detail in section 5.
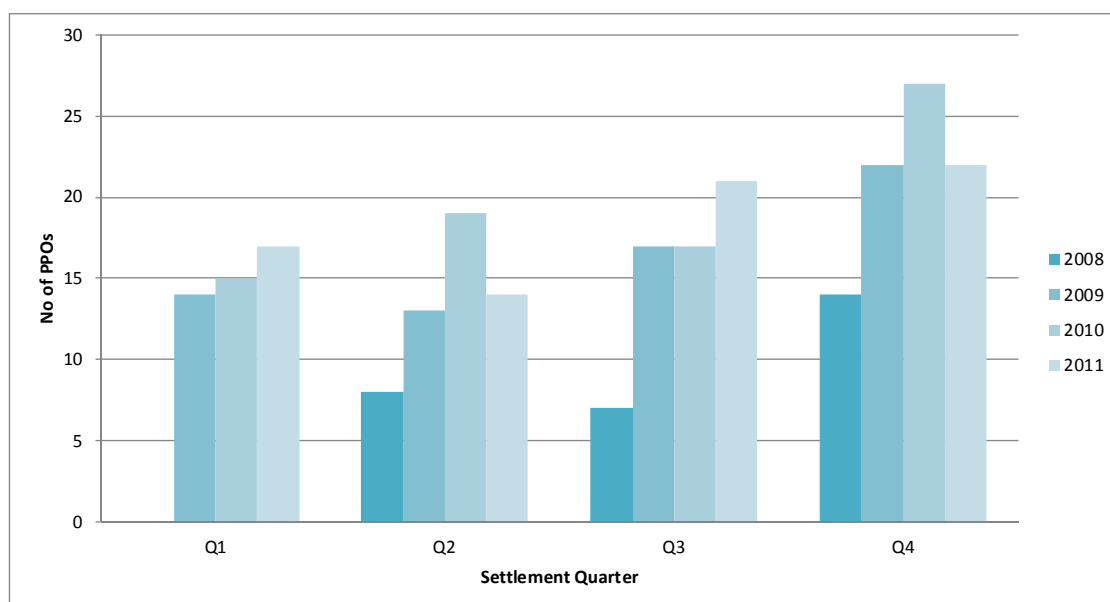
PPO Propensity

2.8.   We received data for individual large claims (defined as claims greater than £1 million) settled since 2008, which has enabled us to investigate the propensity of PPOs.

2.9.   The following graph shows motor large claim propensity for large claims >£1 million. The definition of large claim is £1 million in 2011 values, indexed back at 7% per settlement year.
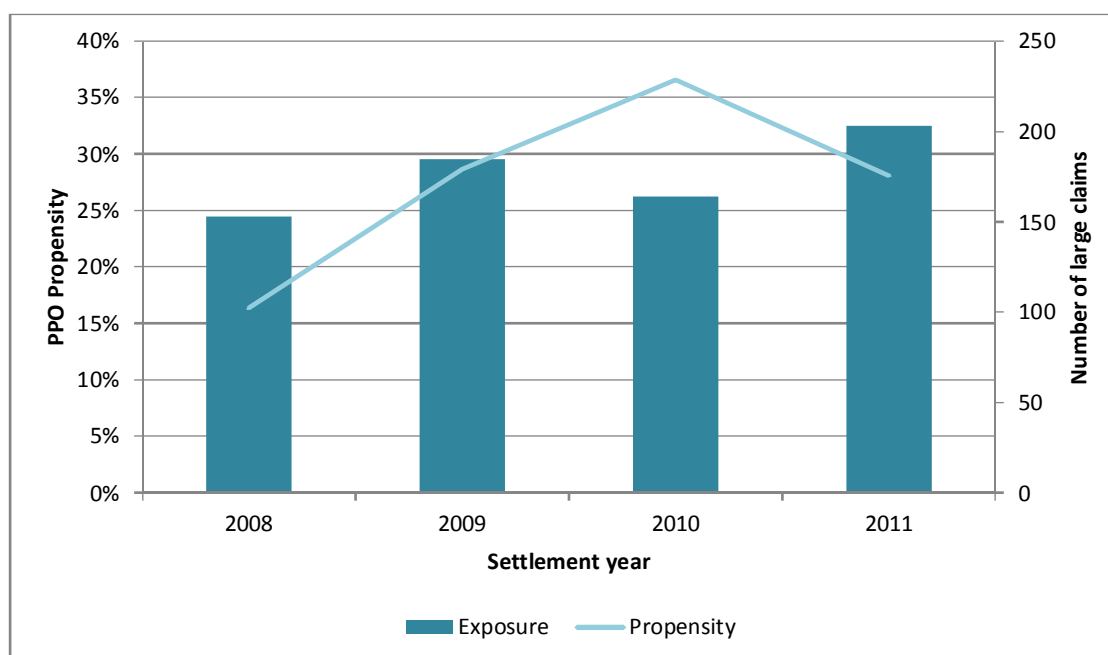
Large claim count includes PPOs

2.10.   We noted last year that the definition of large claims, as well as the definition of which claims are settled, may not be consistent between all contributors. Further to this we noticed that the large claim count for some insurers was not consistent with that provided last year; this is to be expected to some extent due to the fact that some claims will be reopened, however it is not clear whether the degree of inconsistency was actually greater than that which would be explained by claims being reopened.

2.11.   In particular there appears to have been a dip in the overall number of large claims settled in 2010 (and a correspondingly higher PPO propensity showing for that settlement year). The Lord Chancellor announced a review of the discount rate used in the Ogden tables in November 2010. It is possible that this announcement may have led to deferment of settlement for some large claims whilst the outcome of the decision is awaited.

2.12.   As individual claim amounts were provided for the first time this year, we were able to look at the large claim propensity at different large claim thresholds. These threshold definitions are defined in 2011 monetary terms and indexed back at 7% per settlement year. For more details on the method of calculating the estimate of the PPO size see section 10 entitled Reserves Held.

2.13.   It can be seen that the higher the threshold, the larger PPO propensity is, with around 10% of claims in the £1million to £2 million bracket settling as PPOs and 80% of claims greater than £7 million.

Large claim propensity at different large claim thresholds (claims settled since 2009 only) -
Incremental
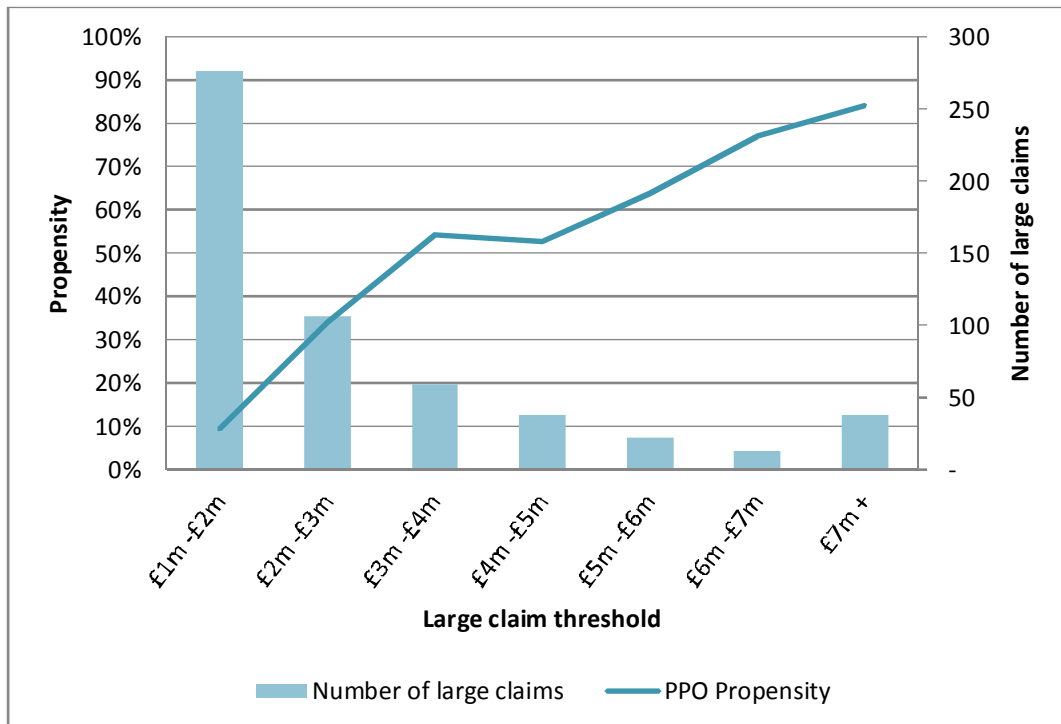
2.14.   The above graph was derived by estimating PPO claim size based on a 2.5% discount rate, if we were to use a 0% discount rate instead, say, the propensity looks slightly different as shown in the graph below. (Note the small number of claims in the £4 million to £7 million categories which leads to greater volatility and more uncertainty in these brackets.)
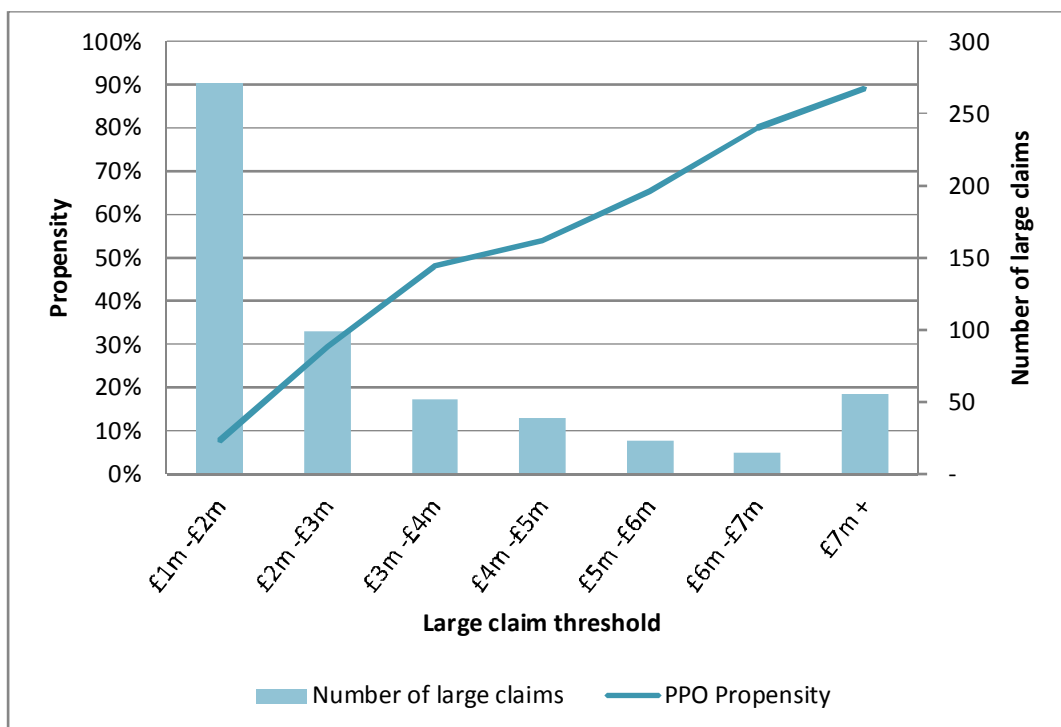
Large claim propensity at different large claim thresholds (claims settled since 2009 only) - Cumulative
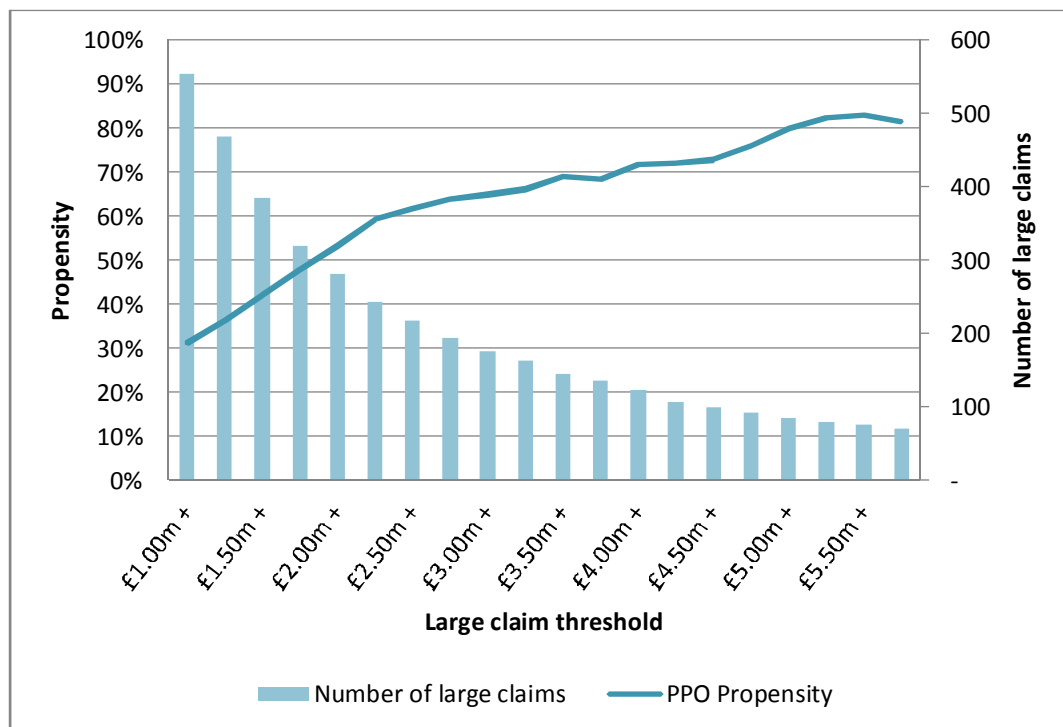
2.15. The following graph shows the large claim propensity by threshold for claims settled split by settlement year. The 2008 year has a significantly lower propensity than the other settlement years. At the larger thresholds there are much fewer claims, which means there will be more variability in the propensity measure.
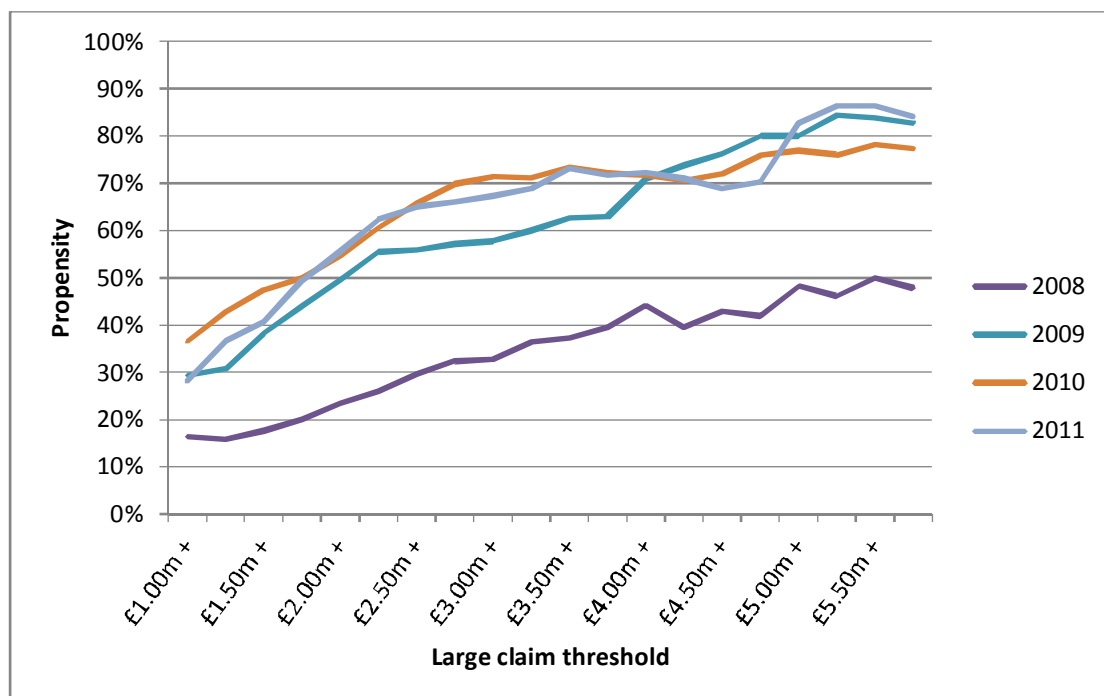
2.16. It can also be seen that there is significant variation in the propensity of PPOs by insurer. The following graph indicates the distribution of PPO propensity across insurers in the survey. It excludes insurers which have settled fewer than 20 large claims over the last four years.

Distribution of PPO propensity by Insurer

Chart: Distribution of PPO propensity by Insurer. Y-axis: Number of Insurers (0 to 4). X-axis: Propensity: PPOs per number of large claims >£1 million. Values — 0%-10%: 0; 10%-20%: 2; 20%-30%: 3; 30%-40%: 0; 40%-50%: 2; 50%-60%: 1.
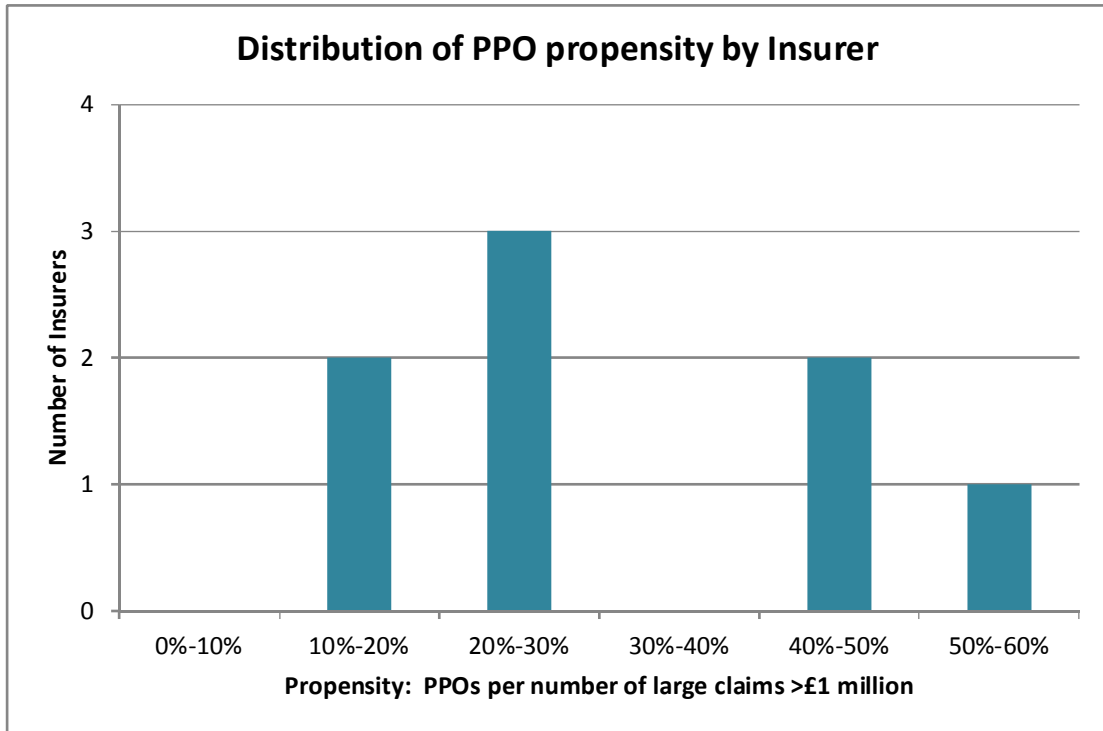
2.17.   As stated earlier, the variability in the propensity rate may be at least partially due to the definition of large claim used by each provider. However we are not surprised to see a variation in propensity between insurers, for example as a result of differences in the policyholder profile across different insurers, as well as due to different attitudes towards settling claims as PPOs by various insurers.

2.18.   We also have the data to enable us to look at triangles of propensity rates which take into account accident period as well as settlement period. We have only collected data on large claims settled since 2008, hence for the cumulative triangles the cells shaded in blue are incomplete and as such should be treated with caution. We have combined accident years prior to 2001, the oldest accident year to be is included is 1987.

Cumulative motor large claim propensity rates – accident year against settlement year

Number of non PPO large claims

	Accident year	0	1	2	3	4	5	6	7	8	9	10	11
1	2000 and prior									39	72	87	107
2	2001								19	30	39	42	
3	2002							22	37	53	62		
4	2003						22	46	60	80			
5	2004					11	32	45	69				
6	2005				8	23	34	58					
7	2006			6	11	25	40						
8	2007		1	4	7	19							
9	2008	0	3	4	10								
10	2009	2	5	7									
11	2010	5	7										
12	2011	9											

Settlement period

Number of PPOs

	Accident year	0	1	2	3	4	5	6	7	8	9	10	11
1	2000 and prior	0	0	0	0	0	3	6	8	14	26	37	47
2	2001	0	0	0	0	0	1	3	6	10	11	12	
3	2002	0	0	0	0	3	3	6	13	17	19		
4	2003	0	0	0	2	2	5	14	20	24			
5	2004	0	0	0	0	5	15	24	27				
6	2005	0	0	1	4	9	21	32					
7	2006	0	0	1	7	21	28						
8	2007	0	0	1	5	19							
9	2008	0	0	2	7								
10	2009	0	0	3									
11	2010	0	0										
12	2011	0											

Settlement period

Propensity rates

	Accident year	0	1	2	3	4	5	6	7	8	9	10	11
1	2000 and prior									26%	27%	30%	31%
2	2001								24%	25%	22%	22%	
3	2002							21%	26%	24%	23%		
4	2003						19%	23%	25%	23%			
5	2004					31%	32%	35%	28%				
6	2005				33%	28%	38%	36%					
7	2006			14%	39%	46%	41%						
8	2007		0%	20%	42%	50%							
9	2008		0%	33%	41%								
10	2009	0%	0%	30%									
11	2010	0%	0%										
12	2011	0%											

Settlement period

Discrete motor large claim propensity rates – accident year against settlement year

Number of non PPO large claims

	Accident year	Settlement period 0	1	2	3	4	5	6	7	8	9	10	11
1	2000 and prior									39	33	15	20
2	2001								19	11	9	3	
3	2002							22	15	16	9		
4	2003						22	24	14	20			
5	2004					11	21	13	24				
6	2005				8	15	11	24					
7	2006			6	5	14	15						
8	2007		1	3	3	12							
9	2008	0	3	1	6								
10	2009	2	3	2									
11	2010	5	2										
12	2011	9											

Number of PPOs

	Accident year	Settlement period 0	1	2	3	4	5	6	7	8	9	10	11
1	2000 and prior	0	0	0	0	0	3	3	2	6	12	11	10
2	2001	0	0	0	0	0	1	2	3	4	1	1	
3	2002	0	0	0	0	3	0	3	7	4	2		
4	2003	0	0	0	2	0	3	9	6	4			
5	2004	0	0	0	0	5	10	9	3				
6	2005	0	0	1	3	5	12	11					
7	2006	0	0	1	6	14	7						
8	2007	0	0	1	4	14							
9	2008	0	0	2	5								
10	2009	0	0	3									
11	2010	0	0										
12	2011	0											

Propensity rates

	Accident year	Settlement period 0	1	2	3	4	5	6	7	8	9	10	11
1	2000 and prior									13%	27%	42%	33%
2	2001								14%	27%	10%	25%	
3	2002							12%	32%	20%	18%		
4	2003						12%	27%	30%	17%			
5	2004					31%	32%	41%	11%				
6	2005				27%	25%	52%	31%					
7	2006			14%	55%	50%	32%						
8	2007		0%	25%	57%	54%							
9	2008		0%	67%	45%								
10	2009	0%	0%	60%									
11	2010	0%	0%										
12	2011	0%											

2.19. Another way of measuring the propensity is to look at the number of PPOs by premium written or exposure. For the following measures we have taken the number of PPOs settled in a given year divided by the average premium (or exposure) based on the premium written over a 6 year period starting 7 years earlier (i.e. the number of PPOs settled in 2010 is divided by the average annual amount of gross premium written during the period 2003 to 2008).
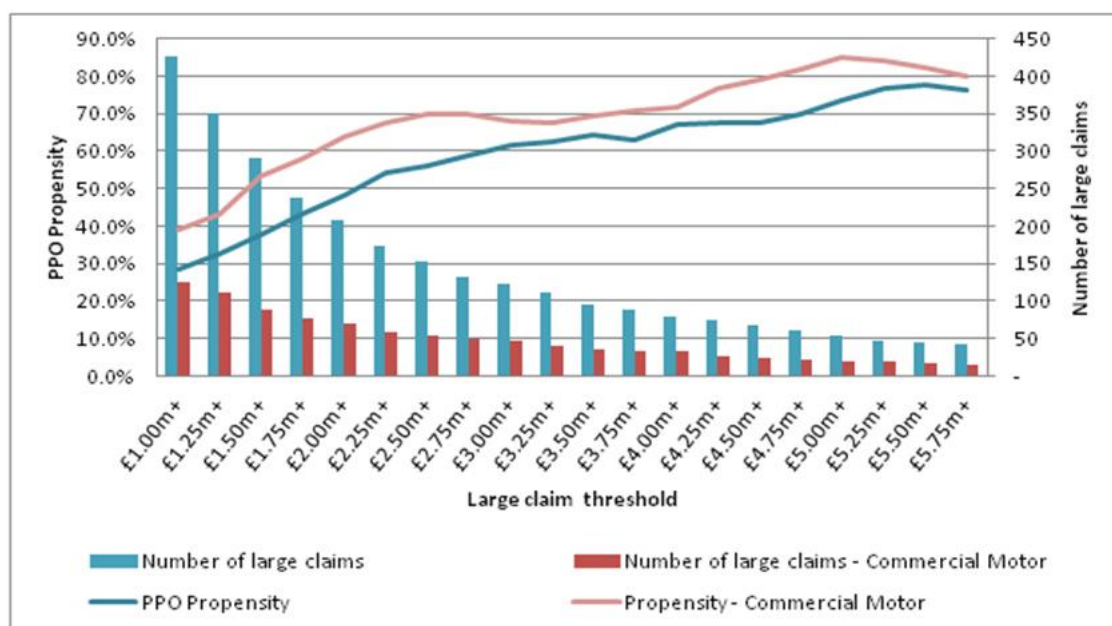
Propensity – gross earned premiums
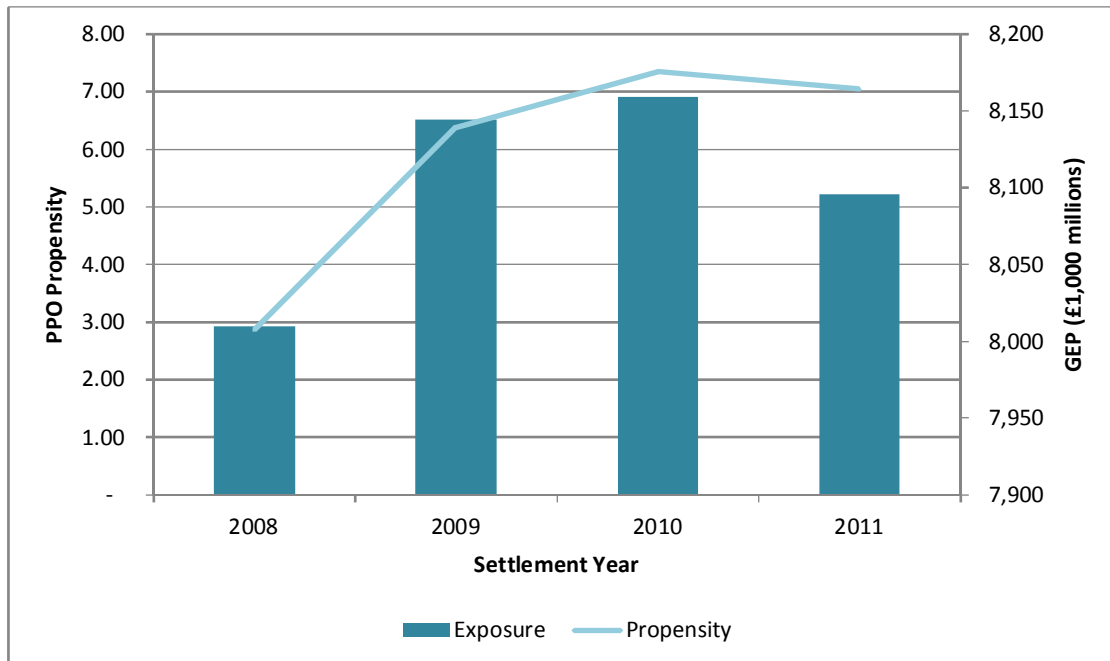

Propensity – earned vehicle years
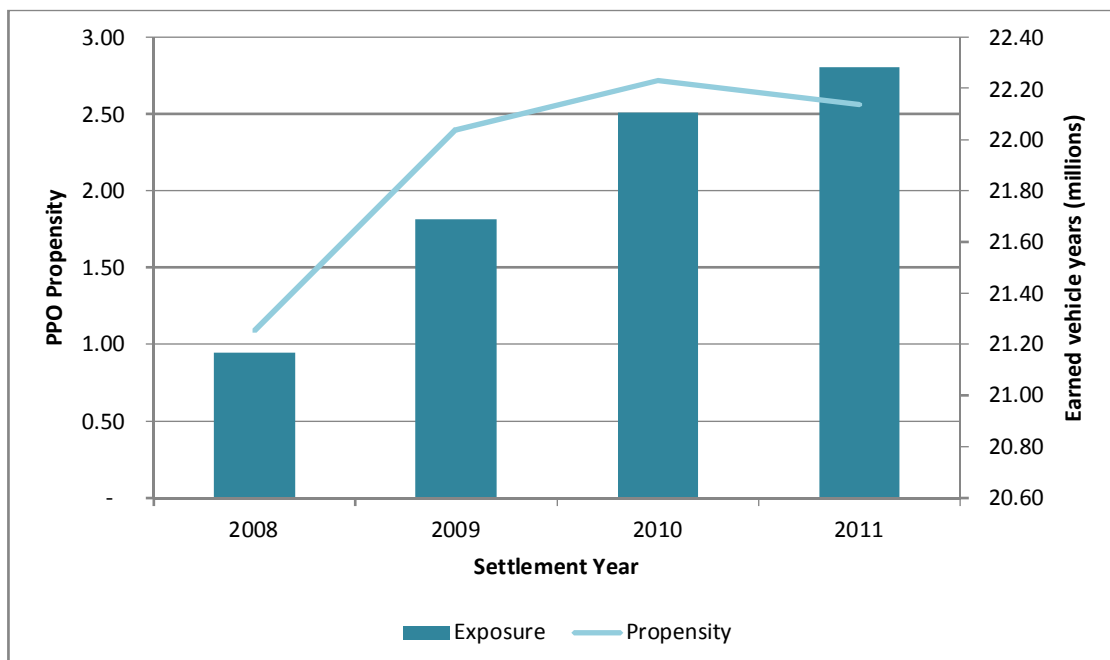
Comparison of propensity by Private and Commercial motor (claims settled since 2009 only)

2.20.   When we look at the propensity of motor PPOs split by private and commercial vehicles, we see that the commercial propensity by large claim appears to be greater at all thresholds.
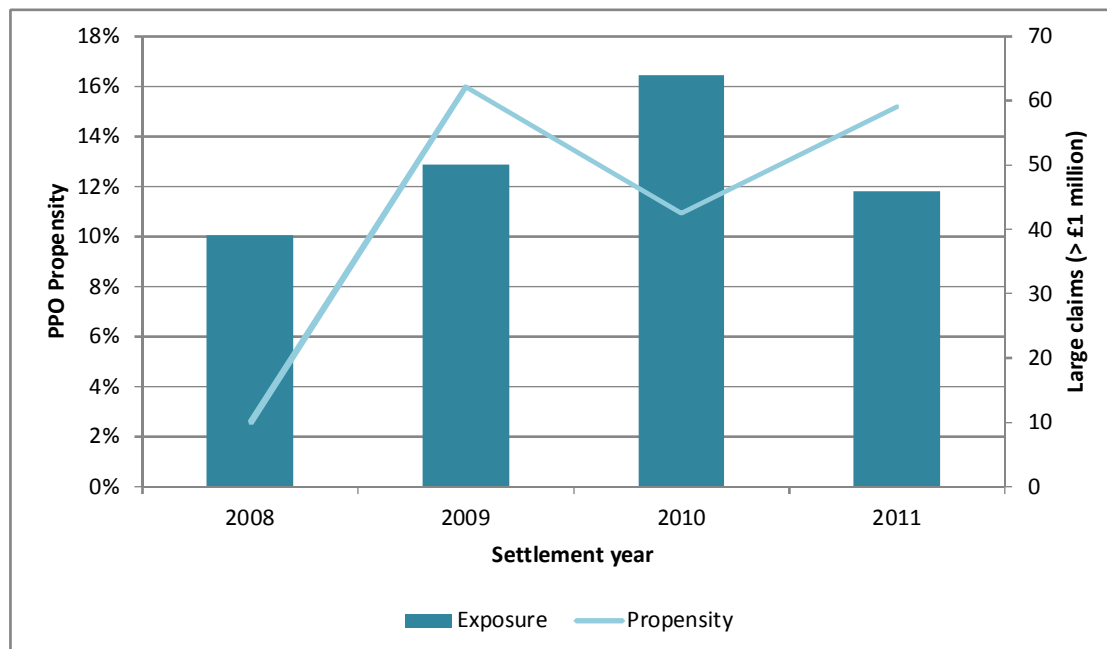

2.21.   However, when we look by settlement year, the results are less conclusive, with commercial motor propensity only greater in the 2009 and 2010 settlement years.
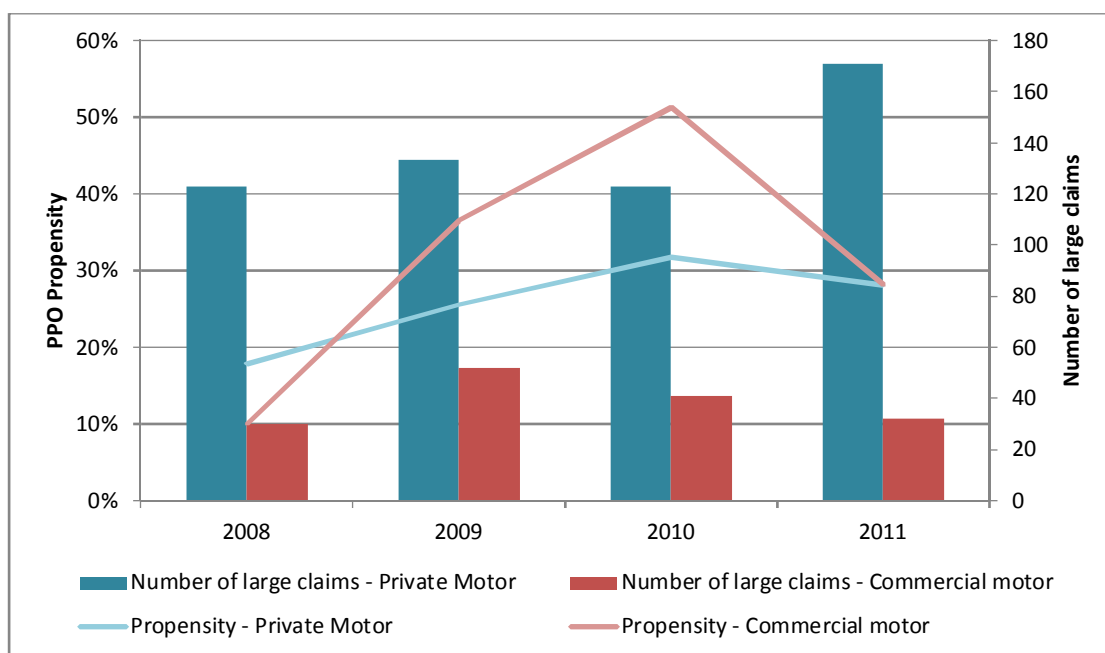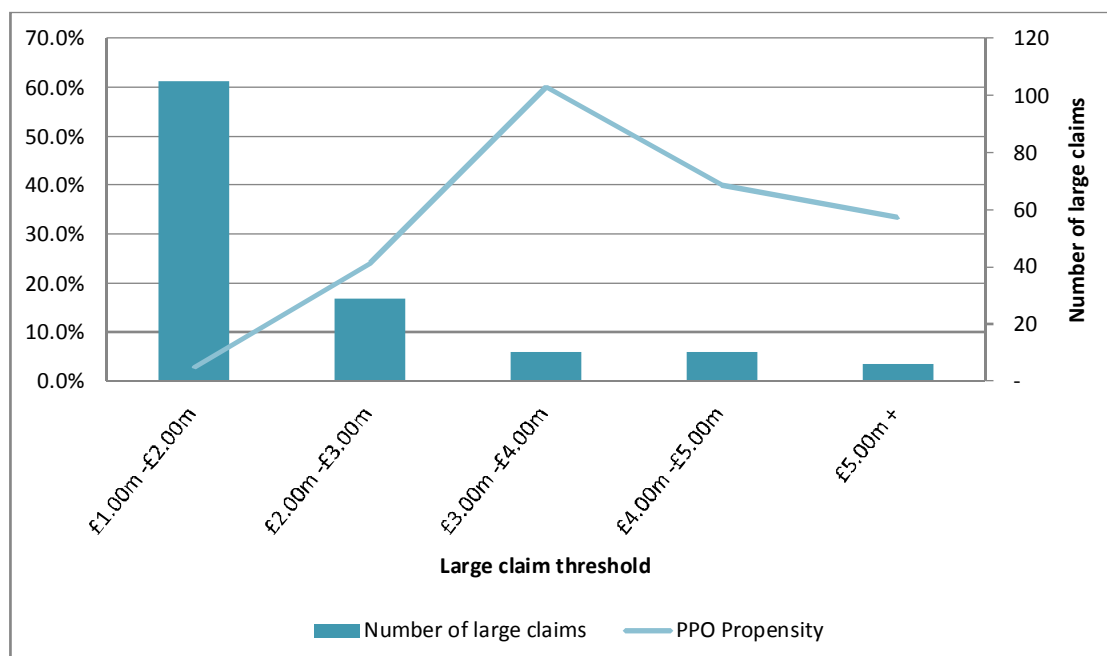
Propensity of Liability PPOs

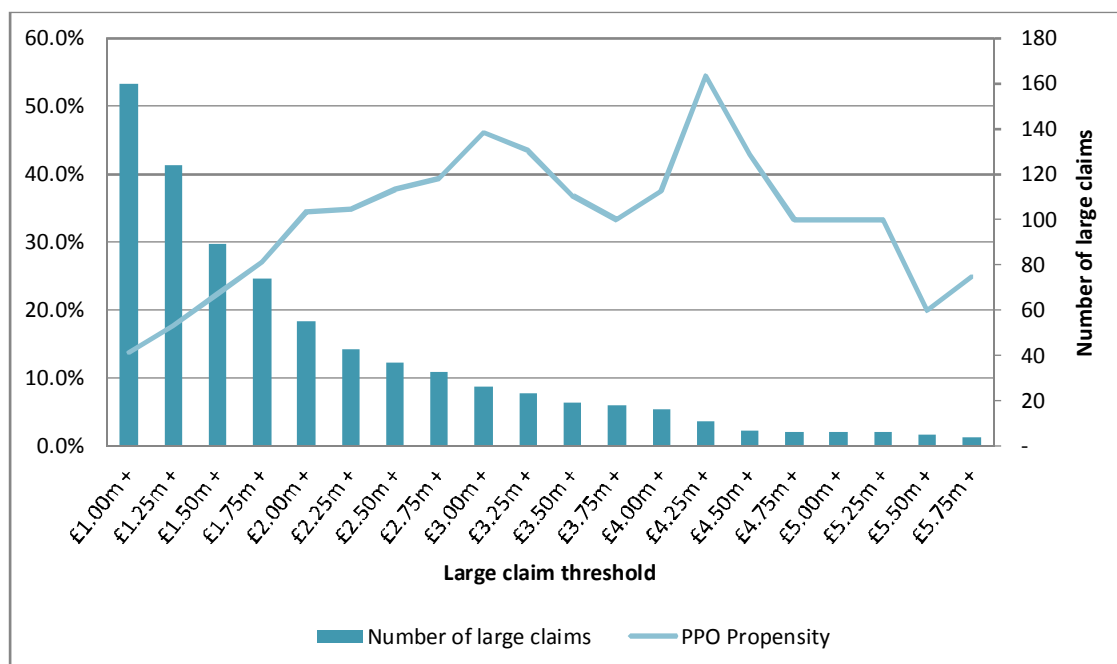2.22. The large claim propensity for liability claims appears to be significantly lower than that for motor.

Propensity – large claims > £1 million

*Large claim propensity at different large claim thresholds (claims settled since 2009 only) - Incremental*

Large claim propensity at different large claim thresholds (claims settled since 2009 only) - Cumulative

2.23. It can be seen that there are very few claims at the larger claim size thresholds, meaning the propensity measure is less reliable, which is likely to explain why the trend of increasing propensity by size of large claim appears to break down at a threshold of around £3 million. It is also possible that this could be a genuine feature, with fewer larger liability claims being settled as PPOs as the effect of liability limits on EL coverage in the UK have an impact.

Propensity by gross earned premium
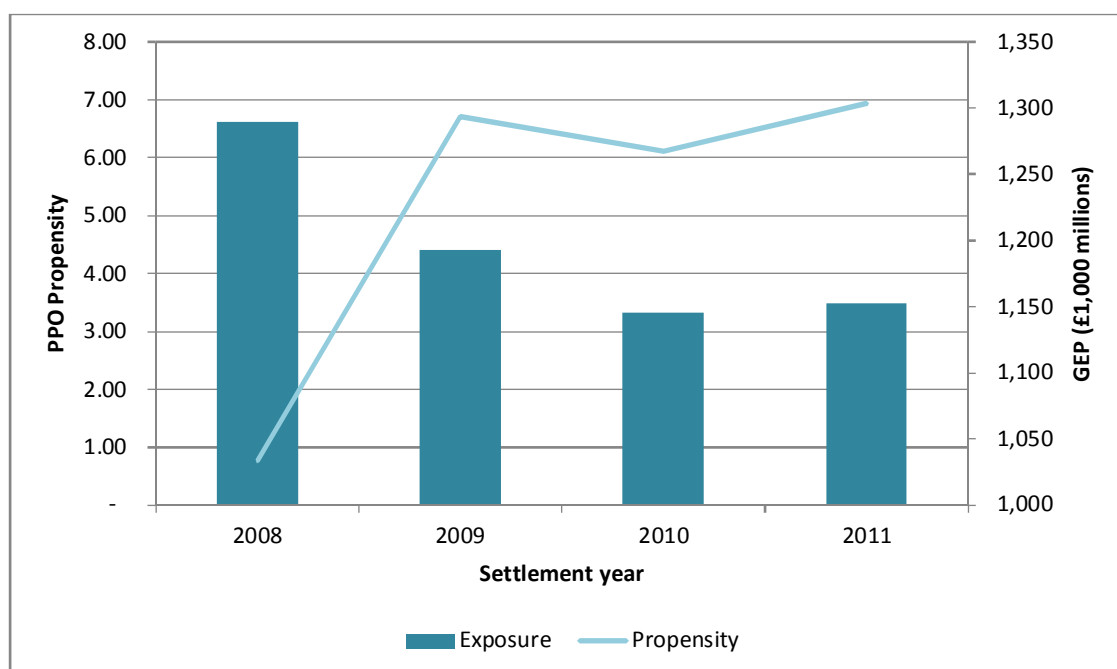
2.24. It was not possible to compare propensity between Employer's Liability and Public Liability as the individual large claims data provided by some companies did not distinguish between these cover types.
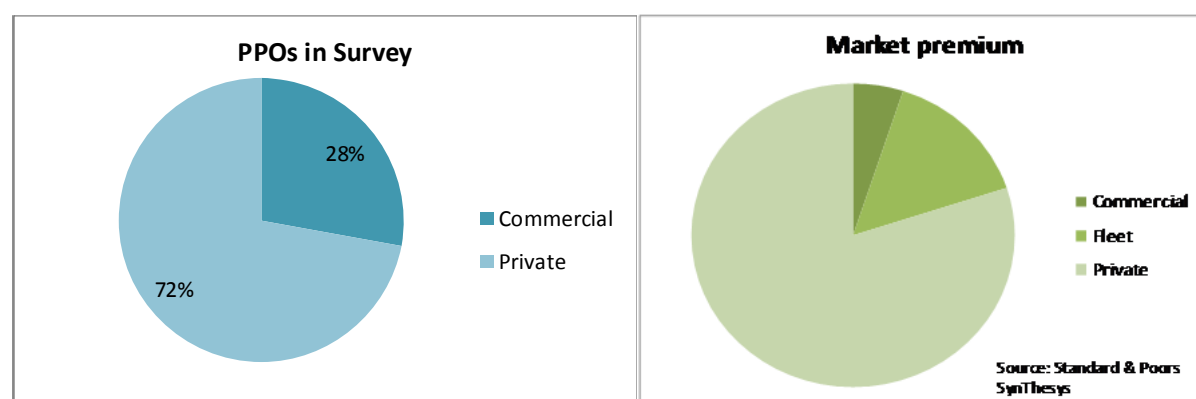
## 3.   Motor PPOs - General Characteristics

Cover type

3.1.   The pie chart on the left shows the proportion of motor PPOs split by cover type, and the one on the right the split of cover type by market motor premium based on data from 2010 FSA returns.

Commercial/Private split

3.2.   Similarly the following two charts compare the proportion of PPOs from comprehensive and non-comprehensive private motor policies against the proportion of premium written in the market.

Comprehensive/Non-Comprehensive split
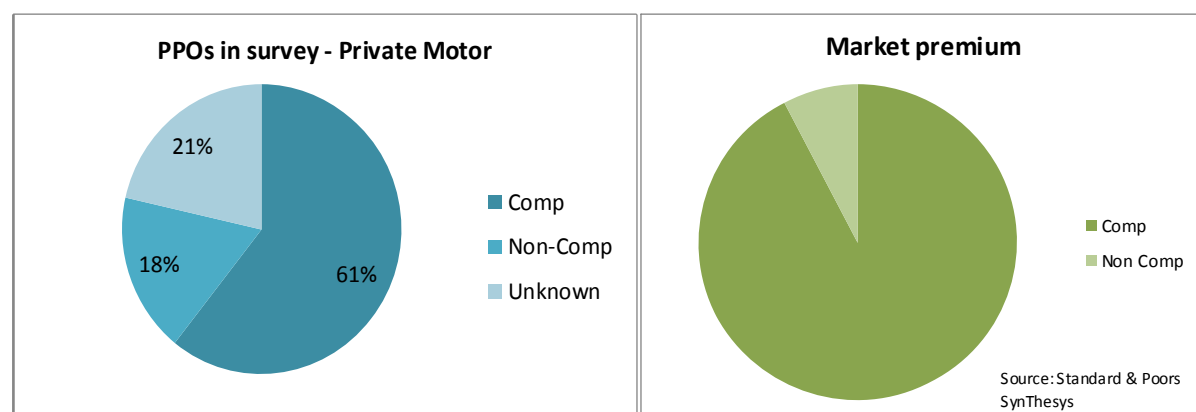
Indexation measures

3.3.   The index used to inflate annual payments was originally automatically linked to the Retail Prices Index (RPI). However, in 2006, a court case was brought in the form of Thompstone versus Tameside and Glossop Acute Services NHS Trust which questioned this assumption and suggested that the payments for future cost of care would be better linked to wage inflation. The court agreed and the annual inflation increase was linked to ASHE. The case was appealed and a number of other cases were put on hold pending the outcome. In 2008 the Court of Appeal upheld the ruling and since then the majority of PPOs have had inflation linked to ASHE as is shown in the graph below.

Number of PPOs by settlement quarter, split by RPI and ASHE indexation
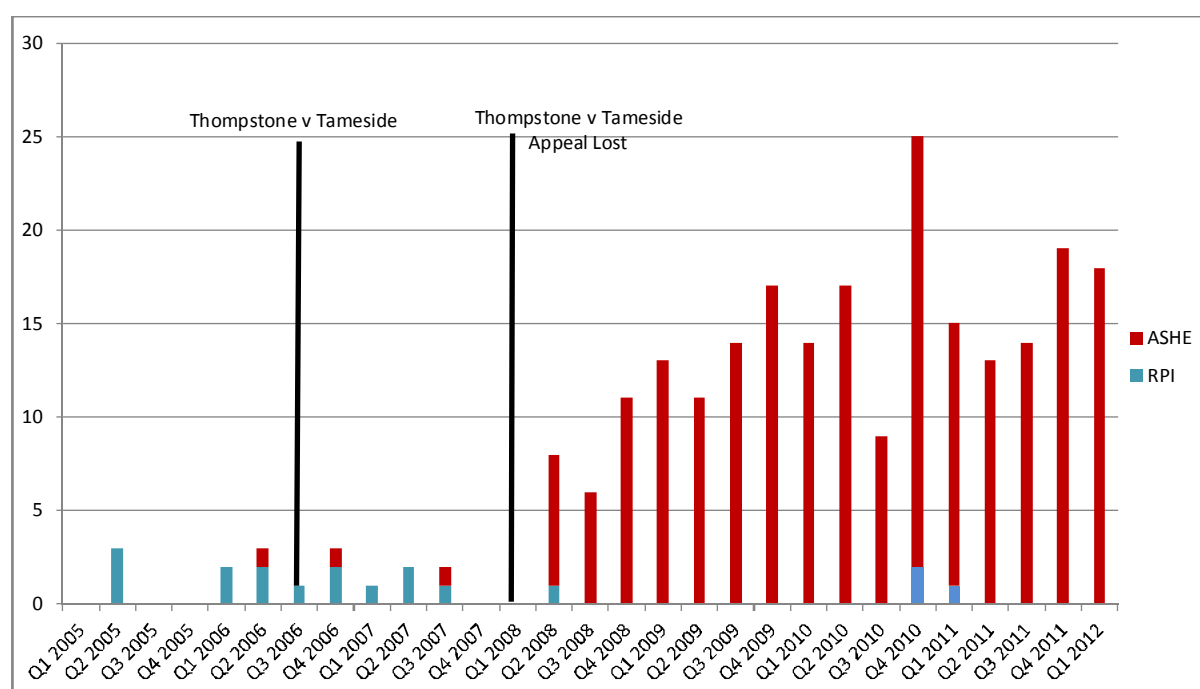
3.4. ASHE stands for the Annual Survey of Hours and Earnings. It is produced by the Office of National Statistics (ONS) every November, based on data as at April. It covers a wide range of occupations, though the vast majority of PPOs so far have been linked to sub category 6115 relating to care assistants and home carers.

3.5. Within a particular job category the ASHE earnings inflation measures are further split into percentiles, ie a PPO will have the annual inflation linked to a specific percentile, for example to those whose earnings are in the top 10% of earners in the category, or the 60th percentile of earners, say.

3.6. As can be seen from the graph above, very few PPOs have been settled with just an RPI element in the last five years, the rest have all been ASHE. Of those relating to care costs that have been settled using ASHE as the index, all have been settled using ASHE 6115.

3.7. The ONS announced earlier this year that code 6115 (Care assistants and home carers) will be split into two new codes; 6145 (Care workers and home carers) and 6146 (Senior care workers). However, they have also stated that they will continue to publish 6115, albeit separately to the main tables, 'for the foreseeable future'.

Multiple heads of damage payments

3.8. There are a small number of PPOs with multiple heads of damage (19 PPOs or 7% of all PPOs in the survey). Of these, where type was specified, there was a tendency for the second head of damage to cover loss of earnings. One covered case management costs, five (all of which were either without type specified, or defined as 'Other') were linked to RPI, and one was not indexed at all.

3.9. Full details of the second head of damage for the 19 PPOs discussed above is shown in the following table:

Second head of damage	Index ASHE 4113	ASHE 6115	ASHE 821	ASHE6116	RPI	Unindexed	Unknown	Total
Loss of earnings	1	4	1			1	1	8
Care		1						1
Case management		1						1
Other		1				1		2
Unknown		1		1		3	1	1	7
Total	1	8	1	1		5	1	2	19

3.10. Of the 255 PPOs where the nature of the payment was specified, only 2 did not relate to care costs, but related to loss of earnings instead.

3.11. The vast majority of care payments are linked to ASHE with just three industry PPOs linked to RPI. Conversely 14 MIB PPOs are linked to RPI but all of these settled prior to the Thompstone vs Tameside appeal loss.

Distribution of ASHE percentiles by settlement year
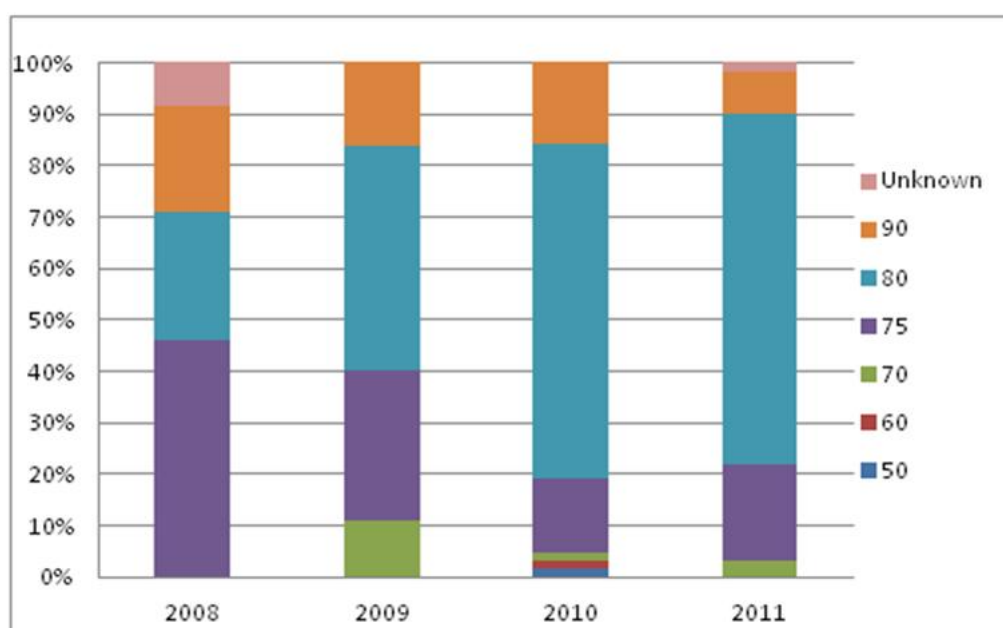
3.12. There has been an increase in the use of the 80th percentile over time, which in 2011 accounted for almost 70% of motor PPOs in this survey - up from less than 20% in 2008. This appears to be primarily at the expense of the 75th percentile which was the most popular in 2008.

3.13.   The following graph shows how the size of the annual PPO amount is correlated with the ASHE percentile: more complicated and serious injuries are likely to need more specialised care, which in turn would be expected to be delivered by more highly skilled care workers, who would be paid relatively higher salaries reflected as a higher percentile on the wage scale.
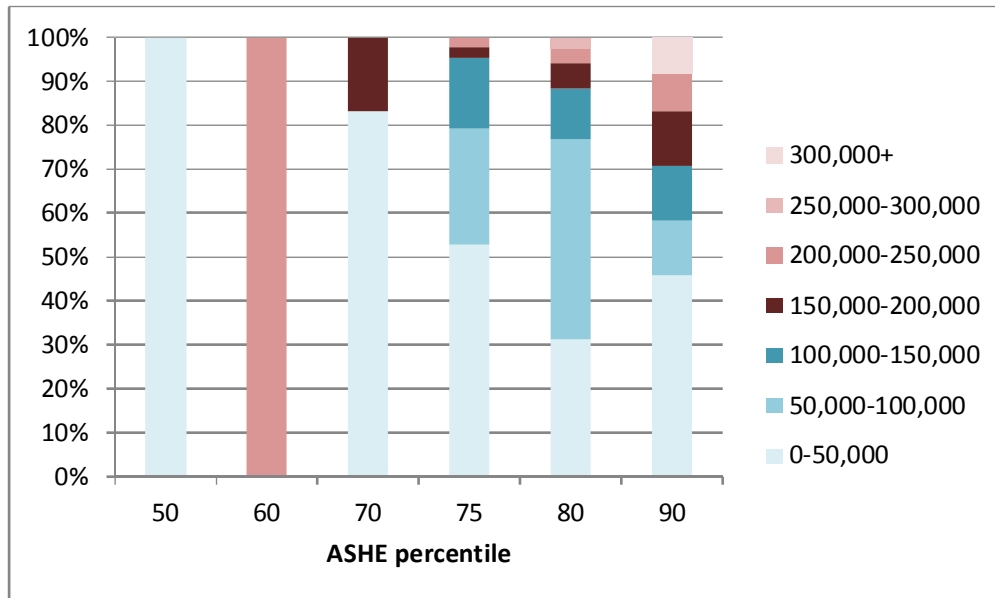
Claimant and driver details

3.14.   The following graph shows the number of PPOs by age of driver at the time of the accident.
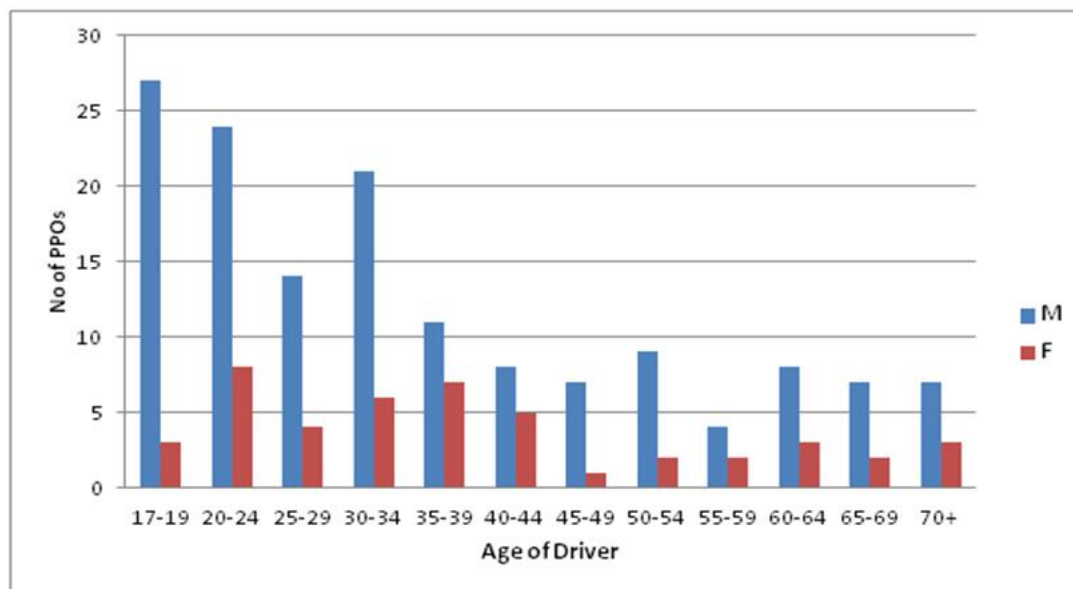
3.15.   The profile of driver age for males is similar to the claim frequency profile by driver age seen across the industry. This is less apparent for females, though this may just be due to the relatively small sample size for females. Please note these figures are for private and commercial covers combined; the profile is different depending on which cover you are looking at, these differences are shown in section 5.

Age of claimant at the time of the accident
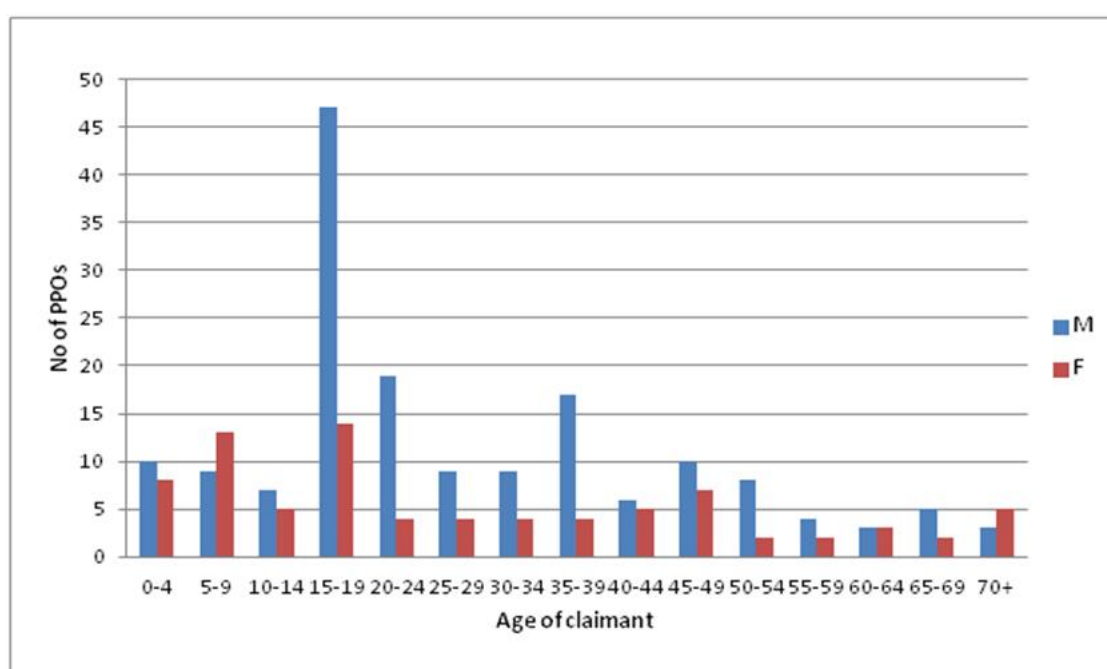
3.16.   There is a spike in claimant age between the ages of 15 and 19 which is consistent with the profile of UK road deaths.

Age of driver against age of claimant at the time of the accident
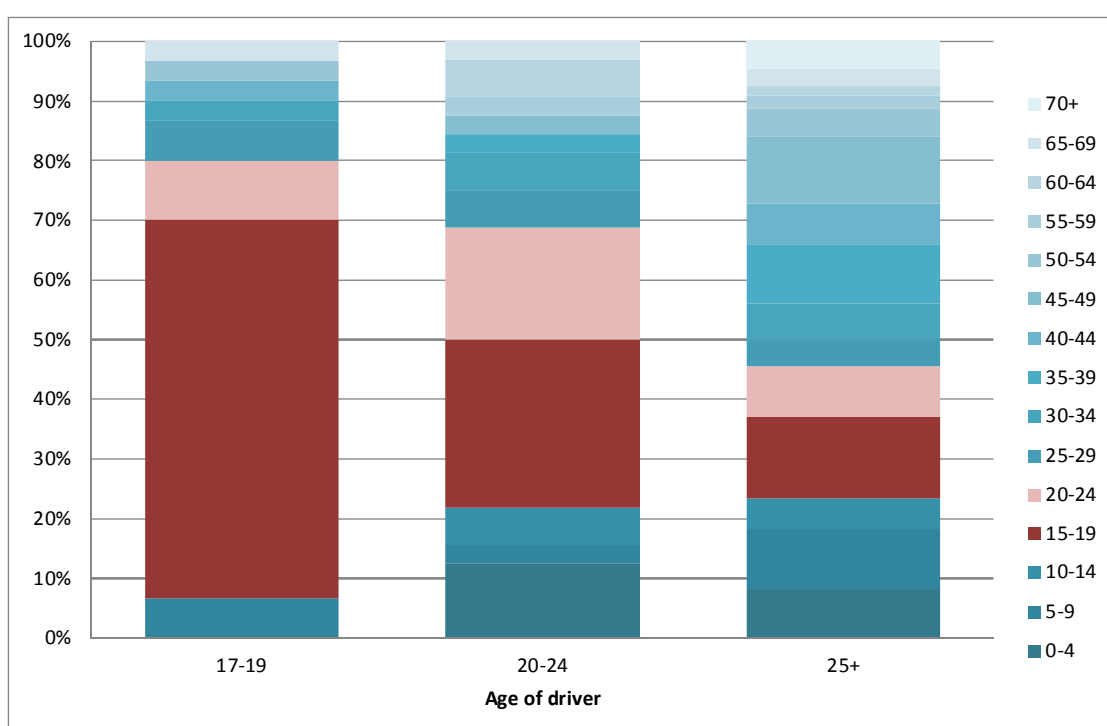
3.17.   There is a correlation between young drivers and claimants particularly in the 17-19 and 20-24 age brackets, i.e. over 80% of PPO claimants injured in accidents, where the driver was aged between 17 and 19, are under 25. This may be due to a feature of young male drivers tending to drive around with a group of similarly aged friends in the car and being more likely to have a serious accident at speed.

3.18.   However it is worth noting that claimants between the ages of 17 and 24, where the drivers are also between these ages, only represent 37 (or 13%) of motor PPO claims in this survey.

3.19.   Claimants who are younger at the time of the accident tend to have longer settlement delays; this is likely to be due to the fact that minors are advised to wait until they are at least 18 before seeking to settle their claims, as only then then can a fair medical prognosis of their condition be made. This would explain the spike in settlements of durations of 12 or 13 years in the graph of delay to settlement below.

Distribution of delay to settlement
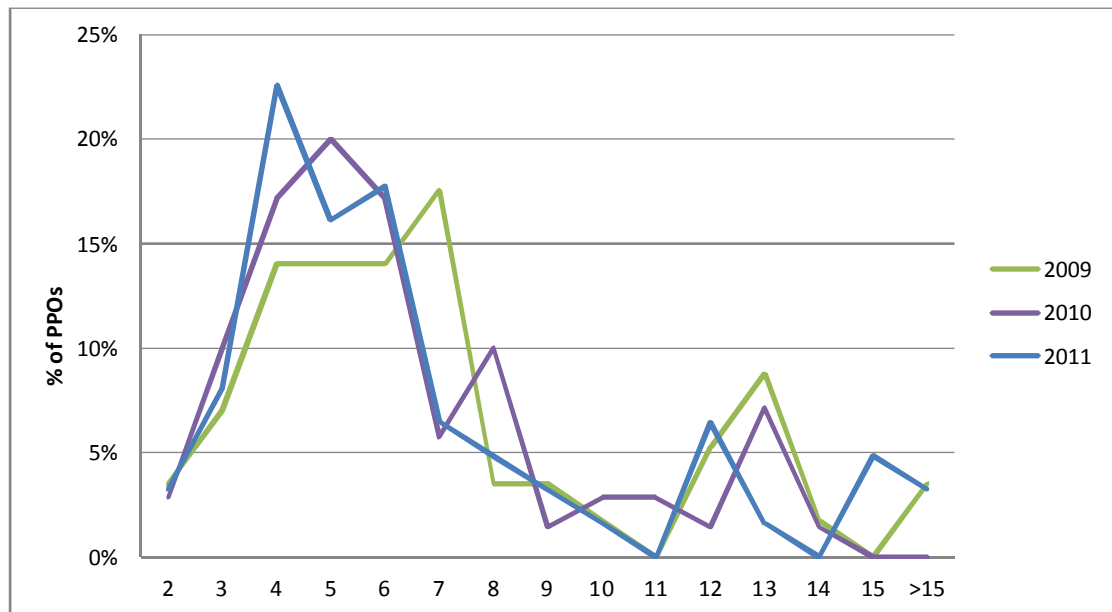
3.20.   Age of claimant at the time of settlement
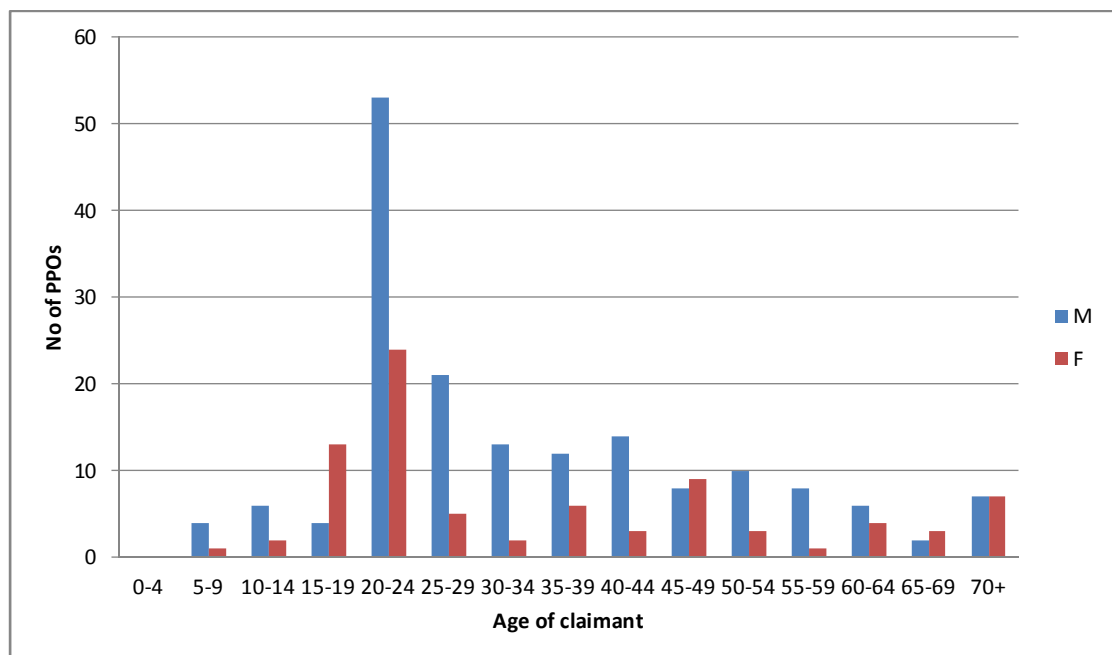
Age of claimant at the time of the accident against delay to settlement
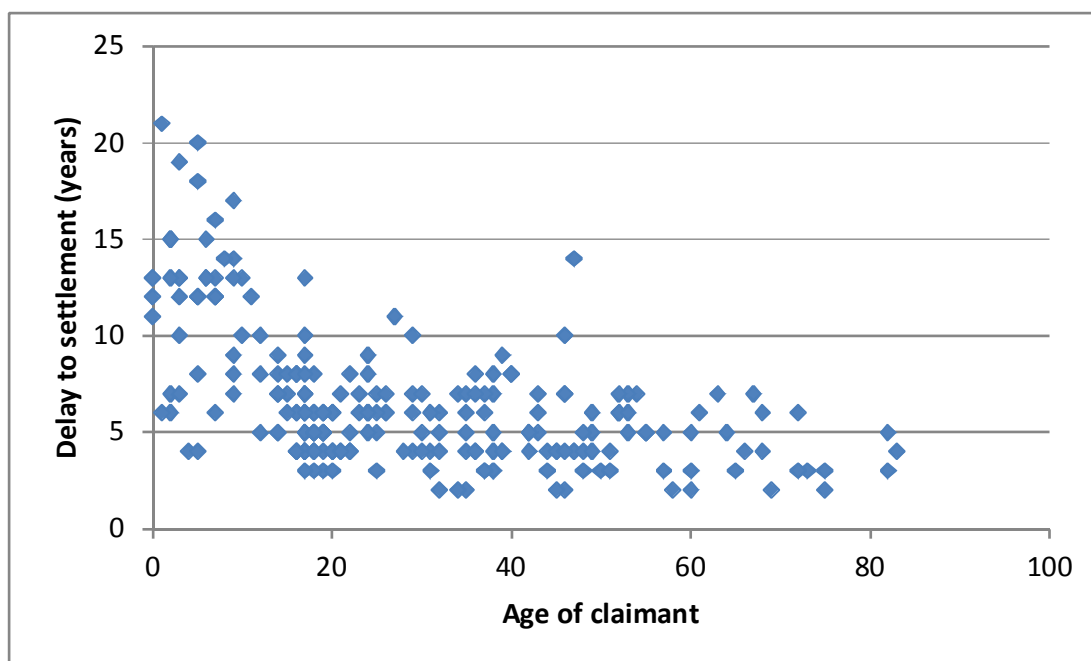
3.21.   The above scatter plot shows that longer delays to settlement are more likely for claimants under 18, this is probably due to the effect of minors waiting until the age of maturity for settlement as discussed above.

Distribution of future life expectancy at the time of settlement

3.22.   The term 'life expectancy' in this document is defined as the future life expectancy (FLE) at the time of settlement as per the survey responses. There is likely to be a wide variation in the practice of determining FLE in the market; this is discussed in more detail in section 9.
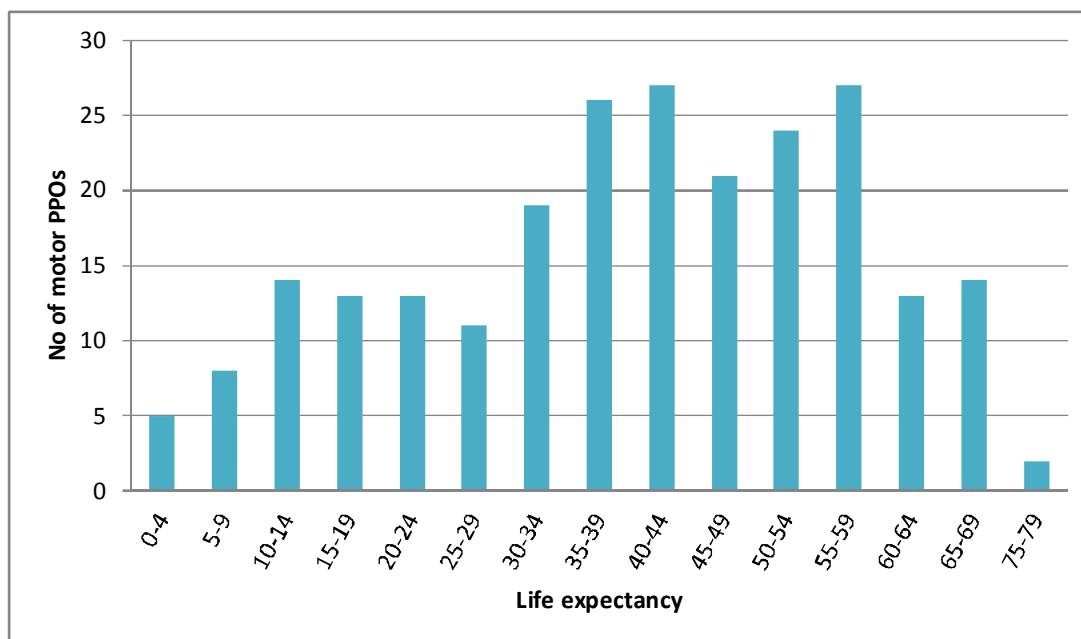
3.23.   It is no surprise that it can be seen that future life expectancy reduces with age of claimant.
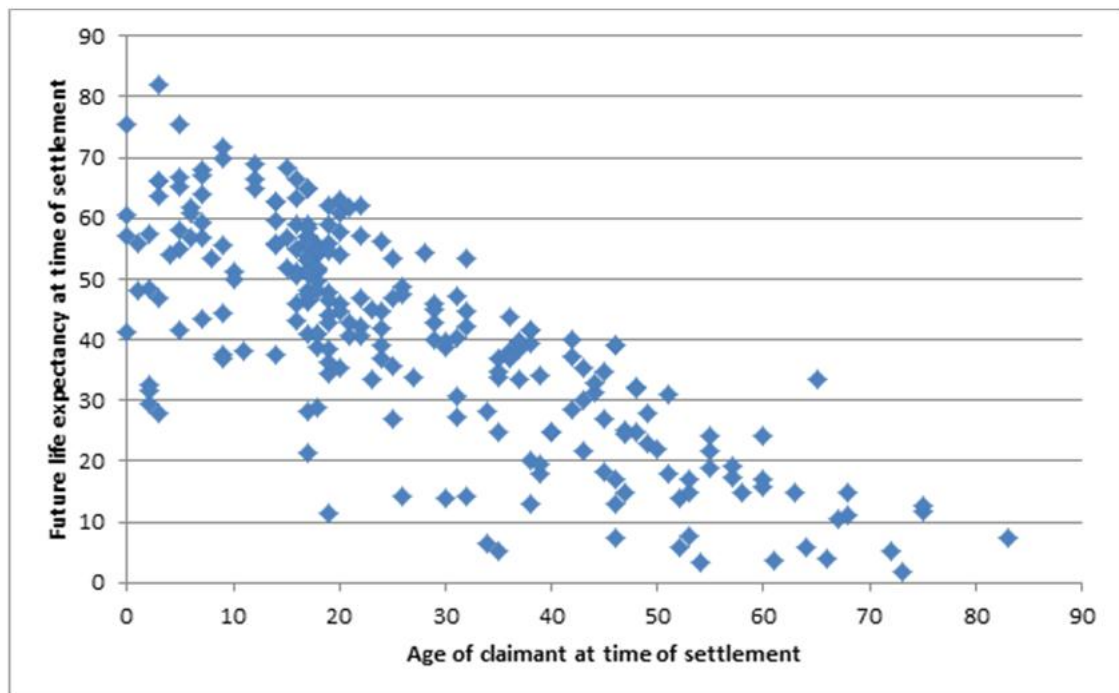
Spearman correlation coefficient: -0.76; Pearson correlation coefficient: -0.79

3.24.   However when looking at future life expectancy expressed as a reduction of unimpaired life expectancy there is no discernible correlation to age of claimant.

3.25.   % reduction in life expectancy is defined as reduction in life expectancy as at the time of settlement as a proportion of unimpaired life expectancy as at the time of settlement.
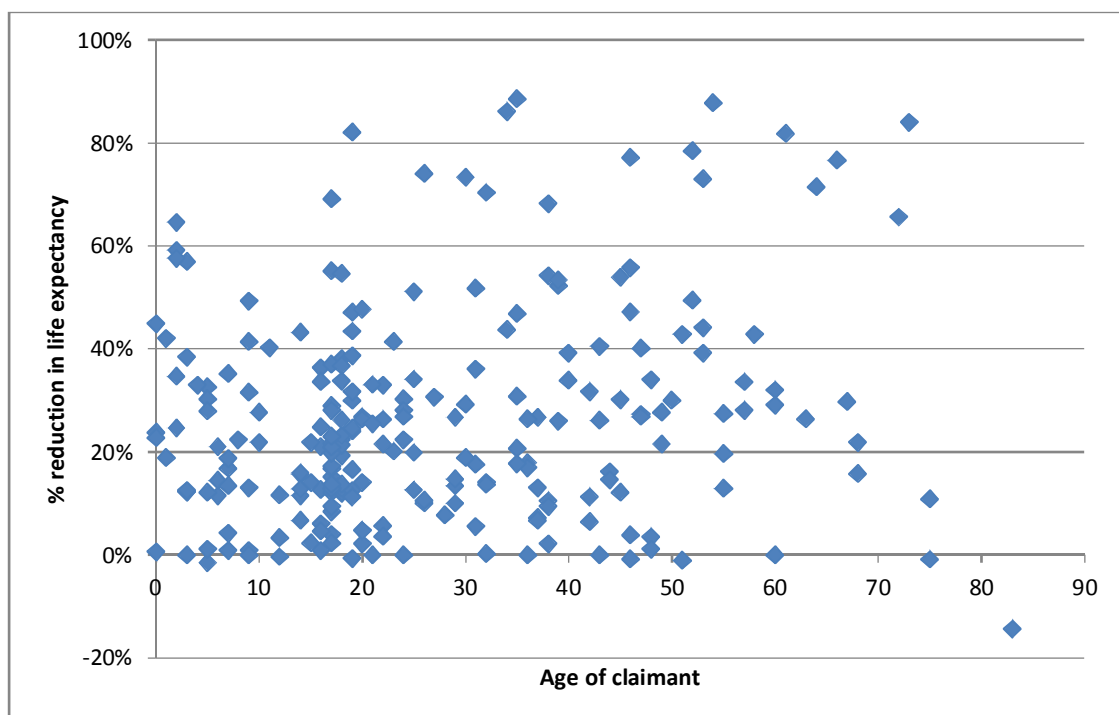
Spearman correlation coefficient: 0.16; Pearson Correlation coefficient: 0.20

Distribution of lump sums

3.26.   This is the distribution of the lump sum element that is associated with a PPO (i.e. the lump sum amount excluding the regular PPO amount) shown for each settlement year.
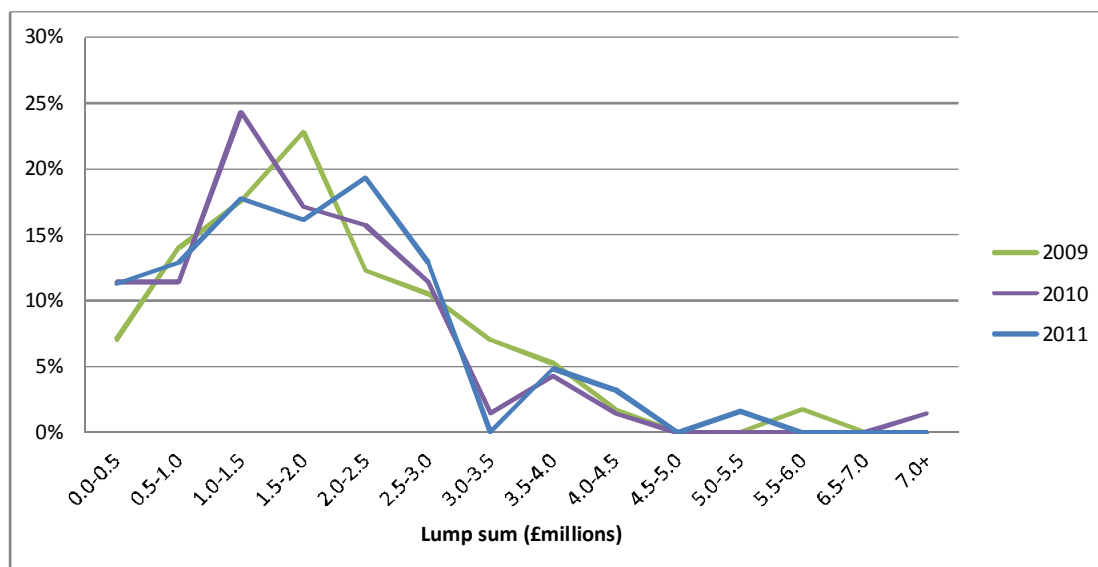
Distribution of initial PPO payments

3.27.   In this document the term initial PPO amounts refers to the regular payment associated with a PPO at the time of settlement.
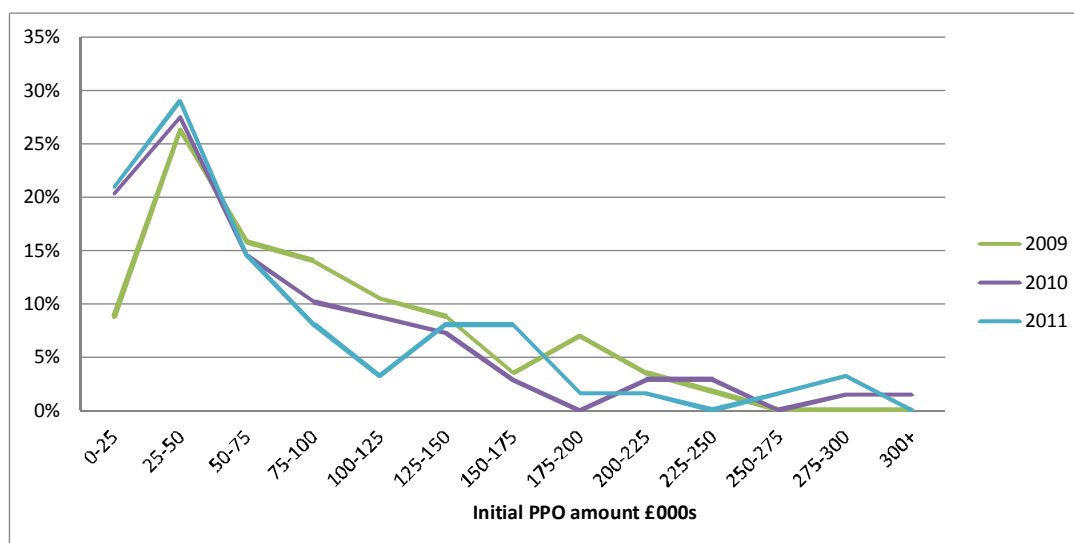
3.28.   These distributions of PPO amounts appear to have followed reasonably consistent distributions over the last 3 years (especially when the relatively small sample size they are based on is taken into account).

3.29. Perhaps not surprisingly, there is some correlation between the size of lump sum awarded and the size of the annual PPO amount as demonstrated in the following graph.
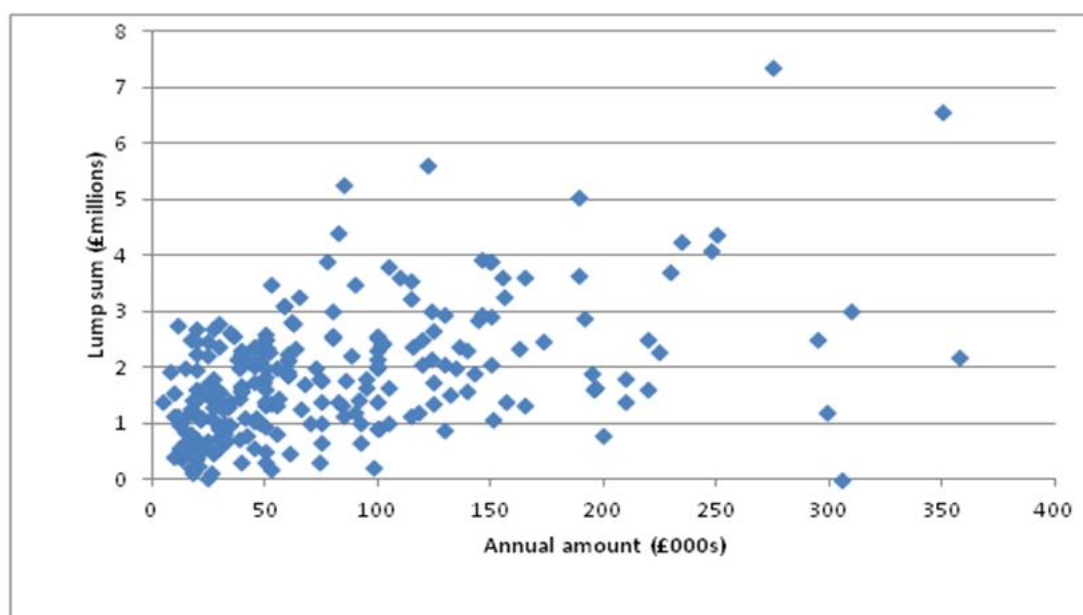
Spearman correlation coefficient: 0.47; Pearson Correlation coefficient: 0.48

3.30. It can also be seen that there is a partial trend towards larger reductions in life expectancy leading to higher annual PPO amounts; this would make sense as more serious injuries are likely to have higher care costs and also lead to shorter life expectancy.
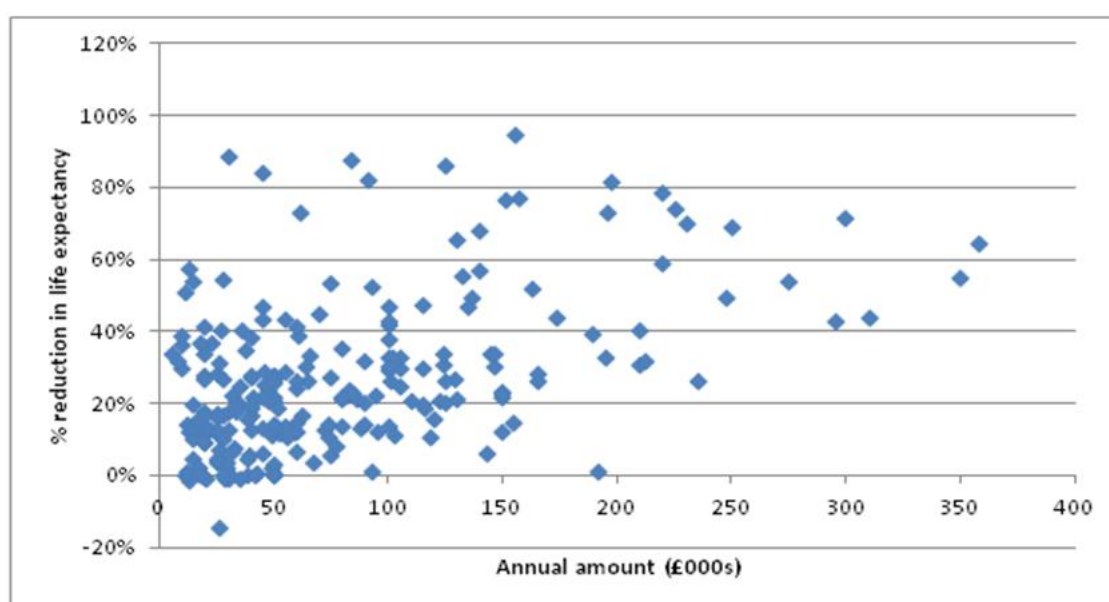
Spearman correlation coefficient: 0.45; Pearson Correlation coefficient: 0.50

3.31. Limitations on the data provided have prevented detailed analysis for some of the following fields. Ways of improving the collection of this data will be considered in next year's survey.

Stepped PPOs

3.32. A significant proportion (30%) of PPOs have stepped payments. A stepped PPO is a PPO where there is a provision for step changes in the regular payment amount to be made. These stepped changes will apply at fixed points in time to situations where a specific change in

circumstance has already been foreseen at the time of settlement. For example, there could be a provision for a one-off increase in payments to be made in the case of a claimant whose parents are the primary carers. This would allow for the time when the parents cannot deliver the same standard of care and additional care costs will need to be incurred.

3.33. It appears that the step changes tend to be increases, but it should be noted that the step change can be either upward or downward.

3.34. The following graph shows that claimants at younger ages are more likely to have stepped payments. The ages shown are age at accident date.
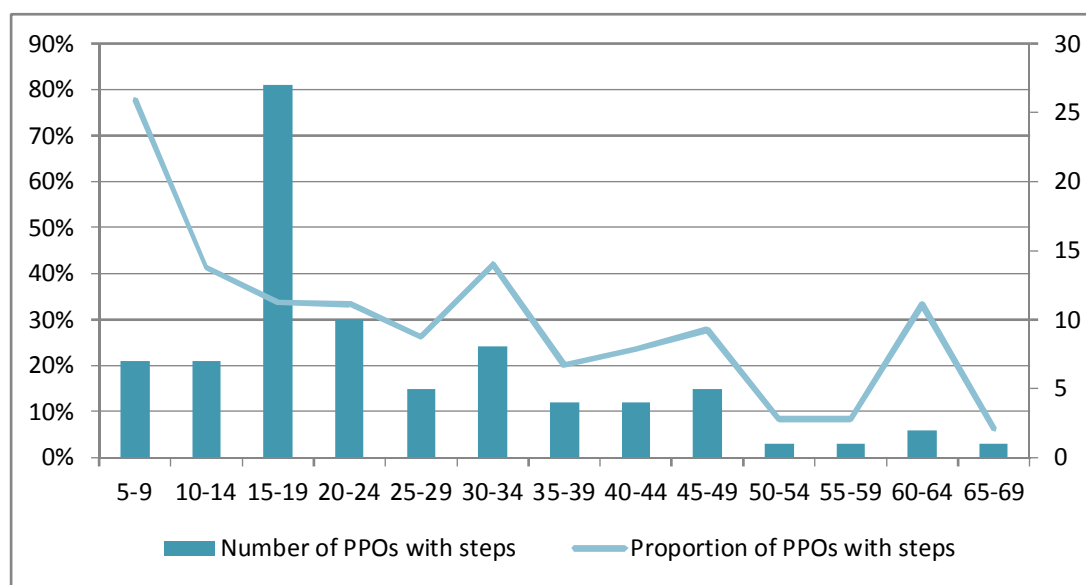
3.35. The data suggests that claimants with a spinal injury are also more likely to have a stepped payment than those with a brain injury (42% against 26%).

Variation orders

3.36. There are 26, or 9% of PPOs, with variation orders in the market. Of these, the 14 with descriptions provided, all allow for revision of the order if pre-specified conditions develop. Data was not sufficient to establish whether the severity of injury of the claim is correlated with variation orders, however, of these 26 PPOs, a disproportionately high number related to spinal injuries (50% as compared to the general PPO population proportion of 25%).

Payment frequency

3.37. 73% of PPOs are paid annually and 20% quarterly. Most insurers make annual payments; only five insurers make non-annual payments and of these, only three companies make quarterly payments.

Number of claimants

3.38. The vast majority of claims have a single PPO claimant.

Contributory Negligence

3.39. 30% of claims, where this field was filled in, had some sort of contributory negligence. 31% of PPOs had this information missing.

Who decided on the PPO

3.40.   According to the data provided, in the vast majority of cases (94%) the claimant decided on the PPO.
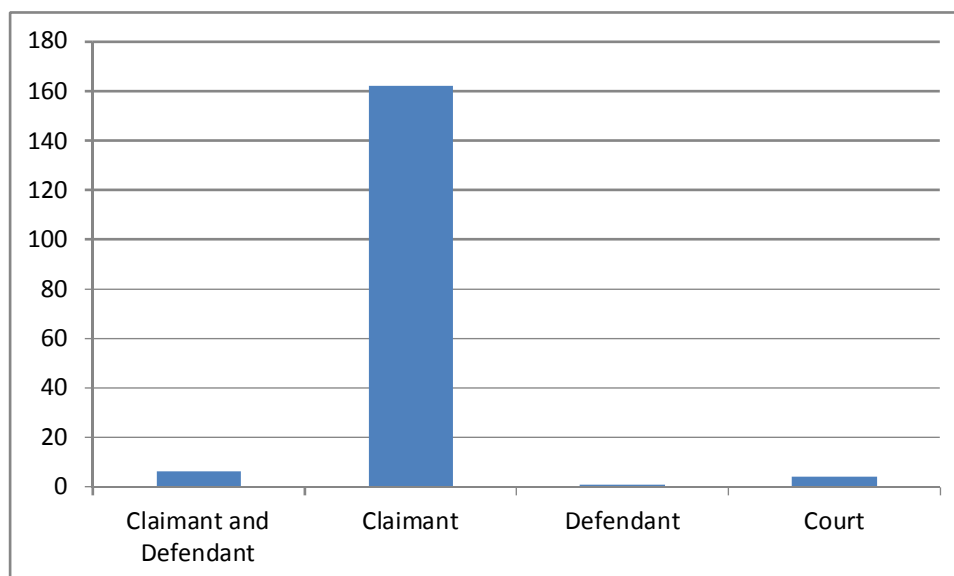
(Reverse) Indemnity Guarantees

3.41.   An indemnity guarantee is a guarantee given by the insurer to pay additional costs in circumstances such as where services provided by the local council are reduced or withdrawn in the future. A reverse indemnity guarantee would cover the opposite situation; for example, where the insurer can reduce their payments if the claimant increases their reliance on public provision of care.

3.42.   Indemnity guarantees appear to be quite rare, applying to only 7% of PPOs. The reverse indemnity guarantee field was less well filled in, but indicated that a similar proportion of reverse indemnity guarantees might be in place.

Name of third party legal firm

3.43.   This field was filled in by eight insurers. There was a huge number of different solicitors cited (nearly 60 different names out of 103 PPOs with details supplied). There were two solicitors names that appeared more often than the rest; Irwin Mitchell (appeared 17 times) and Stewarts (14 times). Most other solicitors appeared only once or twice.

4. Motor PPOs - Nature of Injury

4.1. The vast majority, almost 70%, of the PPOs in the survey related to brain injuries and 90% related to either brain or spinal injuries.
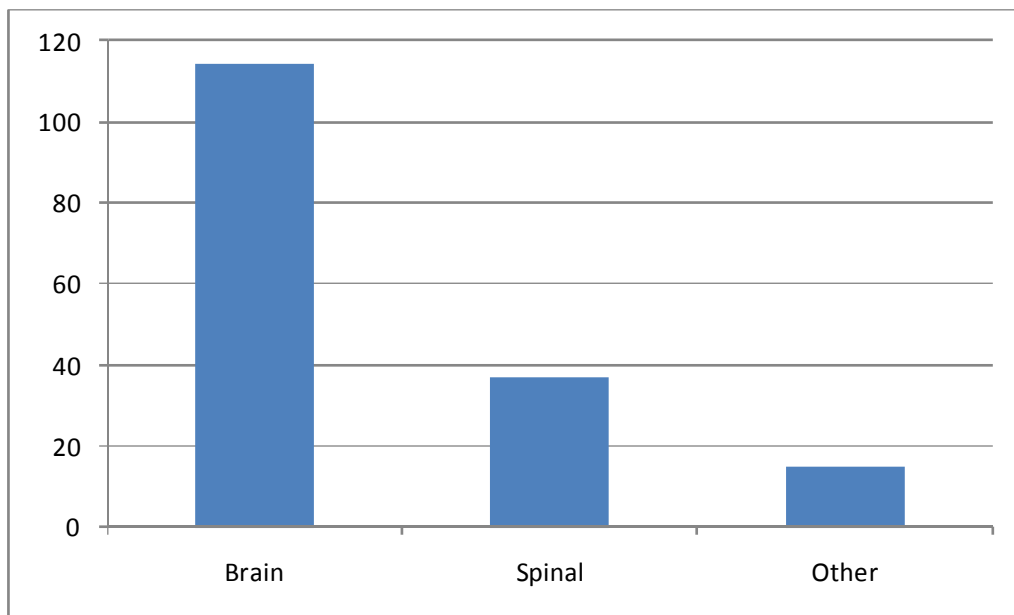
4.2. The data was not categorised well by degree of injury so we have not been able to undertake this analysis this year. Please refer to the 2010 survey where the degree of severity of brain injury was found to be around 4 times greater for the severe brain injury categorisation as it was for the moderate brain injury categorisation (for both initial PPO and lump sum amount measures).

Number of Motor PPOs by settlement year

4.3. The number of motor PPOs from brain injuries has been relatively stable over the period 2009 to 2011, whereas the number of spinal injuries has fluctuated from settlement year to year, though we note there are a relatively small number of PPOs with spinal injuries.
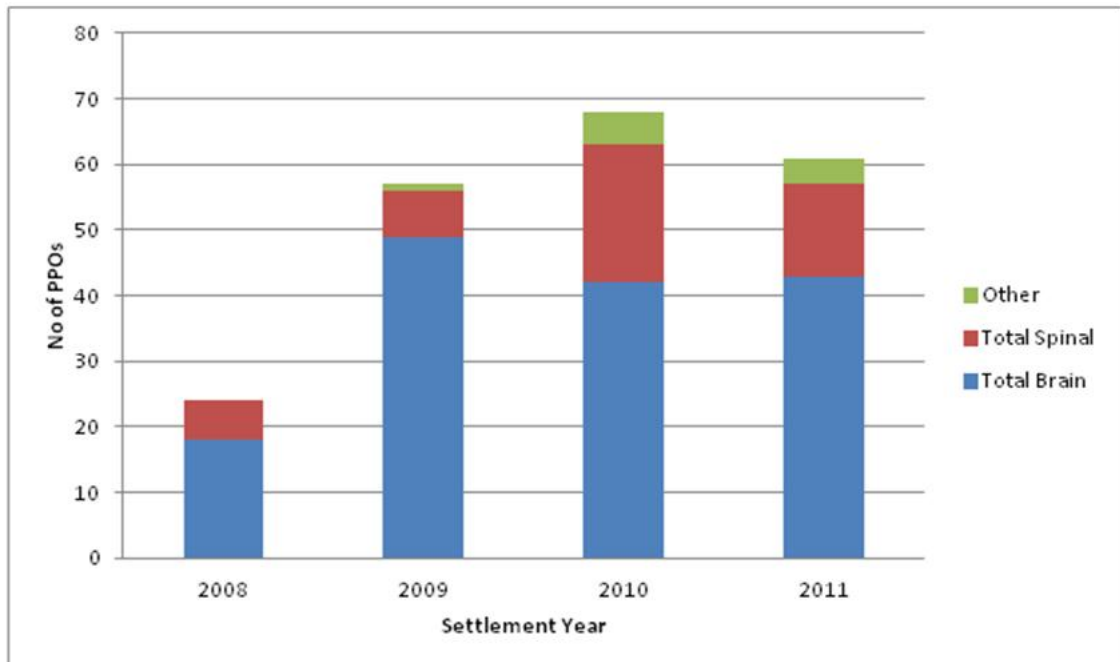
Age of Claimant at time of accident by injury type

4.4. This shows the proportion of PPOs that were due to brain and spinal injuries at different age bands. The graph suggests that the younger the motor claimant is at the accident date the higher the chance the injury is a brain related one.
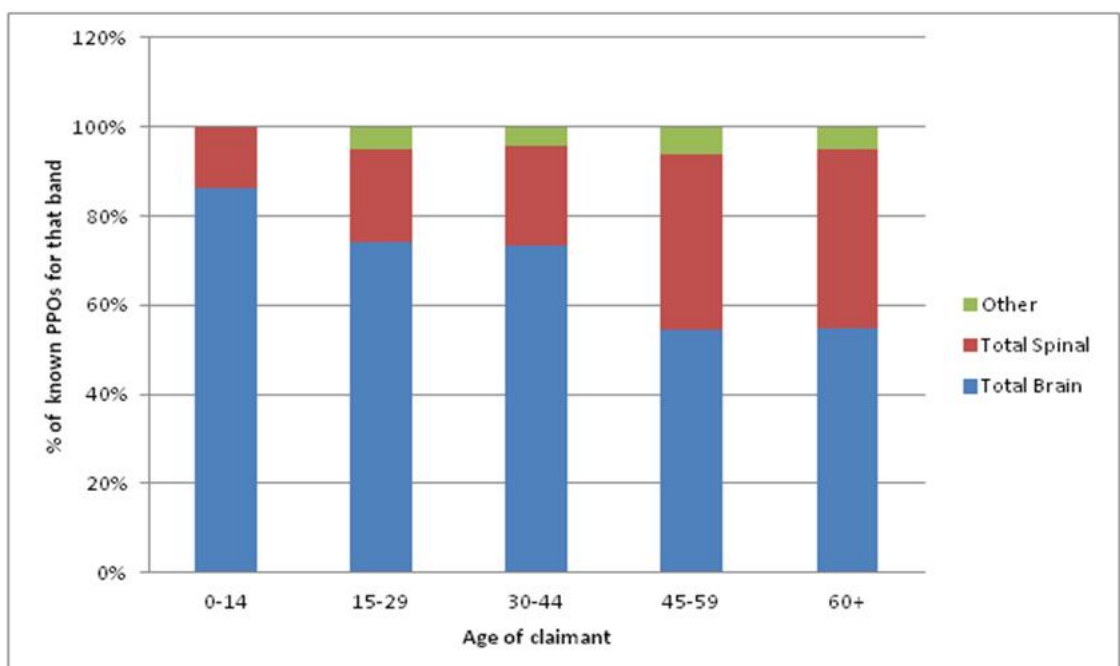
4.5.   The following shows the number of PPOs in each banding to give an indication of credibility.
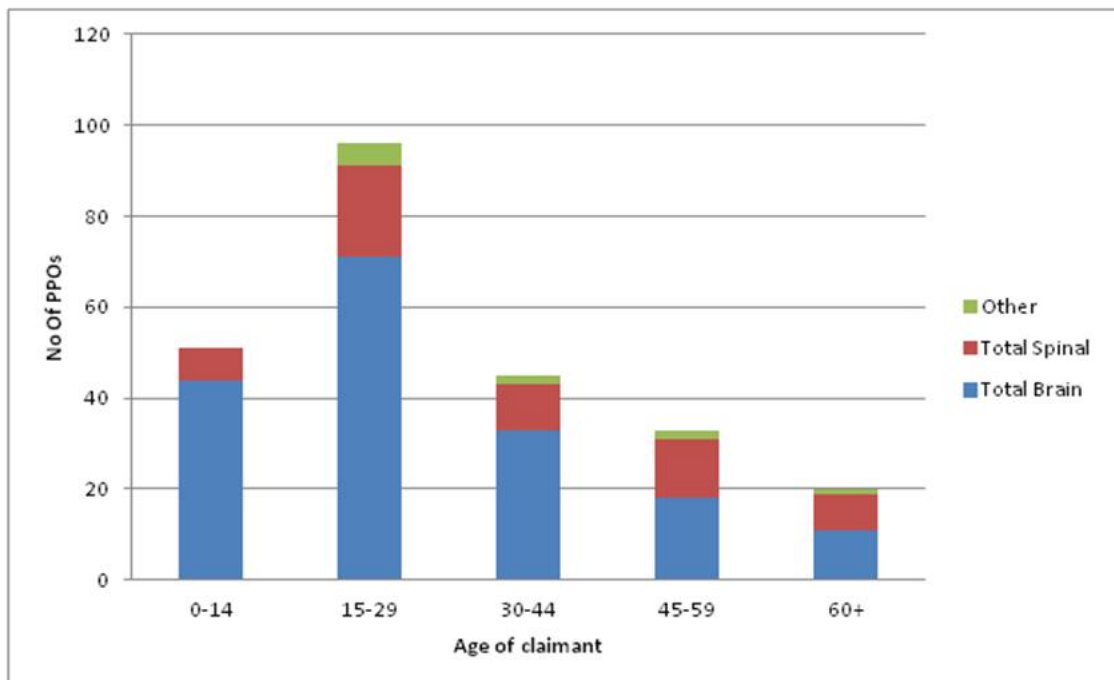
Delay to settlement

4.6.   It appears that PPOs with claimants suffering from spinal injuries are settled more quickly than those involving claimants with brain injuries (4.8 years on average as compared to 6.9 years); the peak can be seen to be sooner for spinal injuries and the tail is much less.
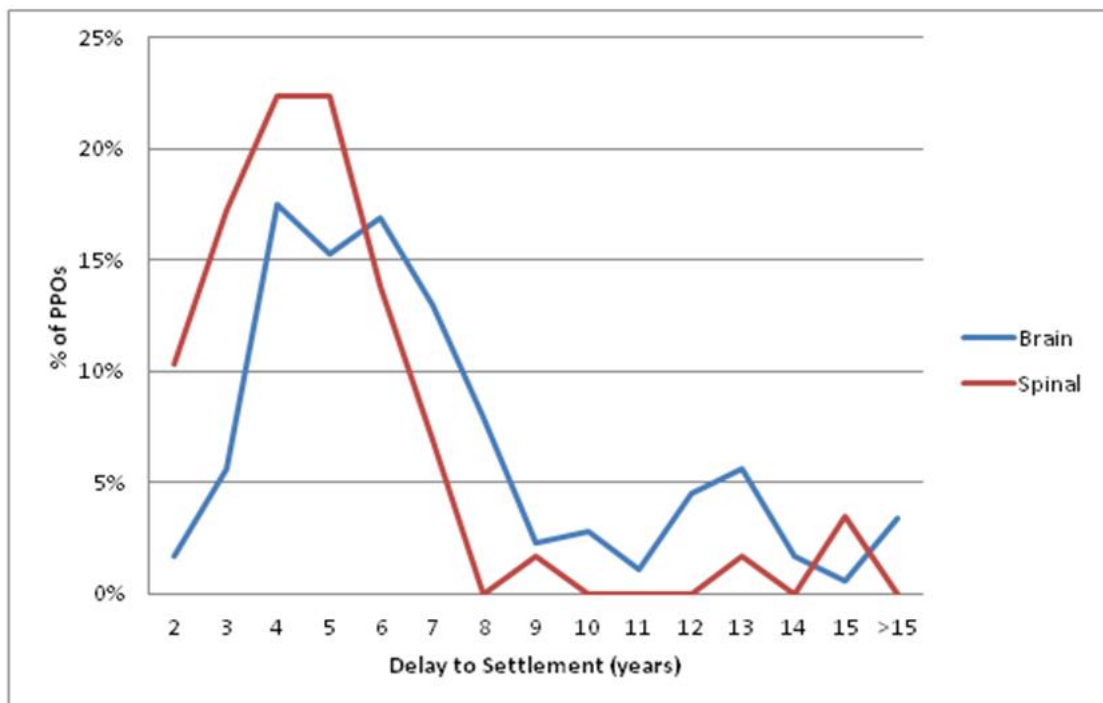
Reduction in life expectancy

4.7.   The data suggests that there are significant differences in the pattern of reduction in life expectancy between brain and spinal injuries, with the average future life expectancy at settlement being 42 years for brain injuries and only 31 years for spinal injuries.
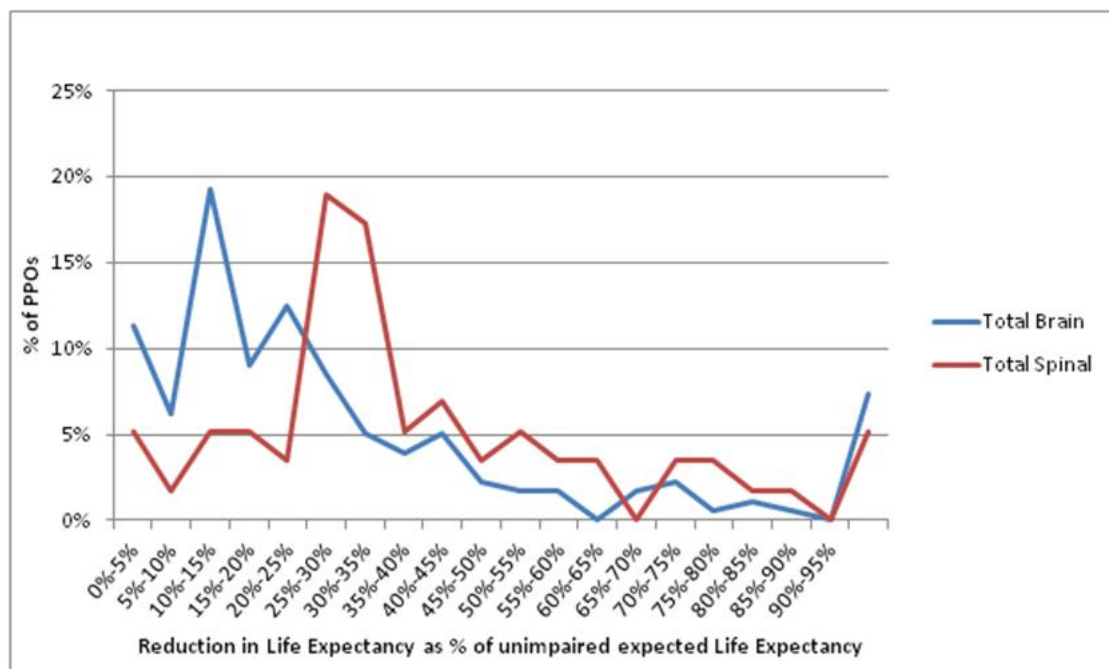
Distribution of lump sums

4.8.   Spinal injury PPOs have a higher average lump sum than brain injury PPOs (at £2.1 million for spinal injuries and £1.7 million for brain injuries). This effect can be seen in the distributions shown below.
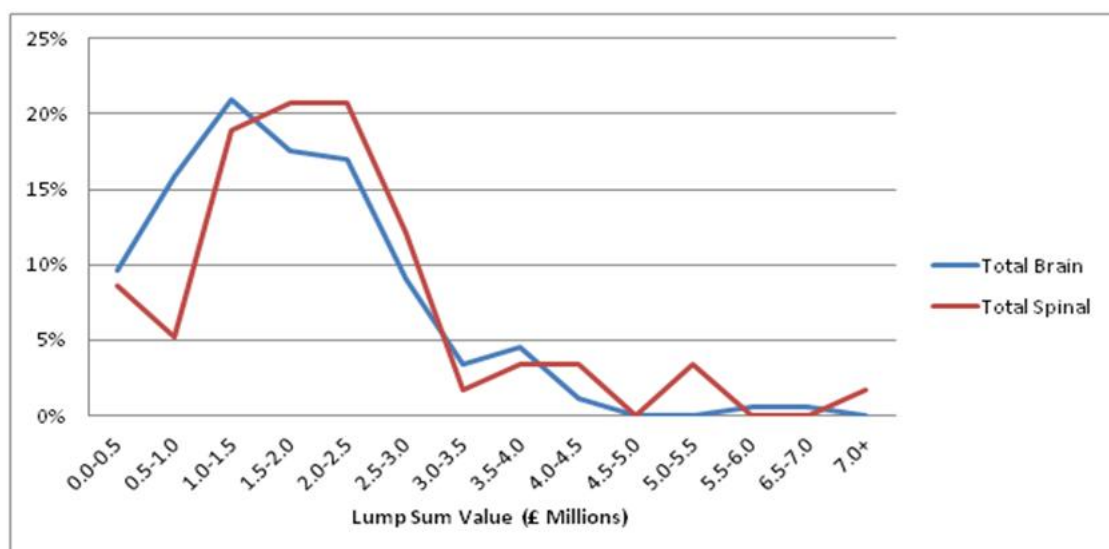
Distribution of PPO Amounts

4.9.   As with lump sums the PPO amounts for spinal injuries are also typically higher than those for brain injuries (with the average PPO amount for spinal injuries at £99,000 compared to £71,000 for brain injuries).
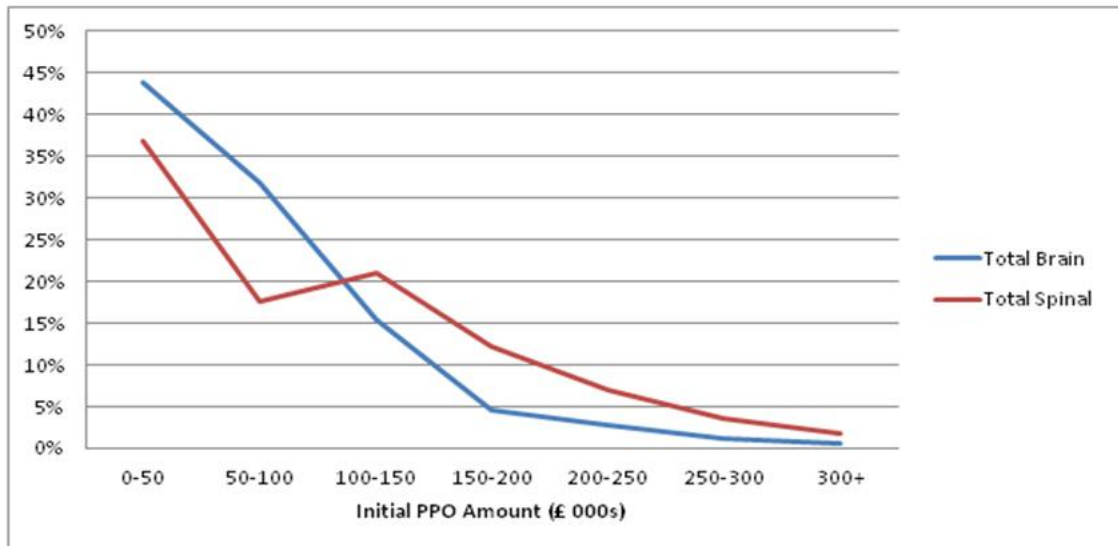
5. Motor PPOs – Comparison of Private and Commercial Covers

Number of PPOs by settlement year
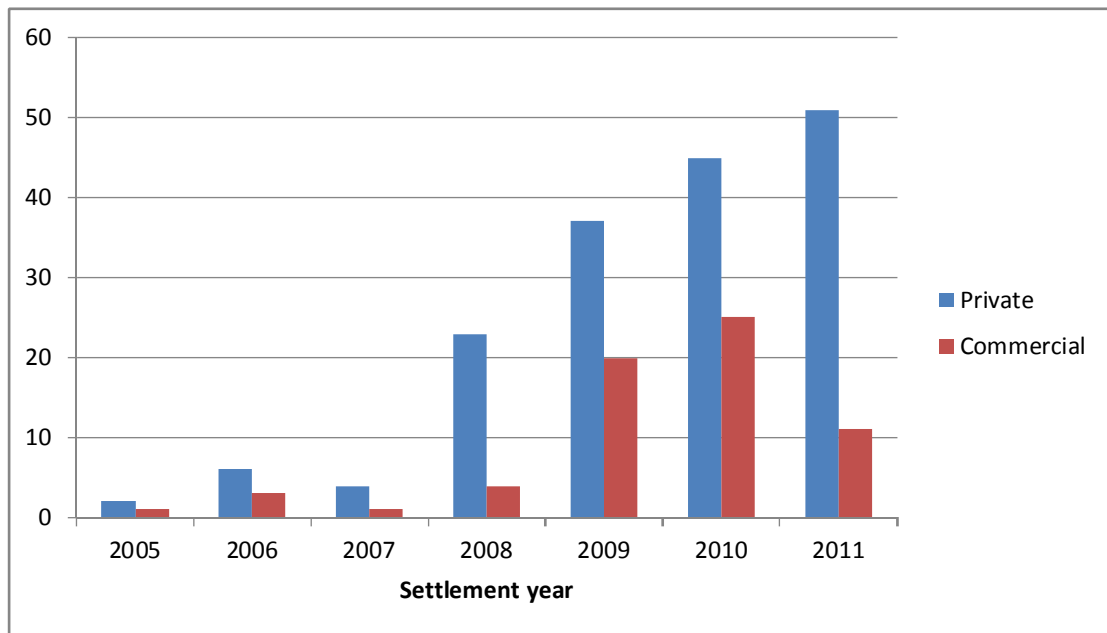
5.1. Private motor PPOs look as though they have been continuing to increase in number since 2008, whereas the number of commercial motor PPOs settled in 2011 look significantly lower compared to previous years.

Age of driver at the time of the accident split by gender

5.2.   By comparing the two graphs below it can be seen that, as would be expected, there is a difference between drivers causing PPOs between private and commercial covers. Drivers under commercial cover tend to be older; the spike at younger ages that can be seen in private cover does not exist with the commercial drivers. Also there are very few female drivers under the commercial cover.
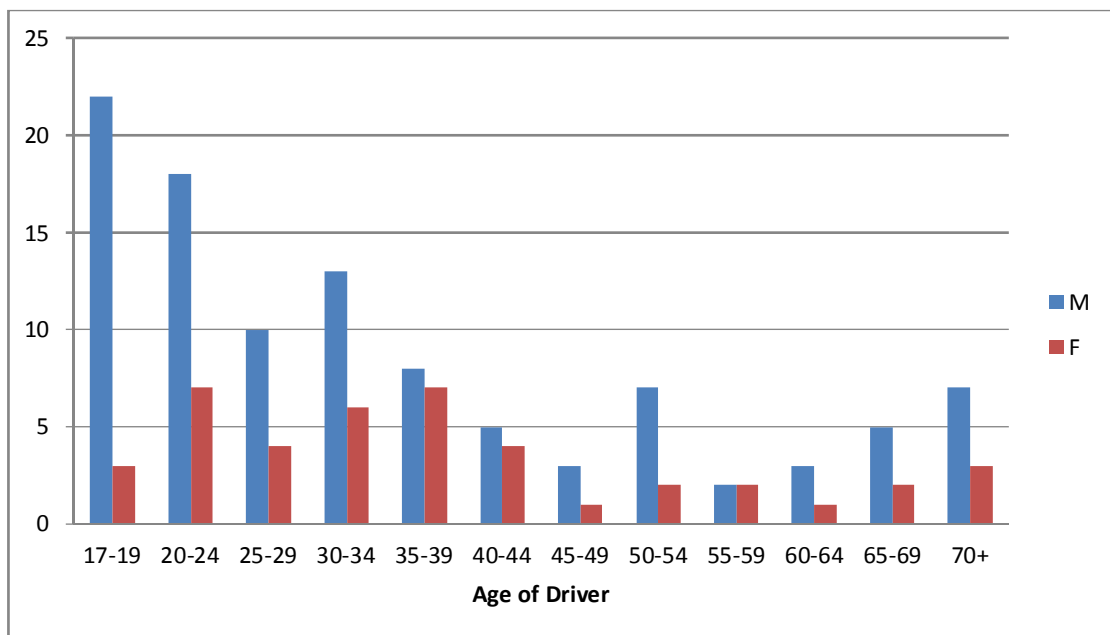
Private Motor
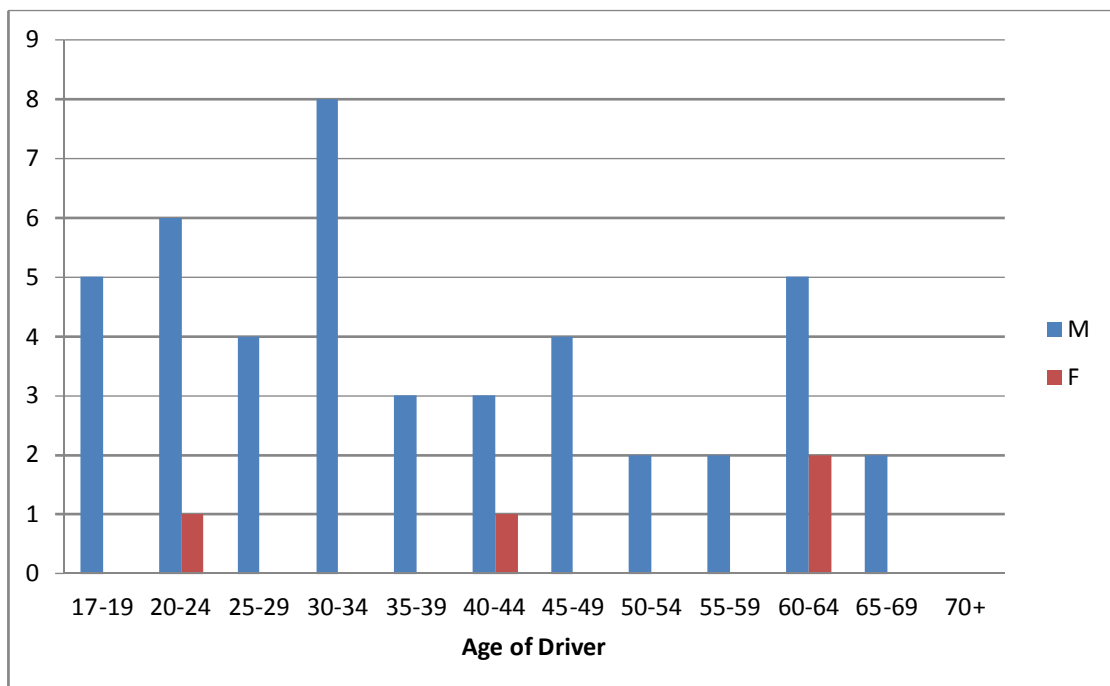
Commercial Motor

Age of claimant at time of the accident split by gender

Private Motor
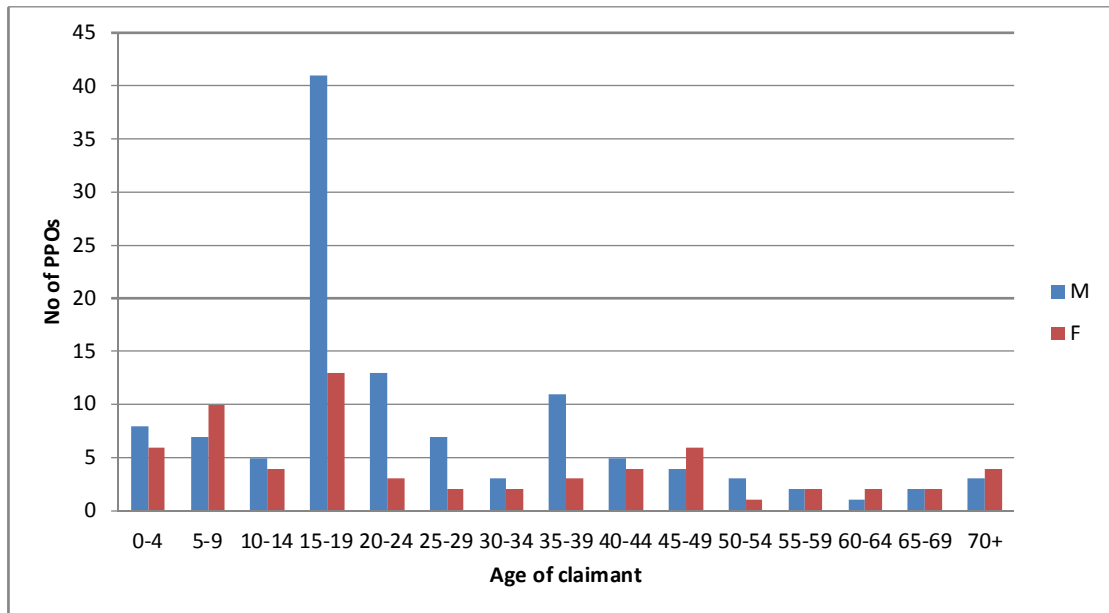
Commercial Motor
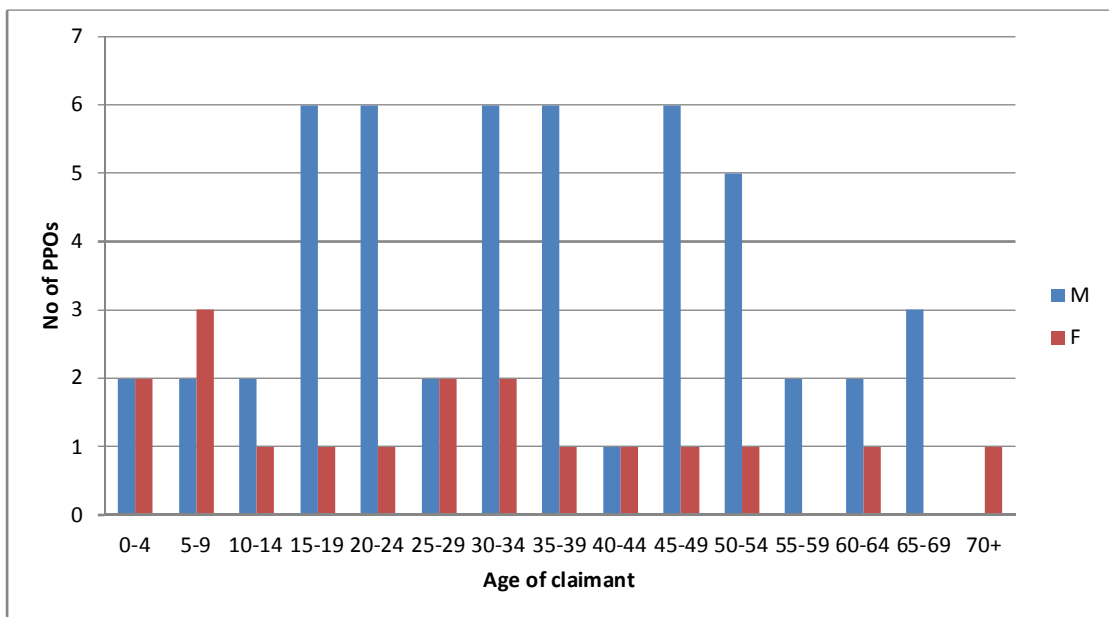
5.3.   Interestingly a similar difference can also be seen with age of claimant between private and commercial covers. This is likely to be due to the correlation between driver age and claimant age, whereby young drivers are more likely to cause PPOs involving younger claimants.

Age of driver against age of claimant

5.4.   This correlation is still in evidence under both private and commercial covers, though is arguably weaker under the commercial cover.
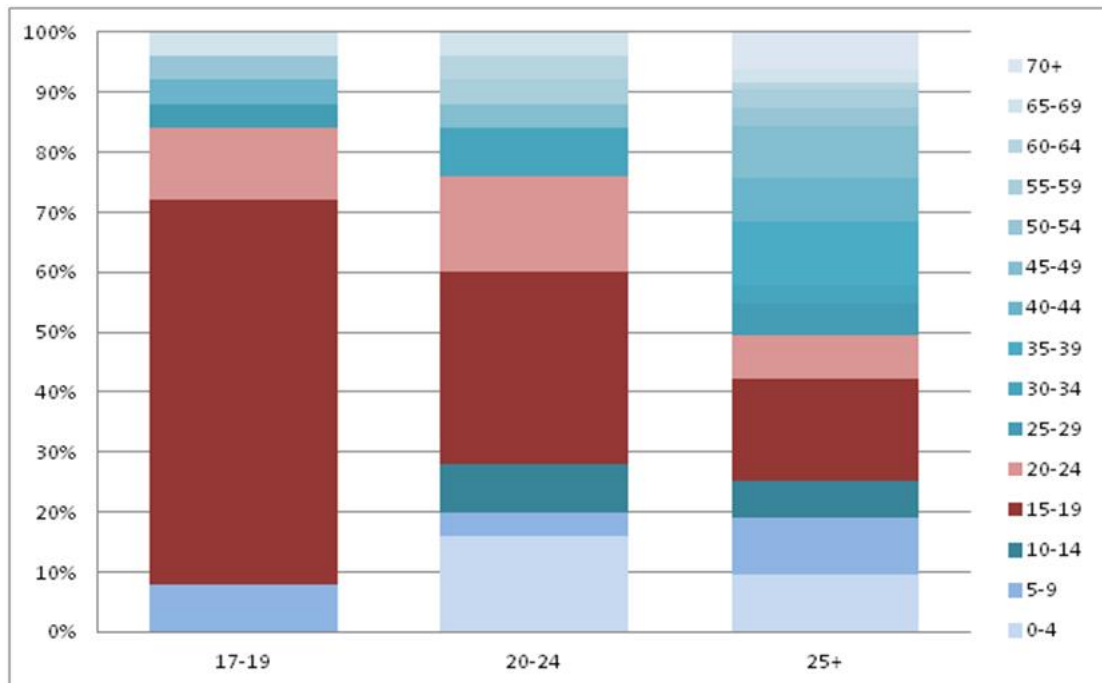
Private Motor
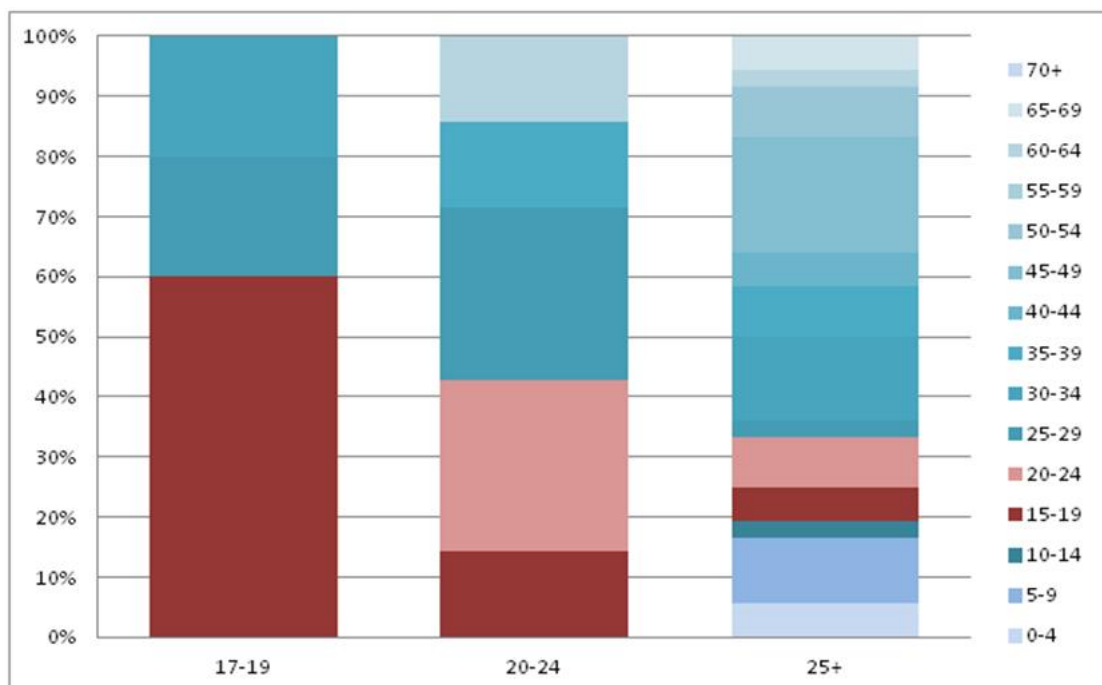
Commercial Motor

Future life expectancy

5.5.   This difference in claimant age profile between private and commercial covers also means that future life expectancy is significantly shorter for most PPOs arising under commercial covers.

Private Motor

Commercial Motor
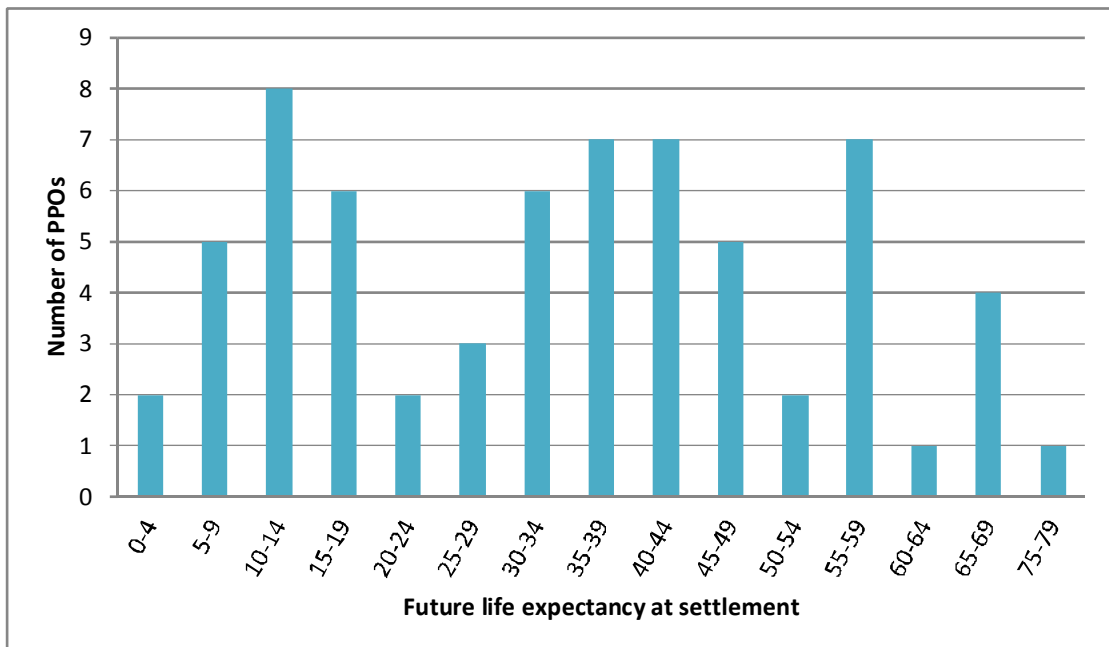
6. Motor PPOs – Comparison of Comprehensive and Non-Comprehensive Covers

6.1. We have compared the results for comprehensive and non-comprehensive arising out of private motor covers. There were only 30 PPOs with non-comprehensive cover so the results are likely to be of limited credibility.

Number of PPOs by settlement year
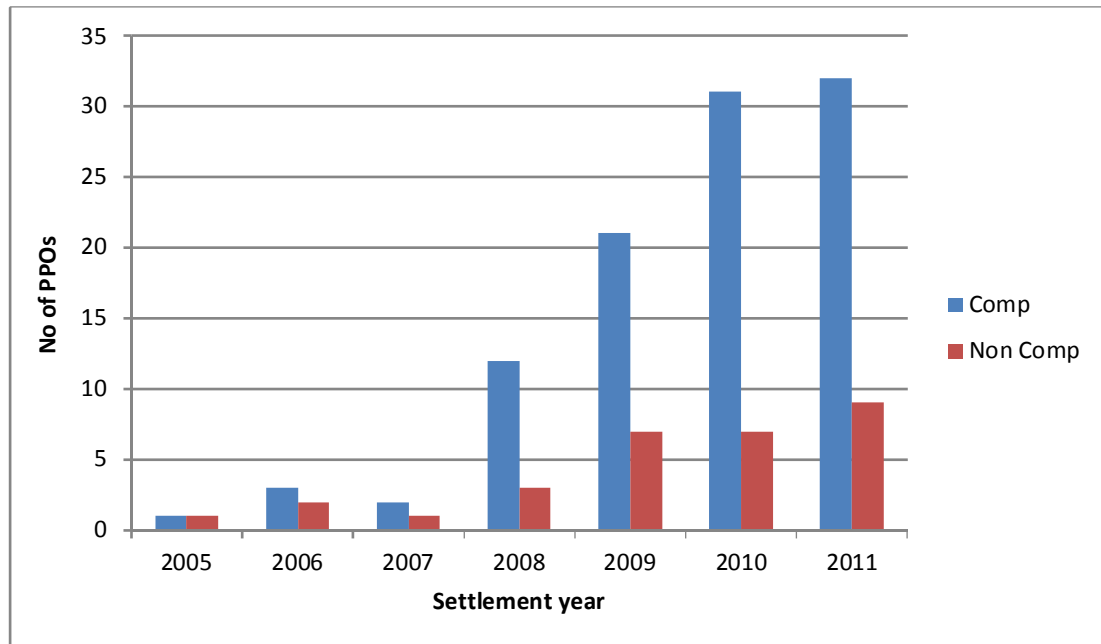
6.2. It looks as though the number of PPOs arising from comprehensive and non-comprehensive covers have been continuing to increase from settlement year to year.

Injury type

6.3. PPOs involving spinal injuries may be proportionately less common under non-comprehensive covers than comprehensive covers (and brain injuries more common), however, as stated above, the results are likely to be of limited credibility due to the small number of con-comprehensive PPOs.
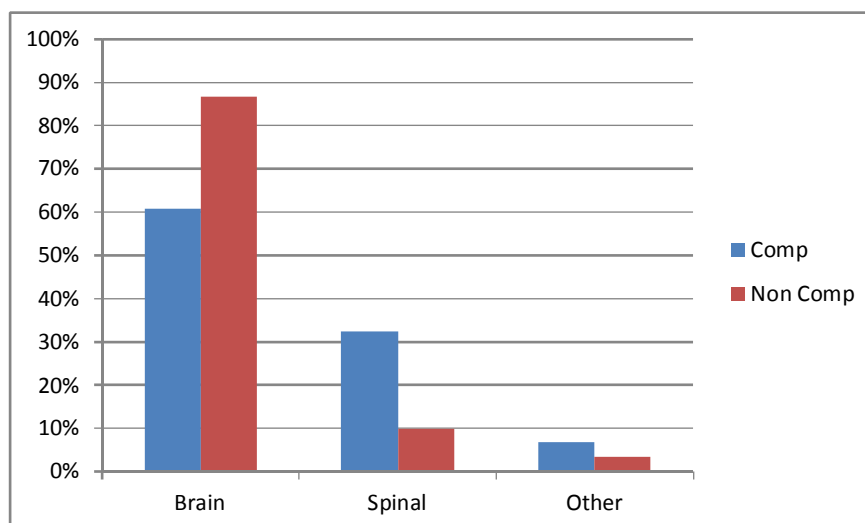
Distribution of driver age at accident

6.4.   From looking at the two graphs below, there is no surprise that there appear to be proportionally more PPOs relating to young drivers from non-comprehensive covers than from comprehensive covers, this is probably because younger drivers are more likely to have purchased non-comprehensive motor insurance.

Comprehensive Private Motor Cover
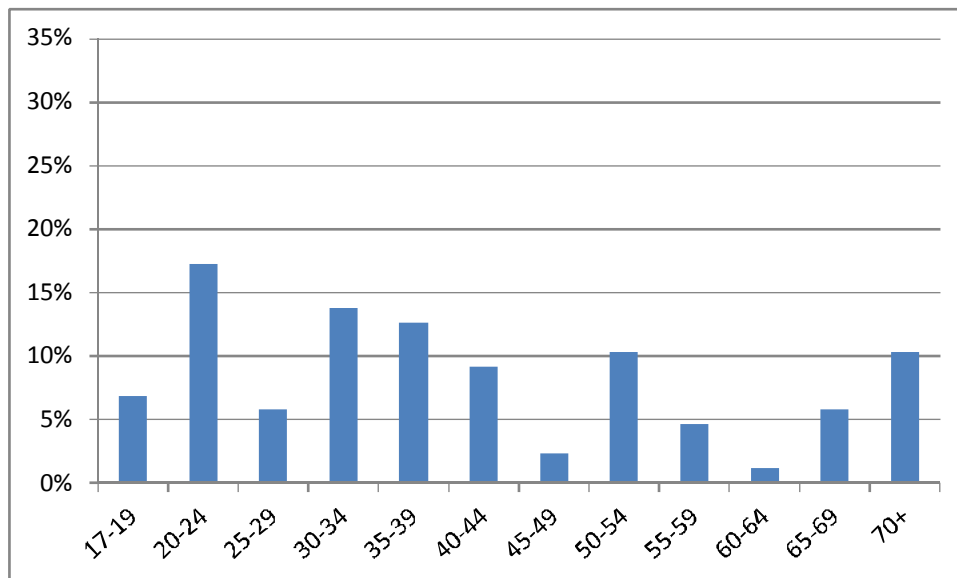
Non-Comprehensive Private Motor Cover
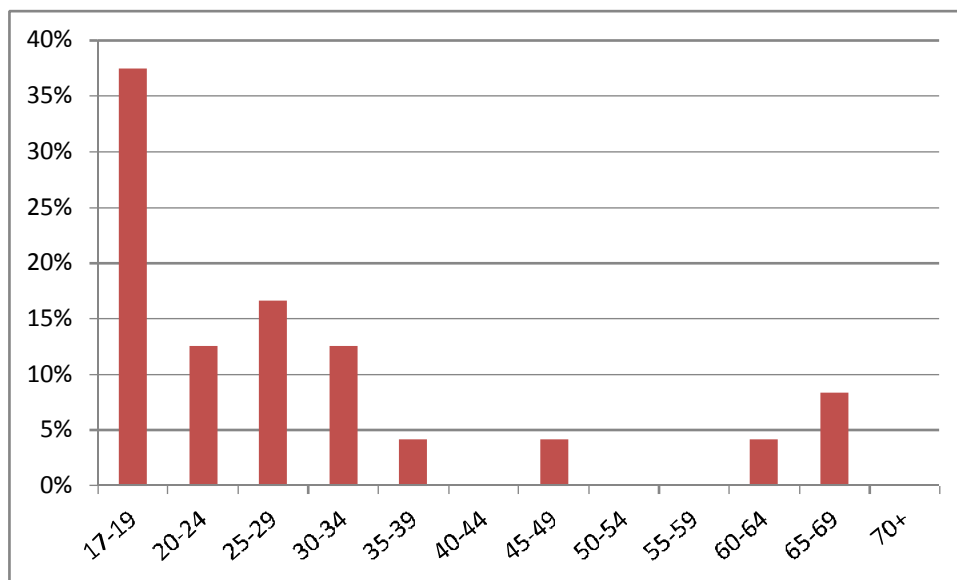
Distribution of claimant age at accident

6.5.   A similar difference can also be seen with age of claimant, with a higher proportion of teenage claimants under non comprehensive cover.   This is likely to be due to the correlation between driver age and claimant age, whereby young drivers are more likely to cause PPOs involving younger claimants.

Comprehensive Private Motor Cover
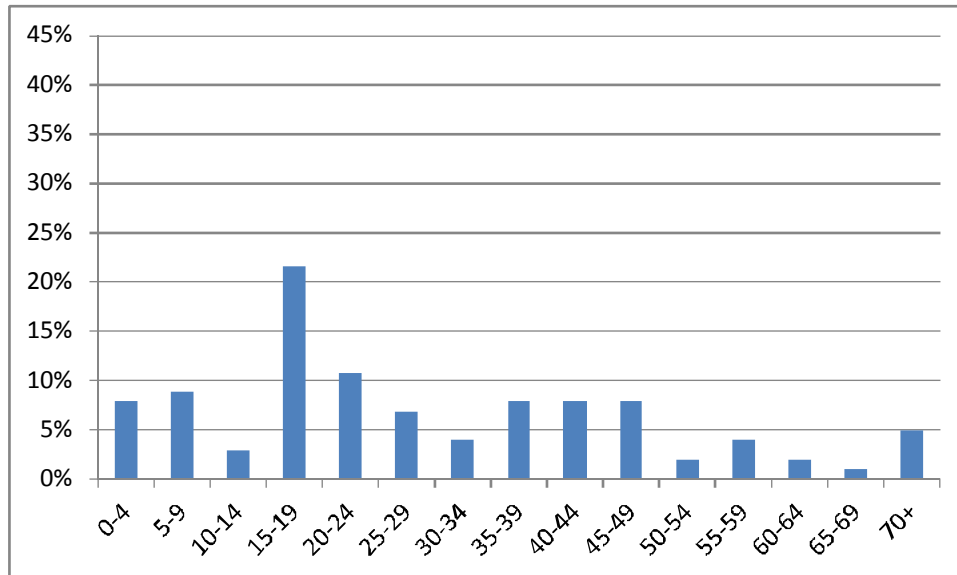
Non-Comprehensive Private Motor Cover
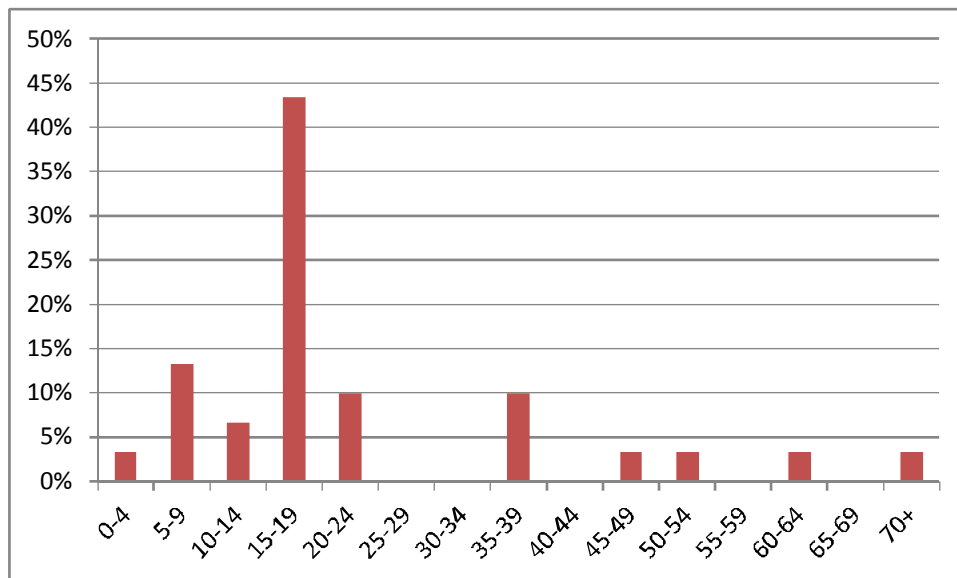
Life expectancy at settlement

6.6.   The difference in claimant age profile also means that future life expectancy tends to be longer for PPOs arising under non comprehensive covers than comprehensive covers.

Comprehensive Private Motor Cover
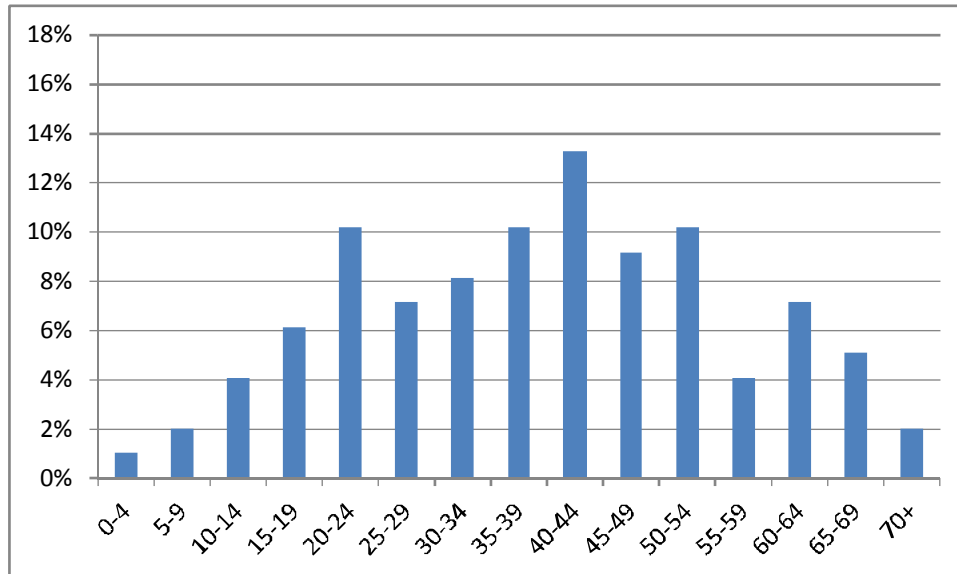
Non-Comprehensive Private Motor Cover
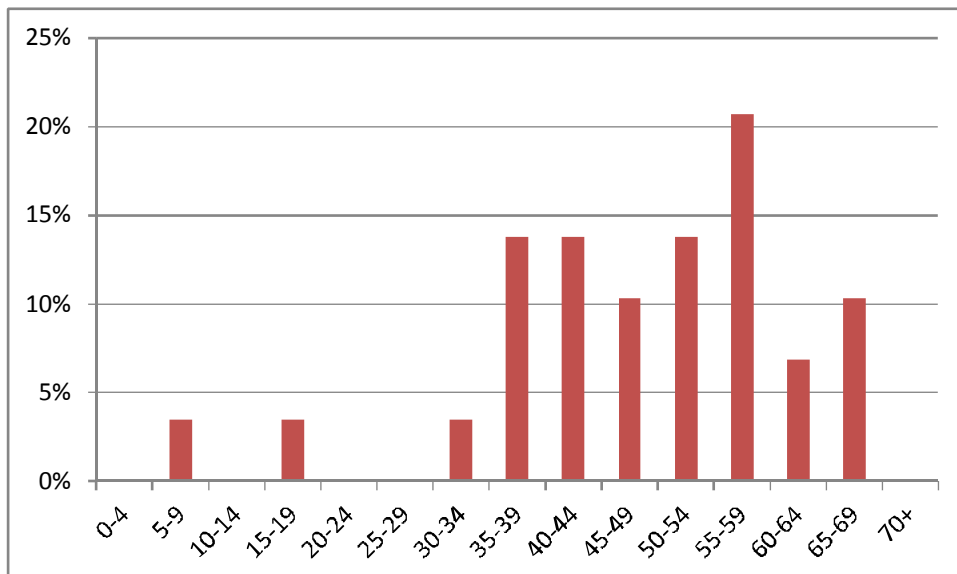
7. Liability PPOs

7.1. There were 33 liability PPOs in the survey, from 7 insurers (as not all of the respondents offer liability insurance).

7.2. It is possible that the existence of indemnity limits on Employer's Liability covers is impacting PPOs settled under liability covers. This is discussed in more detail in section D.

Number of Liability PPOs by settlement year
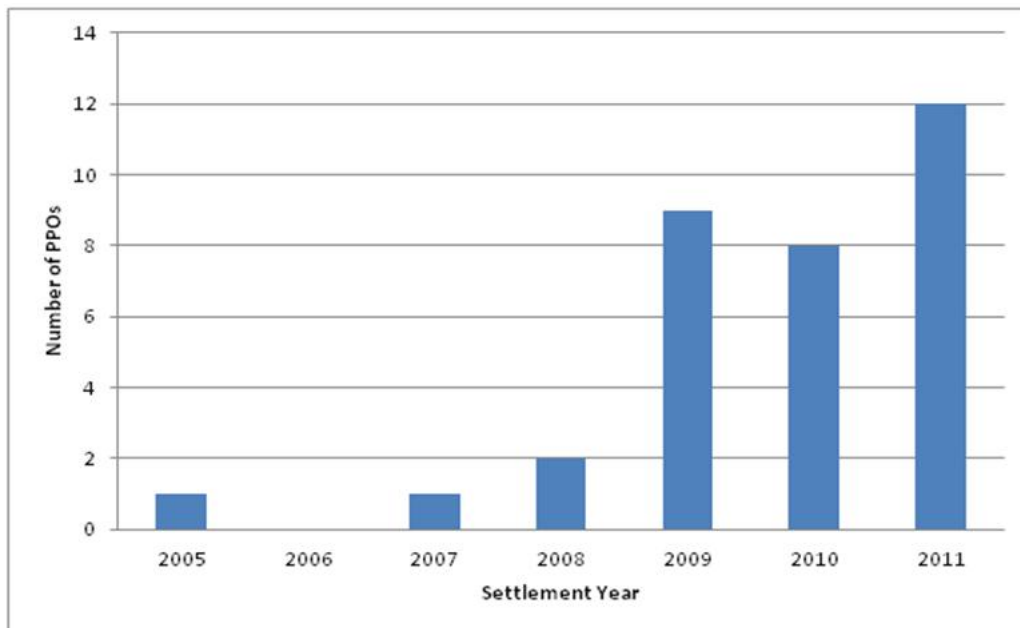
7.3. The pattern of settlement of liability PPOs is broadly similar to that of the motor PPOs. The smaller sample size may account for some additional random noise in the numbers.

Cover type

7.4. The majority of liability PPOs relate to Employer's Liability and Public Liability covers.
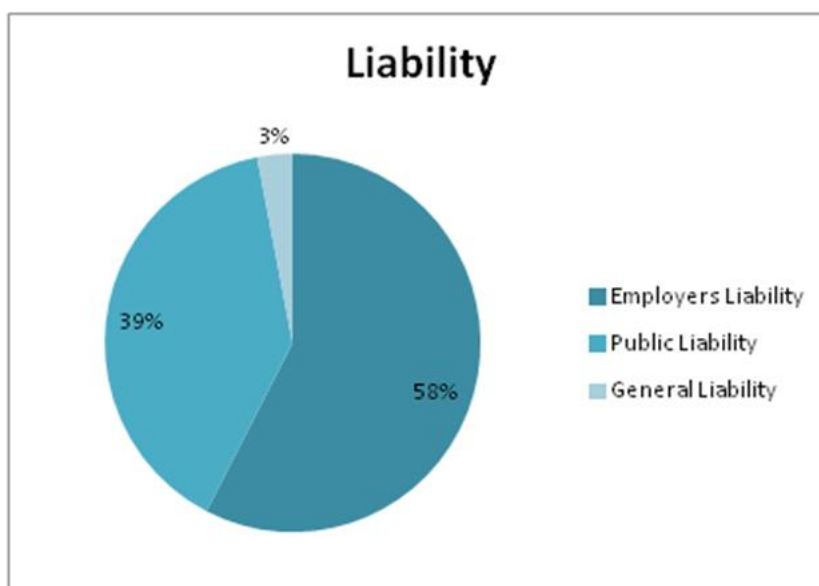
Indexation Measures

7.5.   As for the motor PPOs, virtually all of the liability PPOs have ASHE 6115 (care workers) indexation.

ASHE percentiles
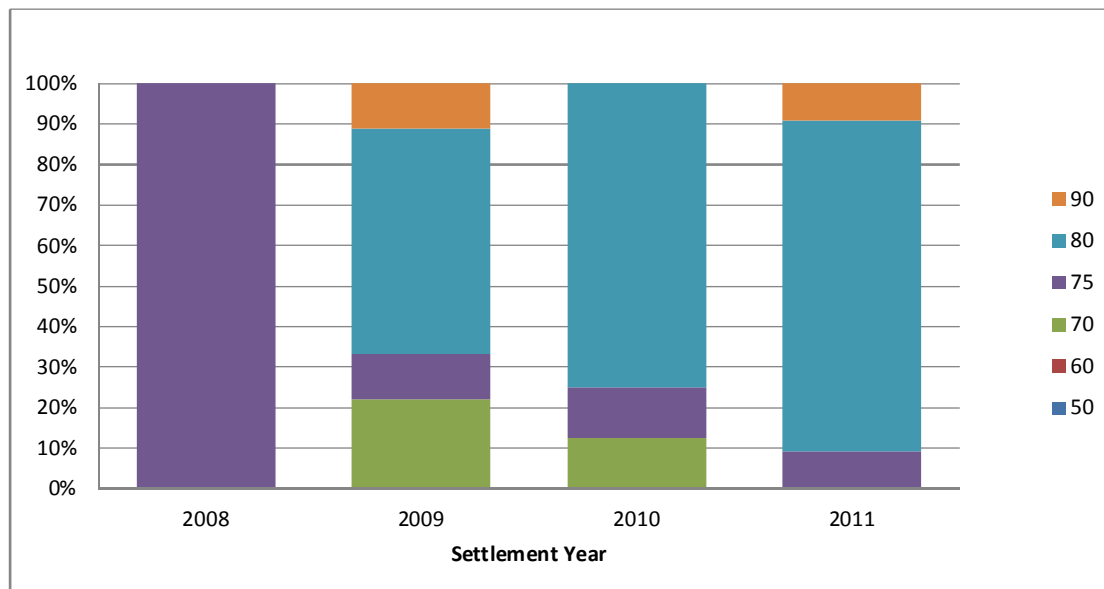
7.6.   It seems that the 80th percentile has always been the most popular for PPOs arising under liability covers (settlement year 2008 only comprises 2 PPOs).

Injury type

7.7.   Spinal injuries appear to be significantly more common under liability coverages, in fact type of injury is almost equally likely to be either brain or spinal injury under a liability PPO. The nature and cause of accidents under motor and liability covers are likely to be very different, with those under liability cover more likely to be accidents such as trips and falls, as opposed to high speed crashes that would be more common under motor insurance.
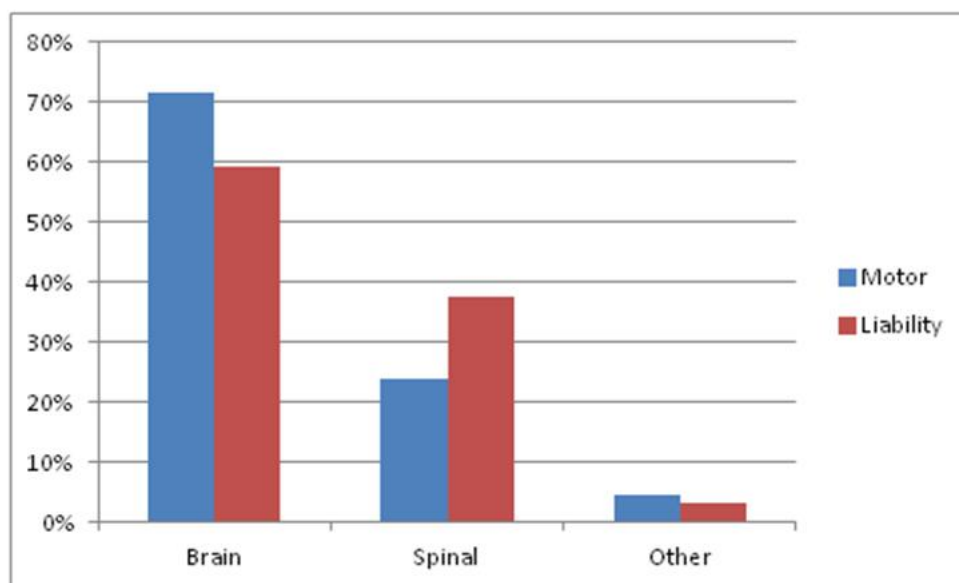
Claimant age

7.8.   Nearly all claimants are male. There appears to be no particular trend in the age of claimant, though virtually all claimants under Employer's Liability policies are of working age, as would be expected (we note the data included one claimant in the 5-9 year old bracket).

Age of claimant at accident date – Employer's Liability
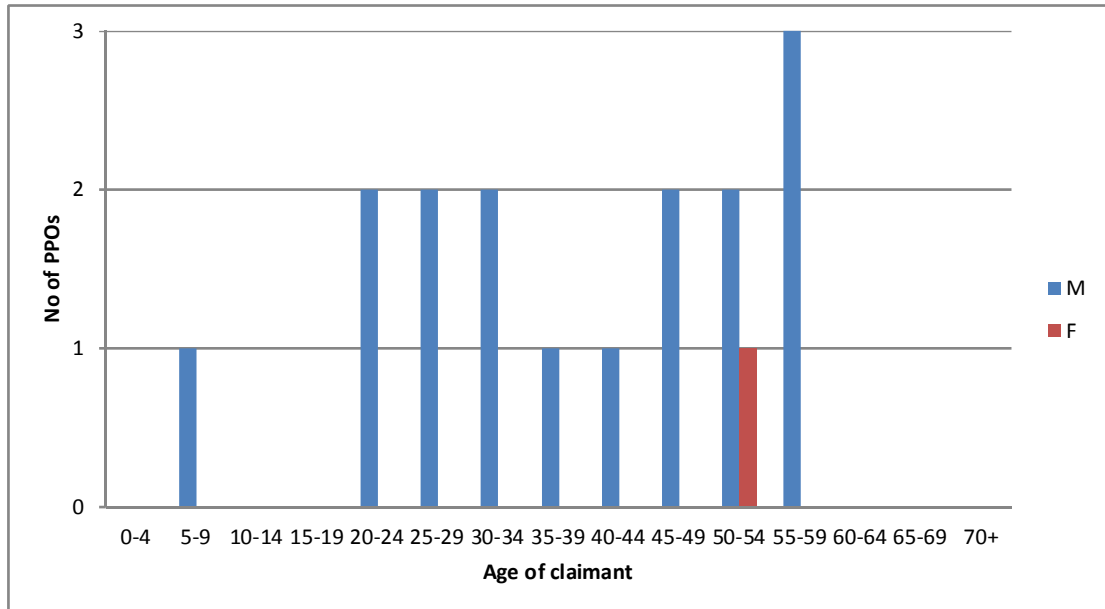
Age of claimant at accident date – Public Liability
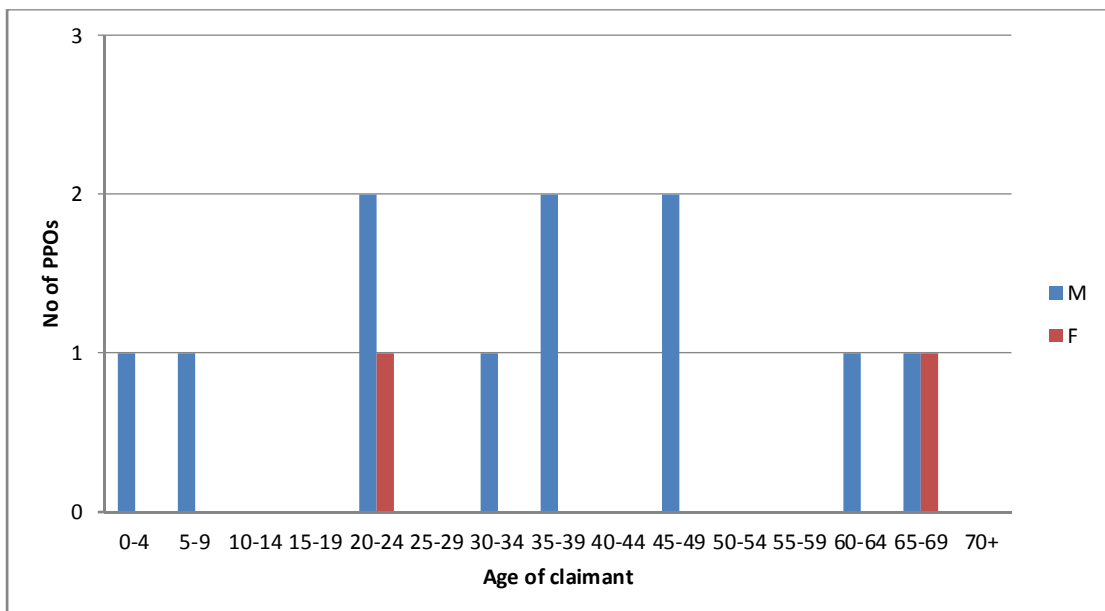
7.9. The following graph shows that claimants arising under liability covers tend to be significantly older than claimants arising under motor covers.
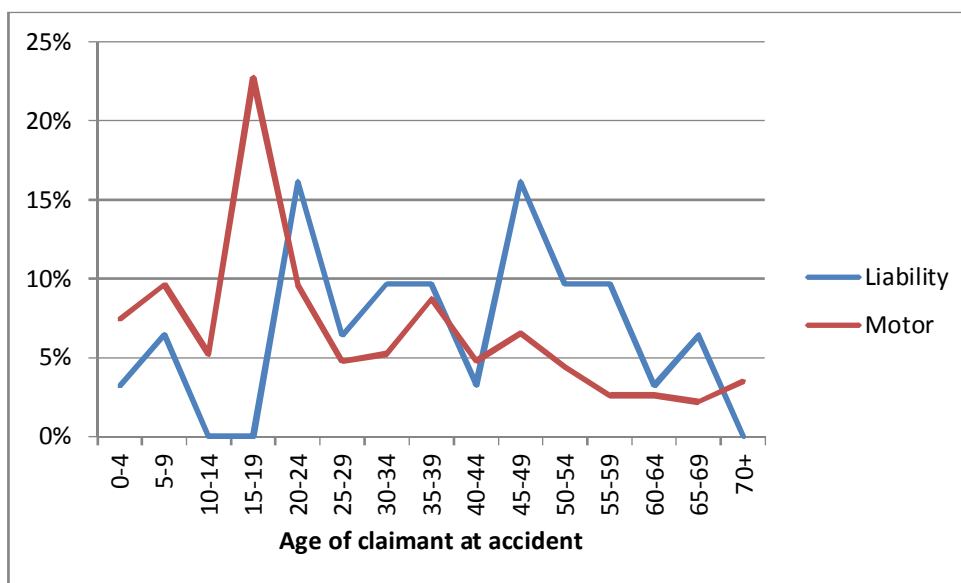
Distribution of future life expectancy

7.10. Following on from the claimant age profile, the future life expectancy of claimants from liability PPOs is significantly shorter than that of motor PPOs.
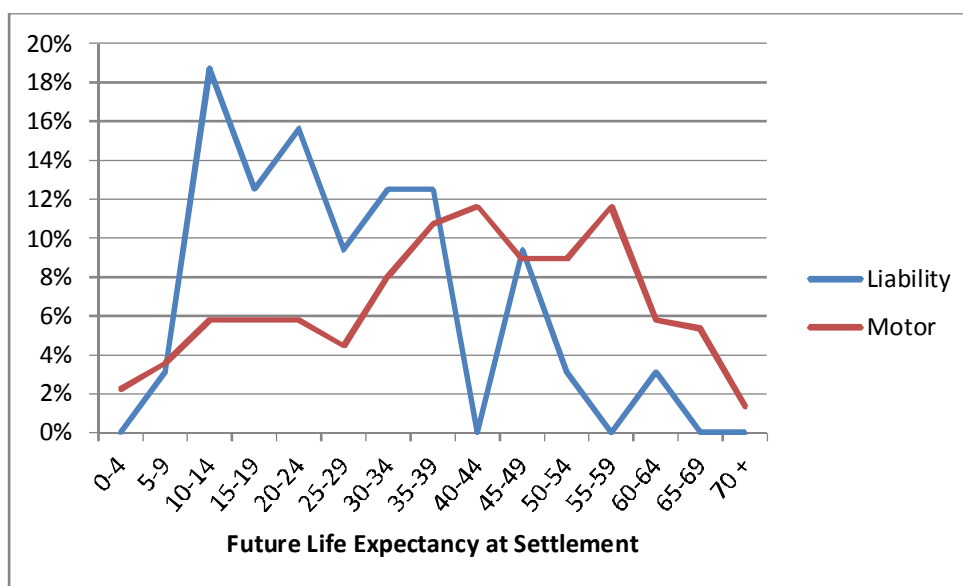
Distribution of delay to settlement

7.11. There is some suggestion that liability PPOs may settle quicker than motor PPOs, though due to the small sample size it is not possible to state this with confidence. There are fewer minors under liability cover and we know that minors can have longer delays to settlement as decisions are often delayed until the claimant has reached the age of maturity, so this would mean we would expect to see fewer claims in the tail of the distribution for liability covers. It is possible that the condition of older claimants, particularly with spinal injuries, stabilises faster than is the case for younger claimants, and as we know liability covers have proportionally more older claimants than motor covers, this could lead to an average shorter

settlement delay under liability covers. In addition we saw in section 4.6 that spinal injuries may settle quicker than brain injuries and there are proportionately more spinal injuries under liability rather than motor cover.

Distribution of initial PPO payments

7.12. The distribution of PPO amounts appear to be similar between liability and motor PPOs, though there is a suggestion that Liability PPOs may have more in the £50,000 to £75,000 range than the <£50,000 range when compared to motor PPOs (though due to the small sample size this is not conclusive).
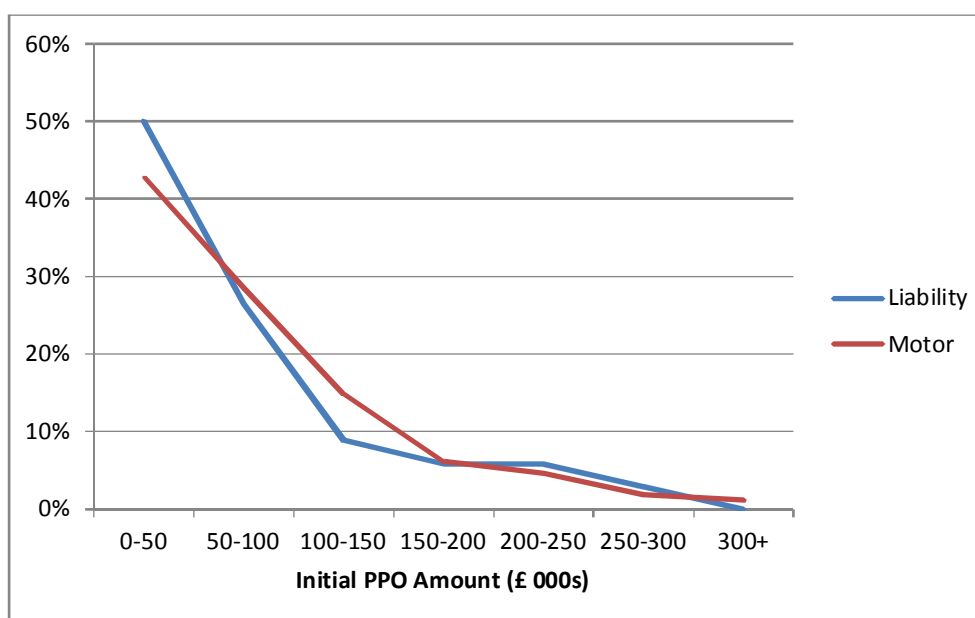
Distribution of lump sums

7.13. Liability PPOs appear to have a lower lump sum associated with them than motor PPOs do. This is likely to be due, at least in part, to the higher average age of claimants under liability covers, thus meaning wage compensation, for example, would be paid for fewer years. In

addition large claims under Employer's Liability covers tend to arise from manual and semi-skilled workers who may have lower average wages.
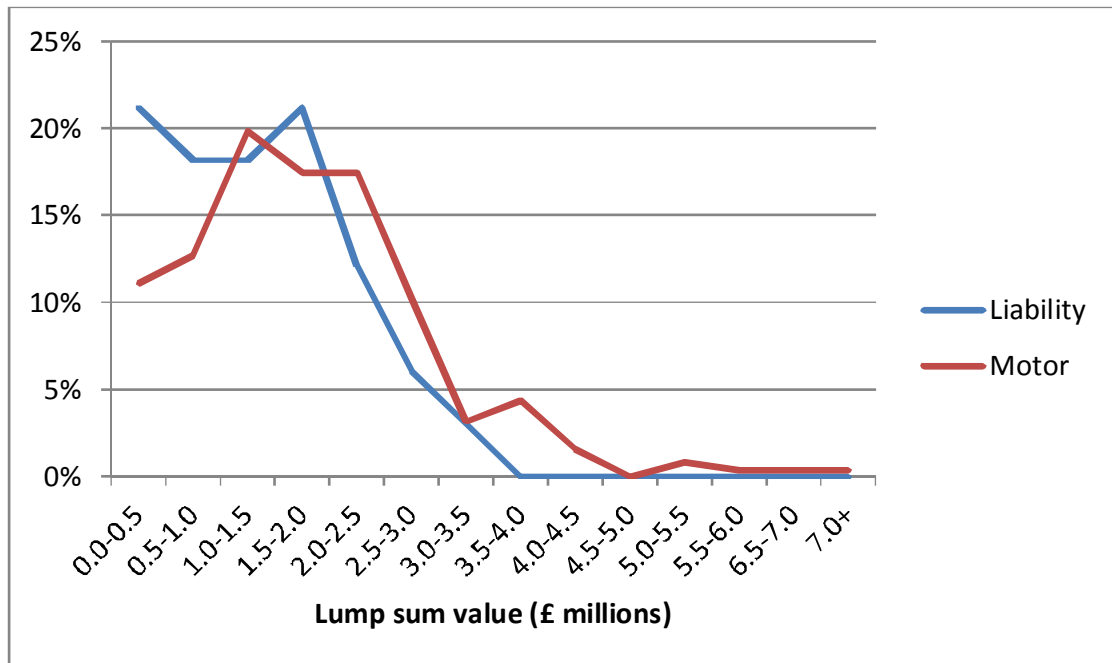
8.   Motor Insurers' Bureau (MIB) experience

8.1.   We have been very fortunate in that the MIB have agreed to provide us with data again this year. The MIB was established in 1946 to compensate the victims of negligent uninsured and untraced motorists. Every Insurer which underwrites compulsory motor insurance is obliged to be a member of MIB and to contribute to its funding.

8.2.   With the exception of the mortality analysis, we have chosen to show the results of the MIB experience separately because, as the MIB covers uninsured or untraced motorists, we thought their profile of claims may be different from the rest of the motor insurance industry. Whilst there are some significant differences, most notably in the propensity rate and the size of lump sums, the following results show that in many cases the profile of PPOs for the MIB is actually quite similar to that of the rest of the industry.

8.3.   Some of the fields requested, such as nature of injury and driver details, were not readily available and so were not provided for this review.

Number of PPOs by settlement quarter
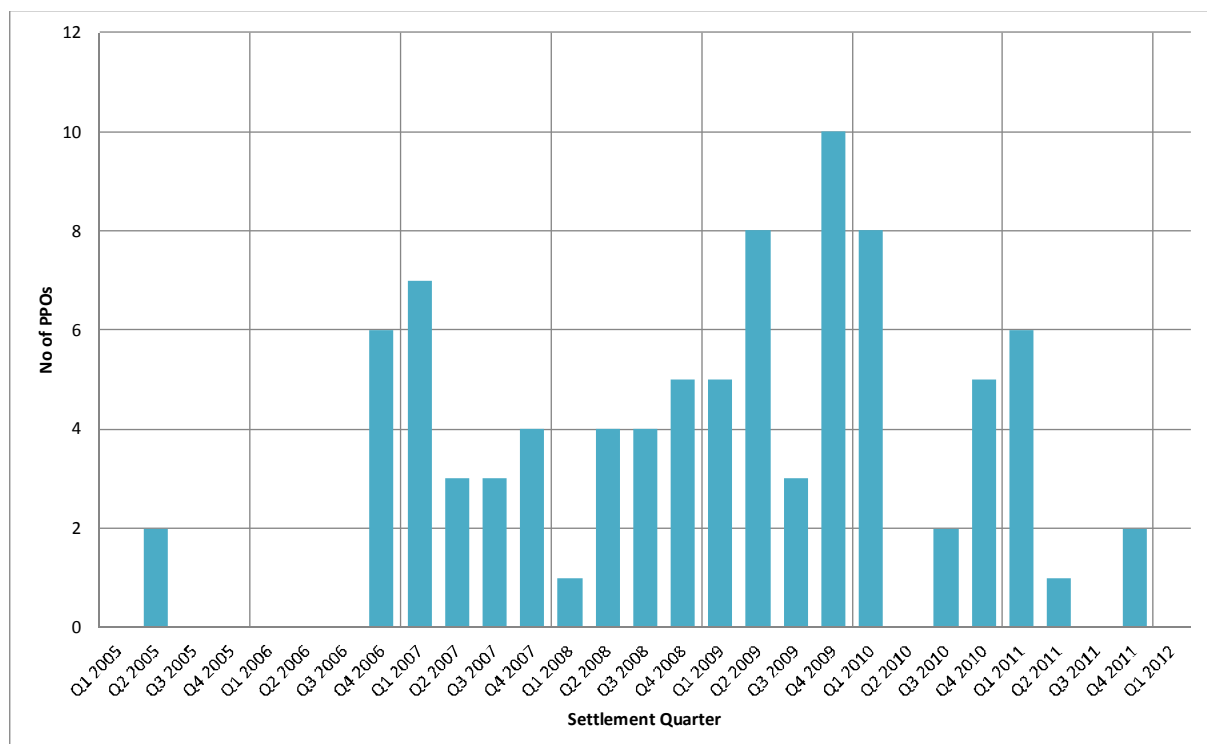
8.4. In last year's review settlement date was not provided and we used an estimate of a field we understood to be first PPO payment as a proxy and adjusted for an assumed delay between settlement and first date of payment. The following graph again shows the number of PPOs by settlement quarter but this time with the industry numbers overlaid. This year we did have a field showing settlement date.

Number of PPOs by settlement year
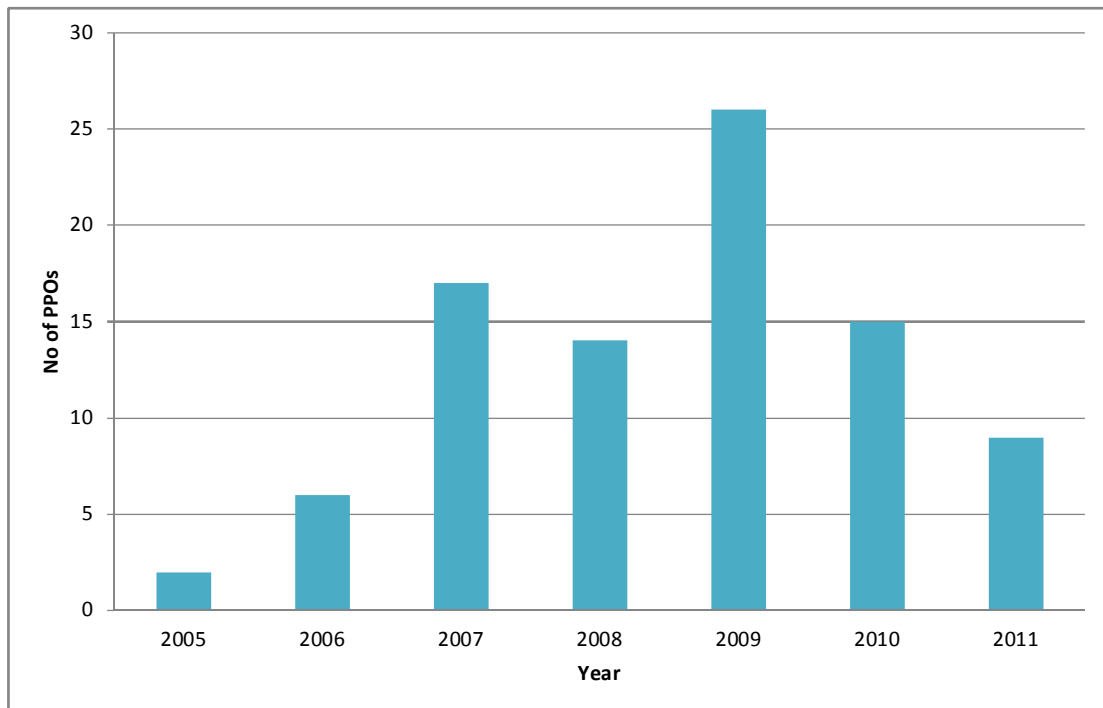
Number of PPOs settled compared to motor industry
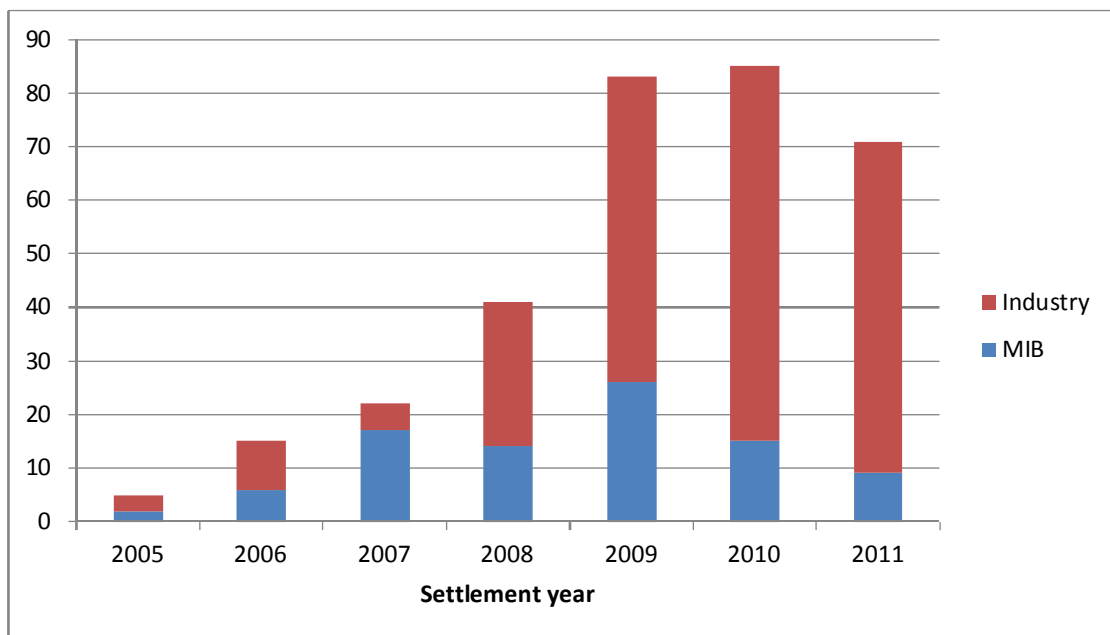
8.5. The graph above gives the impression that the overall number of PPOs in the UK is falling – however it can be seen that this is purely a feature of the MIB experience. It is also clear that

the MIB started settling a sizeable number of PPOs in late 2006, a couple of years before the rest of the market.

Propensity

8.6.   The following graph shows the propensity of PPOs as measured by the number of PPOs divided by the number of large claims (>£1 million) settled in a year. The propensity for PPOs was significantly higher for the MIB than for the motor insurance industry, however this graph suggests that this has altered dramatically in the last two years so that MIB propensity is now more similar to the industry average.

PPO large claim (>£1 million) propensity
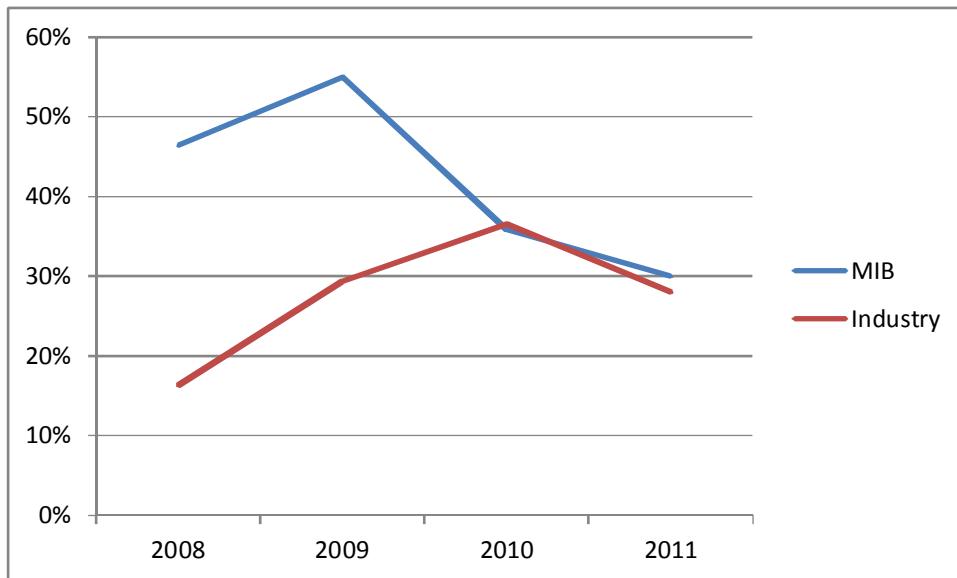
8.7.   This graph is different from that shown in last year's survey due to the change in the settlement date field as described in section 8.4.

8.8.   We are not sure precisely what has caused this apparent very large reduction in the propensity of PPOs for the MIB. One explanation may be related to the fact that the MIB has been settling claims as PPOs since 2006 – at the start of this period there would have been an element of catch up as a backlog of claims from all accident years would have suddenly started to be settled as PPOs, perhaps over-inflating the natural propensity rate. Over time this effect would have lessened. However, if there were such an effect happening it is unlikely to have been so marked as suggested by the results shown in the graph above.

8.9.   If we compare the total number of large claims by settlement year between the MIB and the motor industry we see that if anything the MIB has been settling proportionately more over the period (see the following graph). This suggests that an explanation for the MIB settling fewer PPOs is unlikely to be that the number of uninsured drivers has reduced, as this is not supported by the overall number of large claims the MIB has settled.

Number of non-PPO settled large claims >£1 million
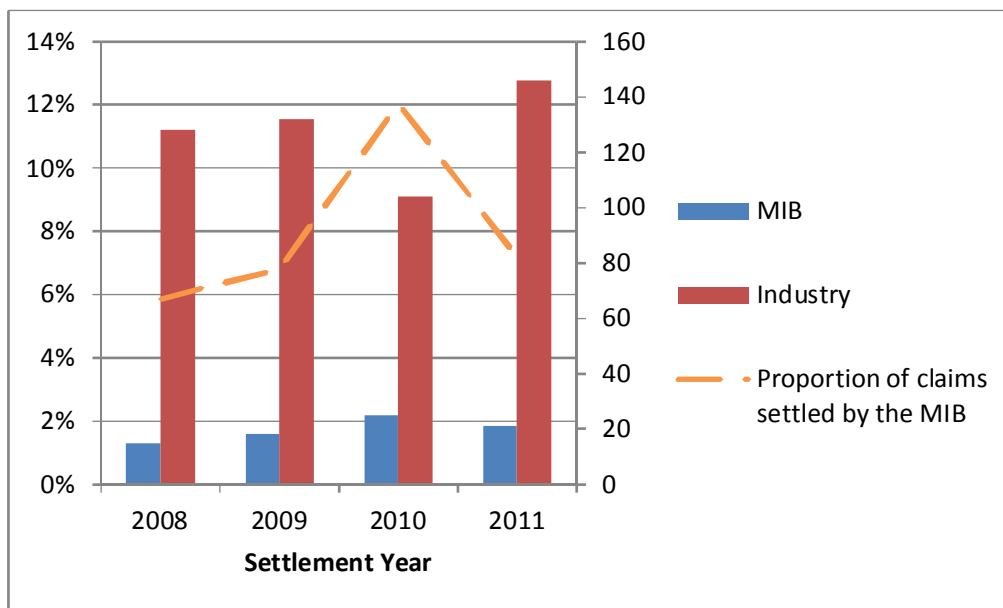
ASHE

8.10. Akin to the industry experience all PPOs prior to Thompstone v Tameside were settled using RPI as the index, whereas since then almost all have been settled using ASHE.

Age of claimant at the time of the accident
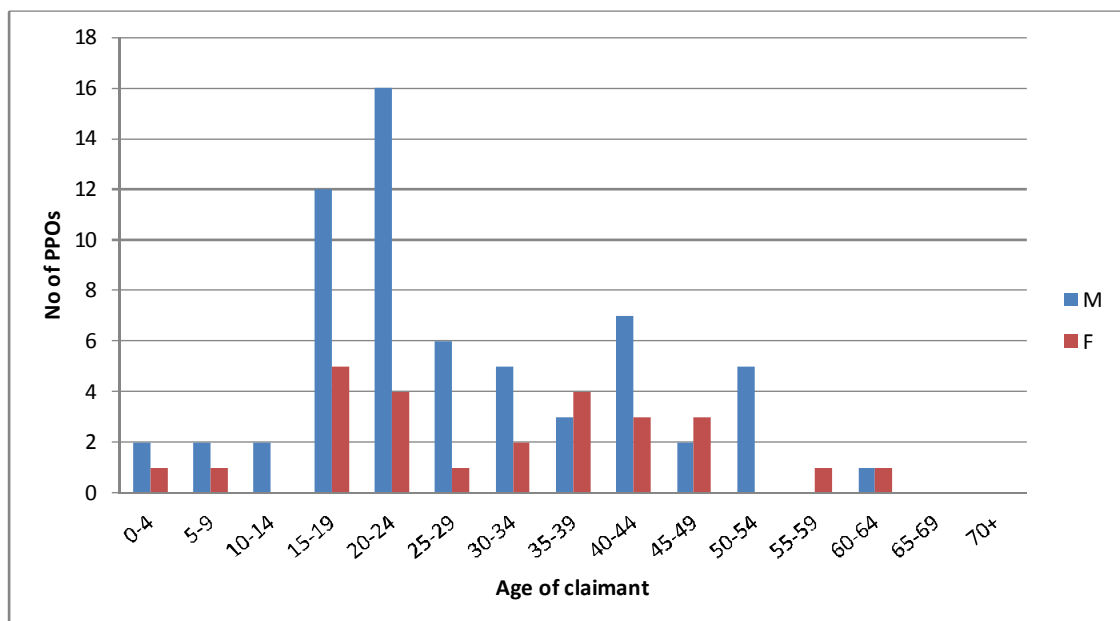
8.11. This is similar to the age profile of claimants seen in the market with a higher propensity of young drivers. However, there appear to be a lower proportion of claimants who are minors in the MIB figures.
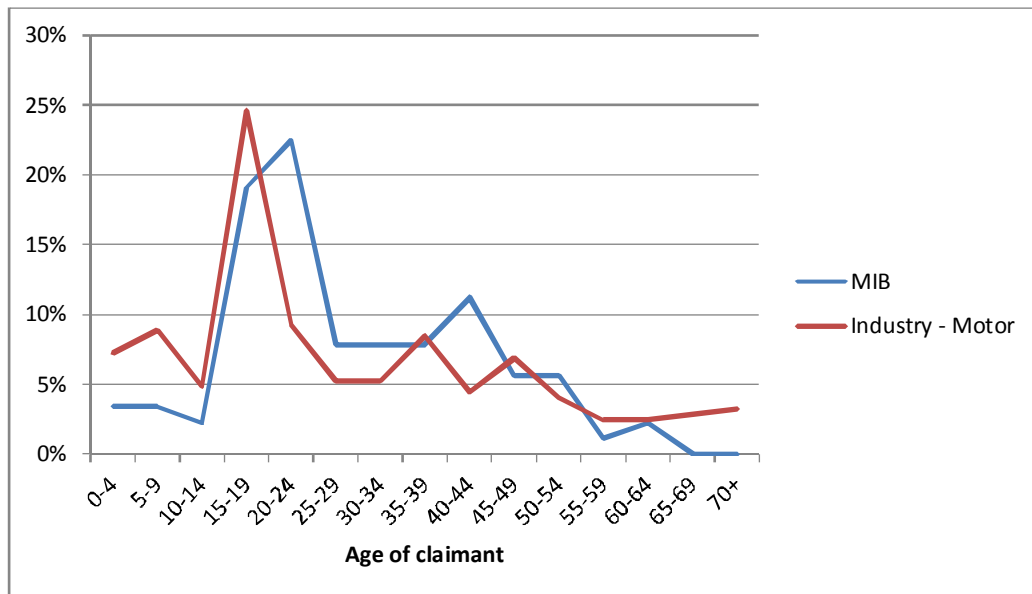
Distribution of delay to settlement
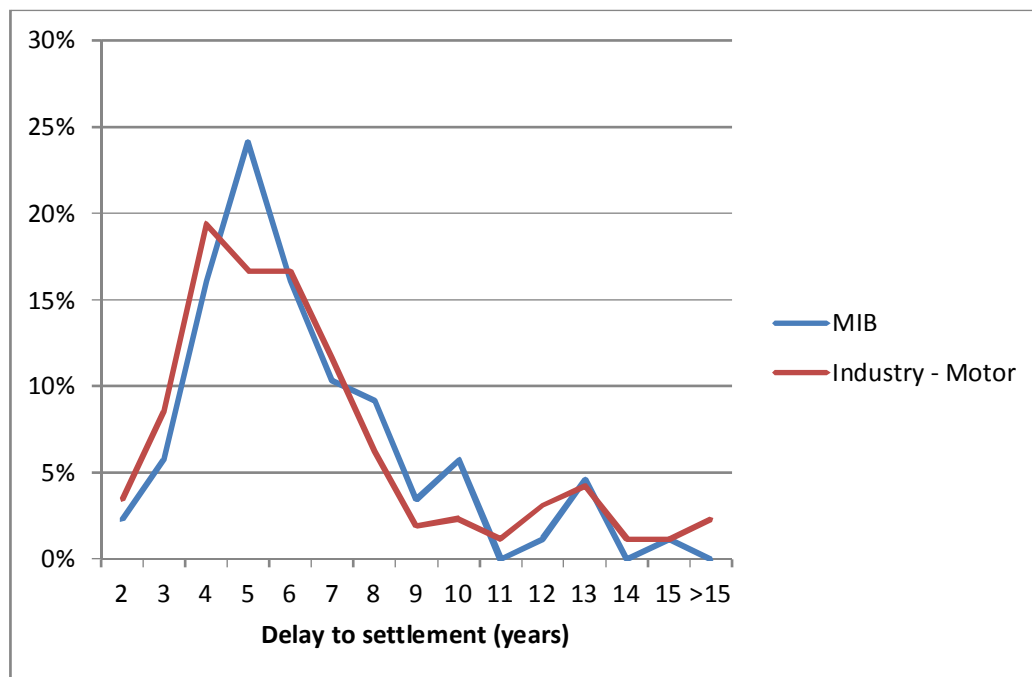
Age of claimant at the time of settlement
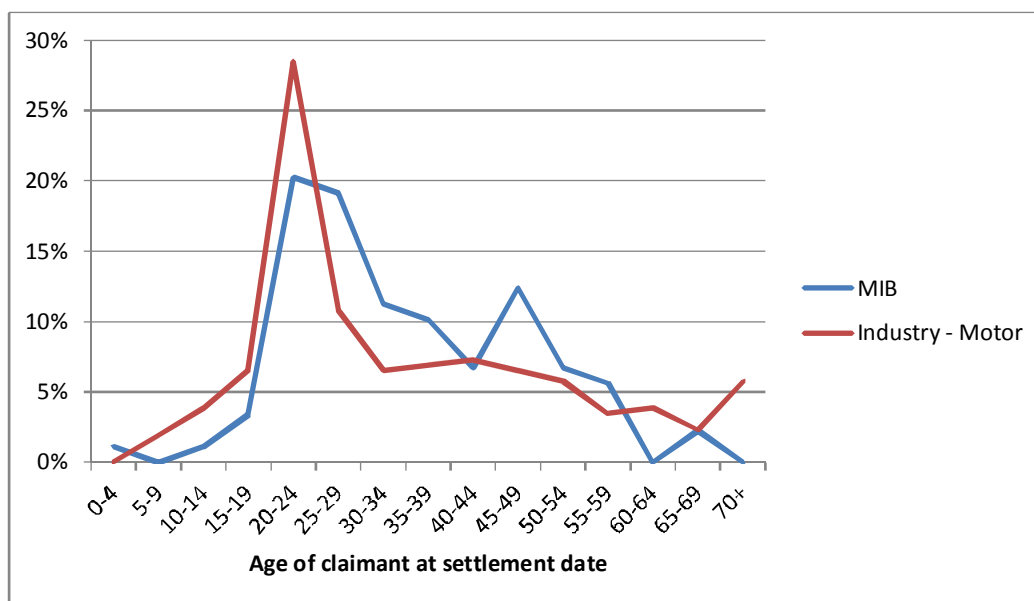
8.12.   Whereas the industry has a spike of settlements in the 20-24 age band, this is not so apparent in the MIB data. This is possibly as a consequence of the lower proportion of claimants who are minors in the MIB data.

Distribution of initial PPO payments
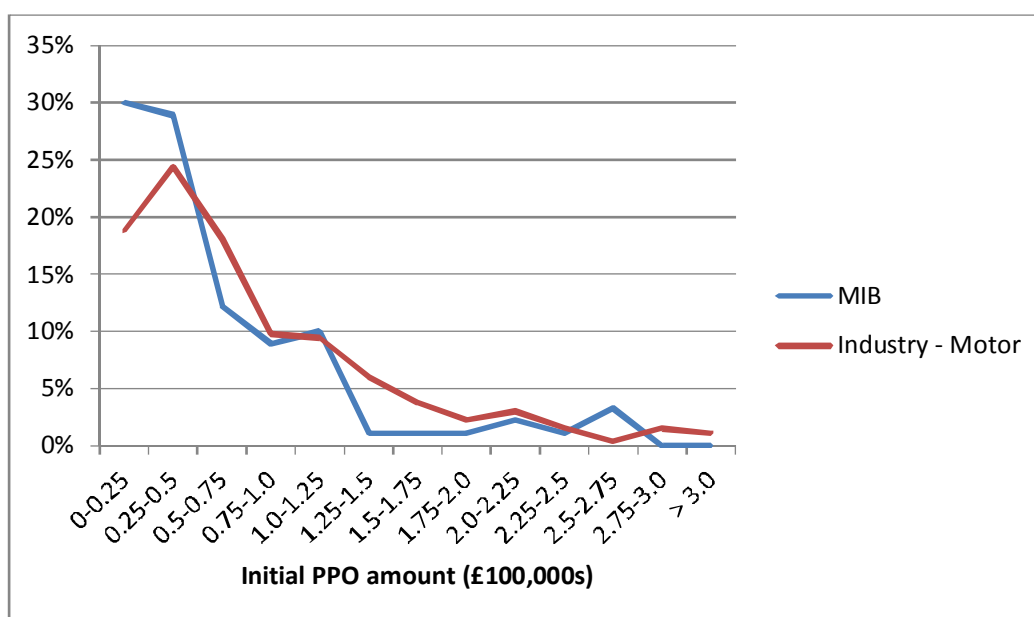
8.13.   The distribution of the PPO regular payment amount is broadly similar between the MIB and the motor insurance industry. However, it does appear that the MIB has a larger proportion of the smallest PPO payments that are less than £25,000.

Distribution of lump sums
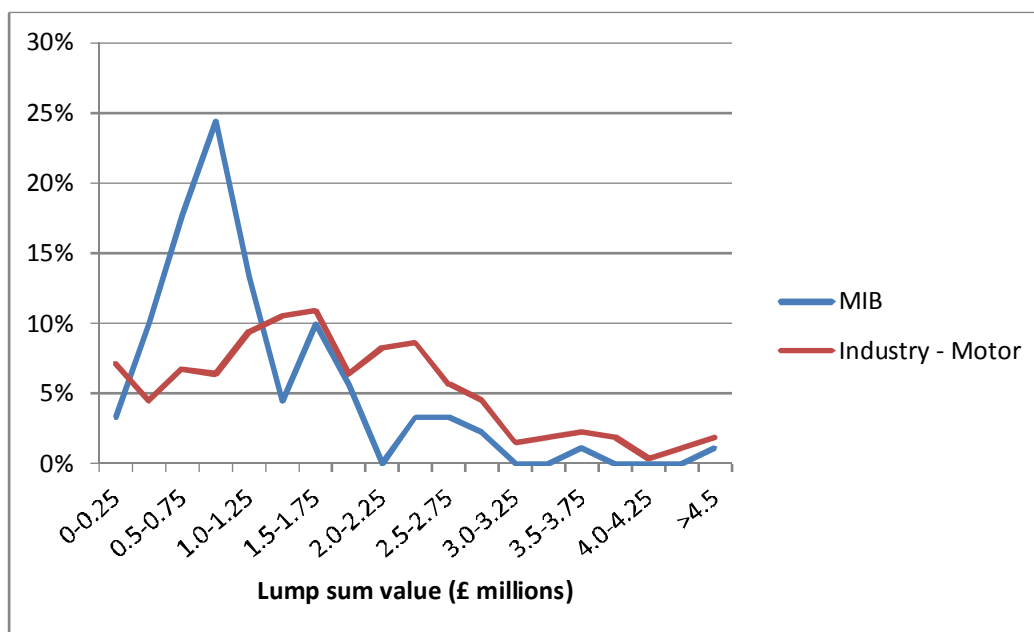
8.14.   The MIB lump sums awarded with PPOs appear to be significantly smaller than those in the wider industry.

Life expectancy

8.15.   Comparison of the distributions of the percentage reduction in life expectancy suggests that MIB life expectancies are in line with the average for the industry. See also the analysis in section 9.15.
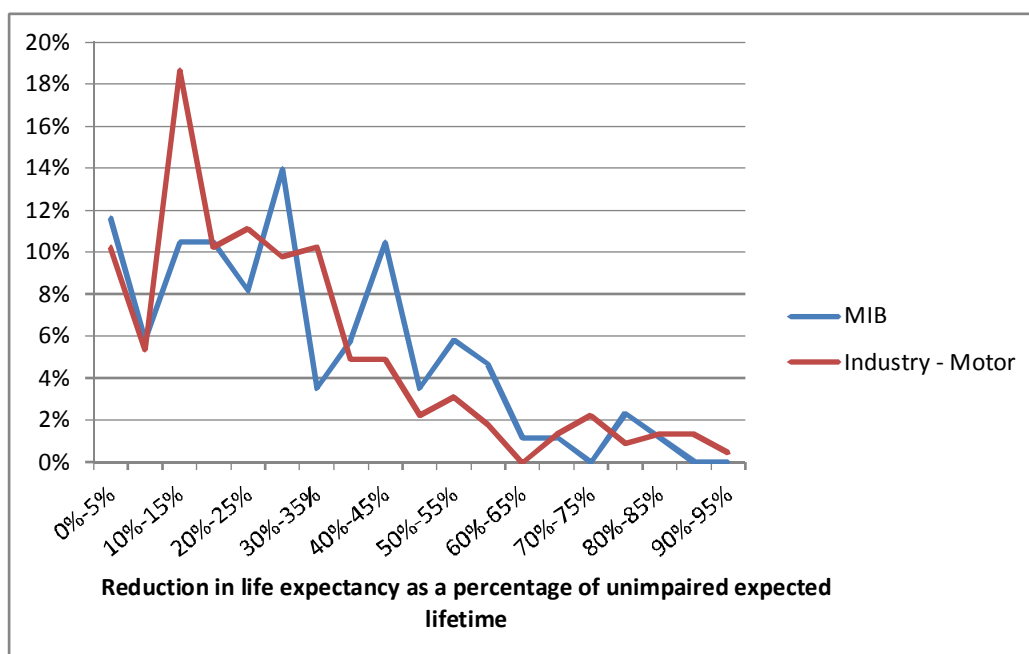
Variation orders

8.16.   The MIB appears to have significantly fewer variation orders than the rest of the motor industry with only 2 recorded (compared to 28 of industry claims).

Payment frequency

8.17. Annual payments are more common for MIB PPOs: only 5 of the 90 MIB PPOs (or 6%) don't have annual payments compared with 27% of industry claims.

9.   Mortality

Mortality analysis

Analysis of number of deaths in the survey

9.1.   The survey shows that there have been 7 male and 6 female PPO claimant deaths in the period from 2006 to 2011. These figures include 4 MIB deaths. Since undertaking this work we have learned that there has been an additional MIB death which was not indicated in the original data.

Males
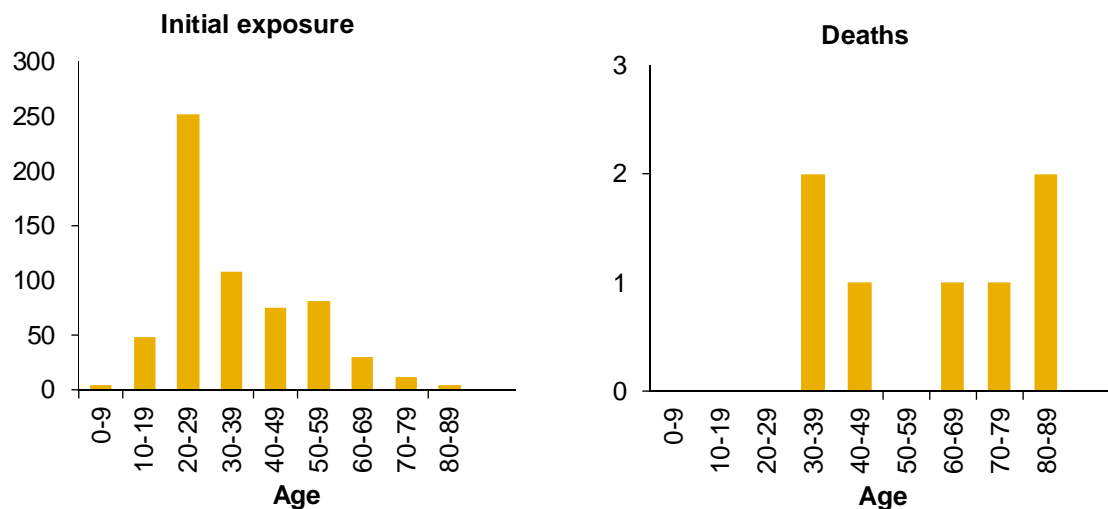
Females
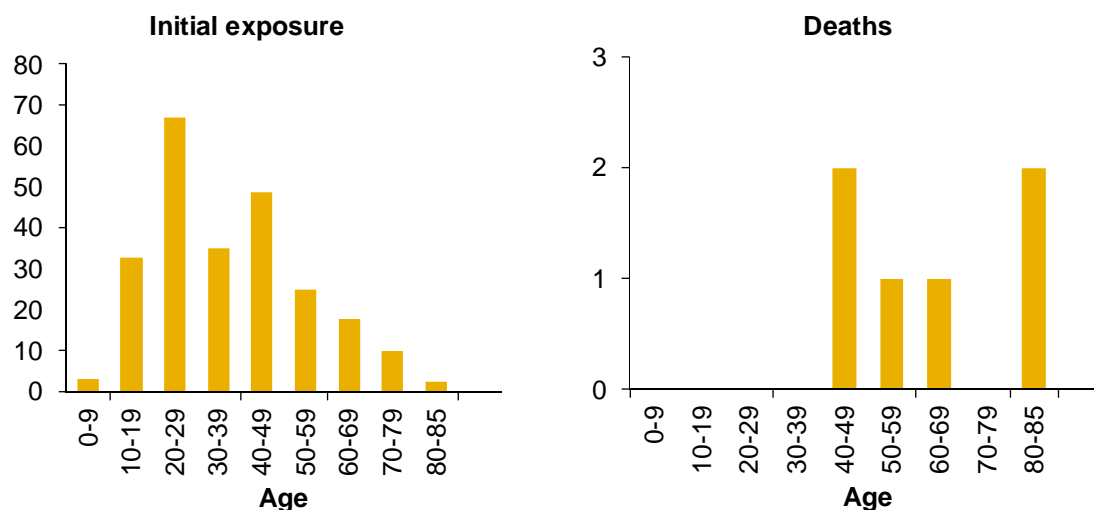
9.2.   Unfortunately life expectancy at the time of settlement was not recorded for the majority of these deaths, for the five cases where we do have this information the expected life expectancies at the time of settlement were 8, 12, 25, 41 and 50 years.

9.3.   We undertook an analysis that involved calculating the adjustment that would be required to the standard Ogden tables for individuals, of the ages represented in the data, to produce the

number of deaths actually seen over the period. We have assumed that the ratio of actual to expected death rates fits to a Poisson distribution, parameterised based on the actual exposed to risk and the mortality rates from the Ogden tables. By using this method we were able to produce confidence levels around the median result

9.4. The analysis was subject to a number of significant simplifications and assumptions, for example:

9.5. It was assumed that the cohort was homogeneous in terms of life expectancy. We know that is very unlikely to be the case; some claimants are likely to have a very different prognosis to others as a result of their particular injuries (and lifestyles). For example, those with serious brain injury will be likely to have lower life expectancies, often significantly so, than those with moderate brain injury.

9.6. It was assumed that it was appropriate to apply a single multiplier to the qxs. In fact we do not know the shape of the mortality curve for these impaired lives, indeed the shape may well be different for different injury types. One particular impact of this may be that it is not appropriate to apply the same multiplier as derived from observing the data at this relatively early stage of the experience to future mortality rates. The reason being that, for these kinds of injuries, mortality (relative to unimpaired mortality rates) is often higher in the early years after the accident[1].

9.7. In addition the analysis was conducted on a very small sample of claims over a short time period (2006 to 2011), and as such cannot be considered to be particularly credible hence there is considerable uncertainty surrounding the results – one additional or one fewer fatality would have a large impact on these figures.

9.8. The table below shows the output of the analysis. The median result suggests that the mortality rate for male PPO claimants is three times that of the general population and eight times for females. The model has output confidence intervals around these figures, however it should be noted that we would expect the confidence intervals to be even greater than that shown below due to elements of model error as described in section 9.4 above. However the results do indicate that PPO claimants are likely to have a higher mortality rate than the general population as defined by Ogden table mortality rates.

Percentile	Males	Females
5th	575%	1550%
25th	398%	1043%
50th	309%	792%
75th	239%	601%
90th	190%	469%
95th	166%	405%

9.9. Normally pension funds would have much greater sample sizes and as a consequence have significantly lower confidence intervals.

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[1] For more information on the effects of the shape of the mortality curve in terms of life impairment please refer to Section 7 of the 2010 GIRO PPO paper (see http://www.actuaries.org.uk/research-and-resources/documents/pl4-periodic-payment-orders-paper).

9.10. *We would encourage readers to place a limited degree of reliance on these estimates and to reference other indicators and data sources to support any assumptions they are using for their own purposes.* To reiterate; we would advise readers to treat these results with caution due to:

- the small sample size; and

- the simplifying assumptions which have been made in the model (homogeneity of underlying mortality in the cohort and the appropriateness of a single multiplier).

9.11. These points are explained more fully above.

Comparison to mortality rates assumed by insurers in the survey

9.12. By assuming the results of the mortality curve for impaired lives is the same as that in the Ogden tables, we have converted the impaired life expectancies provided by insurers in the survey to be expressed as a mortality multiplier. The median assumption in the market for males is that the impaired mortality rate is 3.3 times the unimpaired rate, for females it is 2.6 times.

Percentile	Males	Females
5th	2176%	5776%
25th	624%	853%
50th	331%	258%
75th	199%	183%
90th	130%	107%
95th	105%	92%

9.13. The following shows the distribution of these multipliers, it is interesting to note how skewed this distribution is in terms of how long the tail is; for example 5% of male PPO claimants and 10% of female claimants have assumed mortality rates of more than 22 times the unimpaired rate. This serves to further illustrate the point that the PPO claimants are not a homogeneous group in terms of mortality.
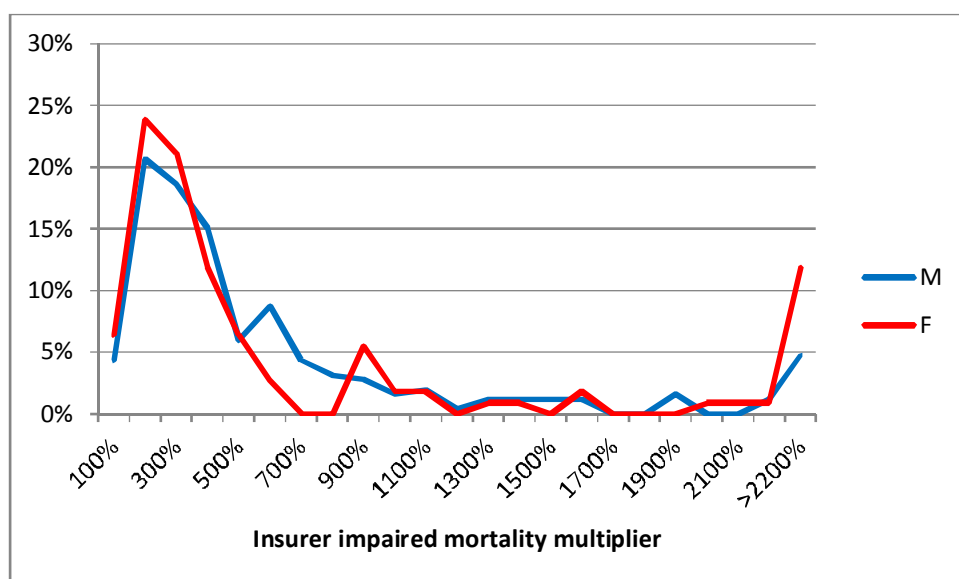
9.14. The following table demonstrates how the mortality rate multipliers would translate to the percentage reduction in life expectancy measure for sample male lives aged 20, 40 and 60.

	Age		
Multiplier	20	40	60
200%	13%	17%	25%
300%	20%	27%	39%
400%	26%	34%	48%
500%	30%	40%	54%
750%	38%	49%	65%
1000%	43%	55%	71%
1500%	51%	63%	79%
2000%	56%	69%	83%

9.15. The results from the mortality analysis can also be expressed in terms of future life expectancy. The purple dots on the graph below show the Ogden 7 unimpaired life expectancy for a 32 year old male and female. We then show the 5th to 25th, 25th to 50th, 50th to 75th and 75th to 95th percentiles of a) the experience analysis (i.e. based on analysis of the number of deaths in the survey) in yellow, and b) insurer assumptions of life expectancy in red.
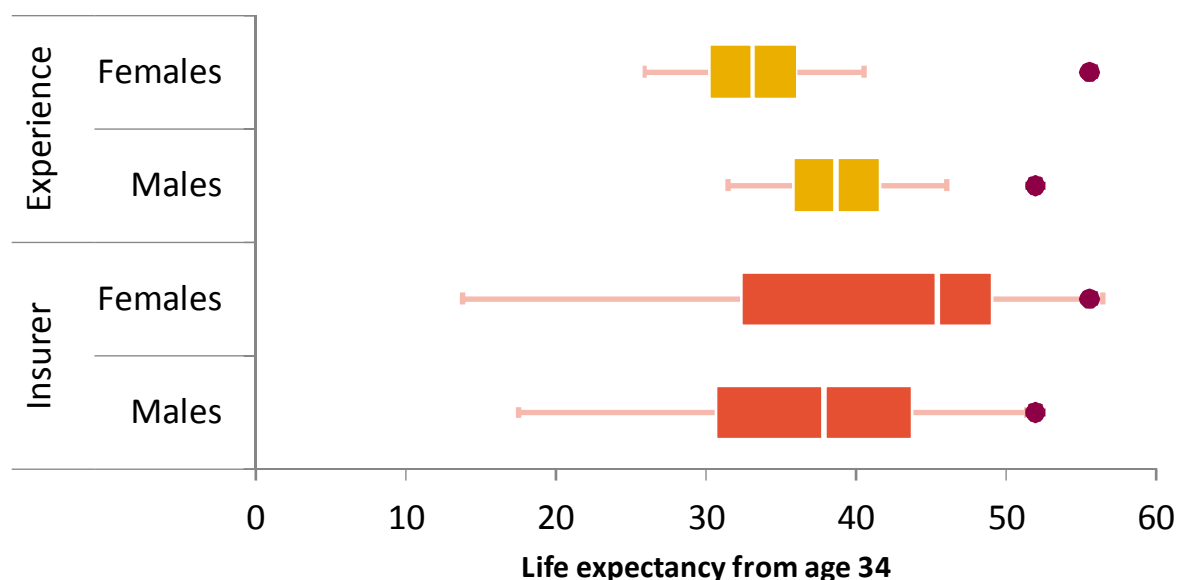
9.16. This graph shows the much larger ranges of values around the insurer assumptions of life expectancy in the market compared to the analysis. This is to be expected due to the lack of homogeneity in the underlying mortality of PPO claimants and also the inconsistent approaches taken to estimating the mortality on a case by case basis as discussed in sections 9.15 and 9.16 below. It also highlights the large discrepancy between the median mortality analysis mortality rate multiplier for females of 7.9 as compared to median insurer estimates of 2.6, however, due to lack of credibility as discussed above, these estimates are in themselves very uncertain.

9.17. It is also worth reiterating that our analysis assumes it is appropriate to apply a single multiplier to the q_xs. However it is likely that for brain and spinal injuries mortality will be higher in the early years after the injury has occurred, and so given this analysis, in most cases, only covers an early stage of development since the accidents occurred, these results may be overstated. However, there is an average delay before settlement for these claims of six years, which would mitigate this effect.

Difference in assumed life expectancy by Insurer

9.18. It appears that estimation of life expectancy may not be consistent from insurer to insurer. The following graph shows the range in the different cumulative distribution of the percentage reduction in life expectancy plotted for each insurer (the smallest insurers have been excluded). It can be seen that there are significant differences in the life expectancy distributions from insurer to insurer; with the MIB assuming the biggest reductions in life expectancy. At least some of this may be explained by different mixes of PPO claim types, but it appears that different approaches to the estimation of life expectancy may be taken by different insurers.

9.19. Percentage reduction in life expectancy is defined as reduction in life expectancy as at the time of settlement as a proportion of unimpaired life expectancy as at the time of settlement.
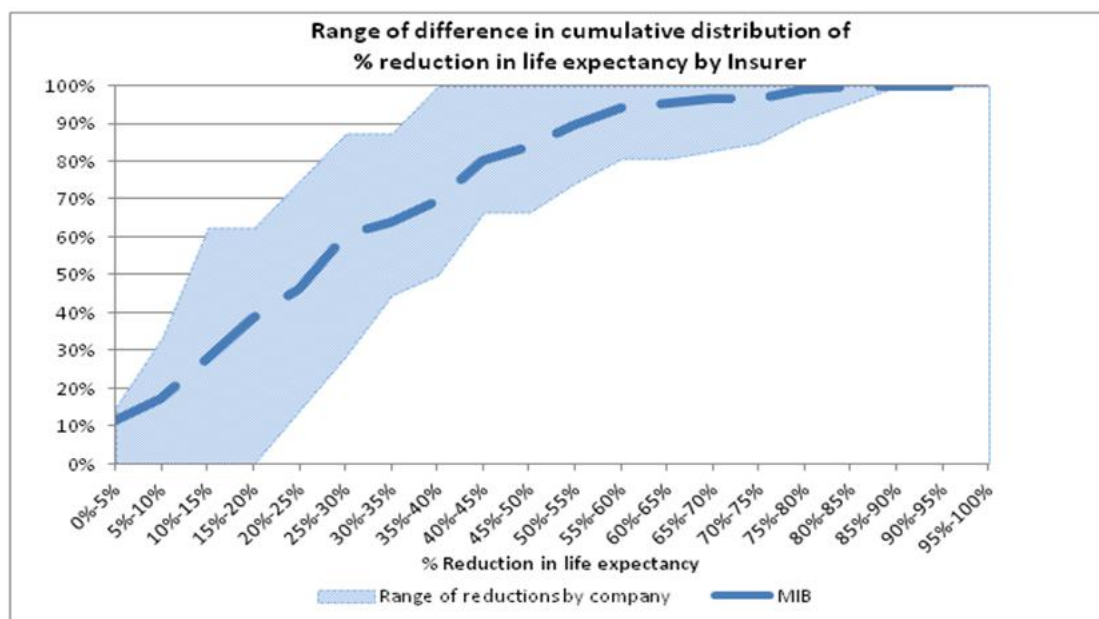
Mortality basis

9.20. One of the fields in the survey asked what the basis used to determine the life expectancy was. Seven companies did not fill this field in. Of the companies that provided an answer, the most common response was "mid range expert opinion". Other mortality bases were cited as

– "one expert opinion"

– "agreed life expectancy"

– "take the 2 life expectancy figures from our expert and the claimant's expert, using the corresponding multipliers (using Ogden Tables 1, 2 or 28 as applicable). Where the life expectancy has a range, apply the mean of the multipliers."

– "Ogden 7 less 'x' years per medical evidence"

– "ELT 2008-2010".

10. Reserves Held

10.1. This year we estimated reserve values for each of the motor PPOs in the survey on a cashflow basis. This meant the same methodology was used for all claims, and we were able to recalculate these estimates using different discount rate assumptions. However the parameters used, such as life expectancy, were taken from individual company estimates.

10.2. These estimates will not be perfect in that some elements affecting the claim size, such as multiple claimants and variation orders, will not have been captured. However details of stepped payments have been incorporated.

10.3. Not all PPOs in the survey had complete data, for example where settlement date or life expectancy had not been provided. These PPOs were excluded from the analysis, meaning the total PPO figures will be slightly understated. Around 7% of the PPOs, by number, were excluded for this reason.

Measure of PPOs as a proportion of UK motor reserves

10.4. We then took our estimates of PPO reserves as at 31 December 2011 and compared them to the reserves held as indicated by FSA returns. We calculated two measures:

a. $$\frac{Reserves\ of\ PPOs\ in\ payment}{Outstanding\ reserves\ from\ FSA\ returns}$$

b. $$\frac{Reserves\ of\ PPOs\ in\ payment\ plus\ PPO\ IBNR\ estimate}{Outstanding\ plus\ IBNR\ reserves\ from\ FSA\ returns}$$

10.5. To estimate the PPO IBNR component we used the assumption that the ultimate number of PPOs (i.e. the number including IBNR PPOs) is around between 2 and 4 times the number of PPOs actually settled. This benchmark was presented at the reserving seminar by the Third Party (TPWP) and PPO Working Parties in November 2011, based on a relatively crude analysis of Private Car Comprehensive claims frequencies for claims above £1 million, from TPWP research, and large claim propensity rates from the PPO WP survey.

10.6. These ratios only used included results for the companies that both supplied data to the PPO survey and were in the FSA returns.

10.7. Given the approximations and assumptions inherent in the analysis, the following results are intended to only give a broad indication of the current position, and should be treated with caution.

10.8.   The following graph shows:

- Measure (a) as defined above, as the dashed line

- Measure (b) shown as a bar indicating a range of results.

The results are repeated for different real discount rates used to calculate the PPO reserve estimates (as shown on the x axis).
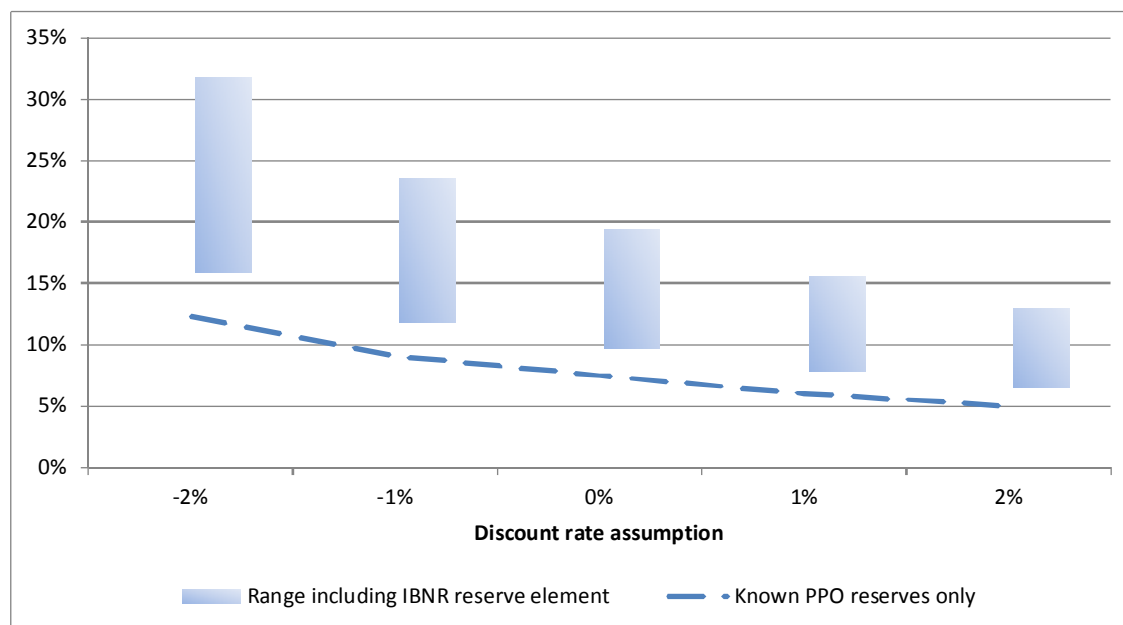
10.9.   The results suggest that PPOs already in payment may currently make up somewhere between around 5% and 12% of UK motor case estimates, and when IBNR PPOs are taken into account (i.e. claims that have already occurred that will become PPOs in the future) this figure could rise to somewhere around 7% to 30% of UK motor reserves as at the end of 2011. The higher value of the second measure may indicate that the market is currently underestimating IBNR PPO claims (if the TPWP and PPO WP benchmark assumption is to be believed).

Distribution of reserve size

10.10. The following graph shows the distribution of our estimate of individual PPO claim reserve size for different real discount rate assumptions.
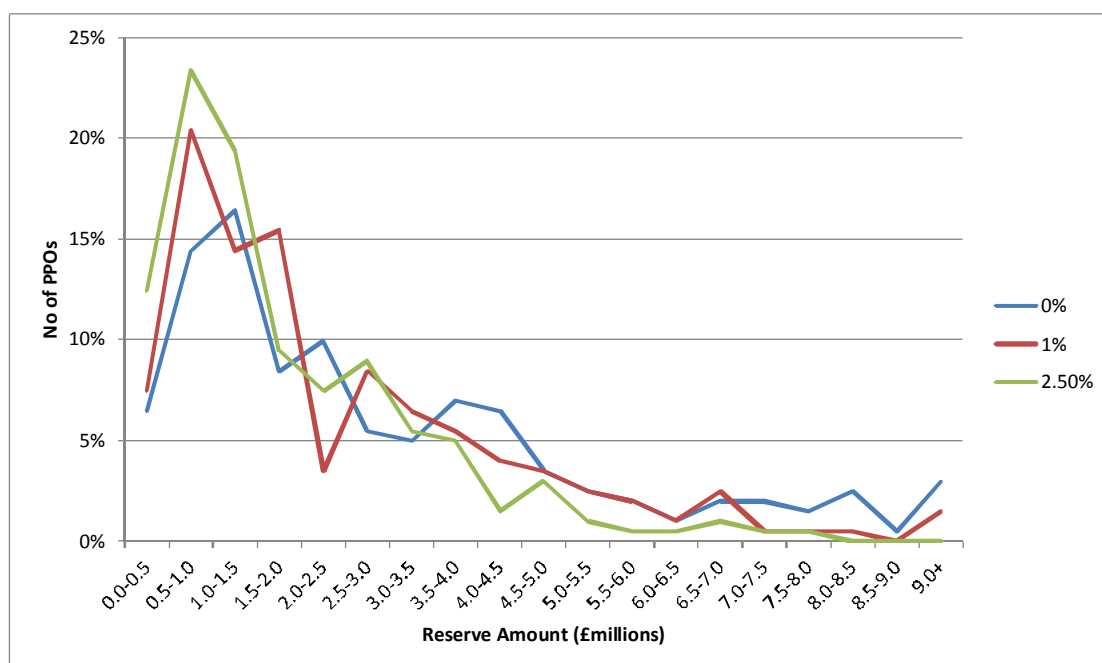
10.11. What is not immediately obvious from this graph is the impact that changing the real discount rate assumption has on the estimate of the PPOs reserves. When we compare our estimate of the reserves for PPOs in payment for the PPOs in the survey, we see that choosing a real discount rate of 0% increases the PPO reserve estimate by 60% over using a real discount rate of 2.5% (which is consistent with the rate used in Ogden lump sum values) and an assumed real discount rate of -2% would increase the reserve estimate by 2.6 times.

Assumed real discount rate	Effect of PPO reserve estimate as compared to the same estimate on Ogden 2.5% basis
-2.0%	2.7
-1.0%	2.0
0.0%	1.6
1.0%	1.3
2.0%	1.1

Effect of the real discount rate on size of PPO reserve estimate - shown according to total reserve size
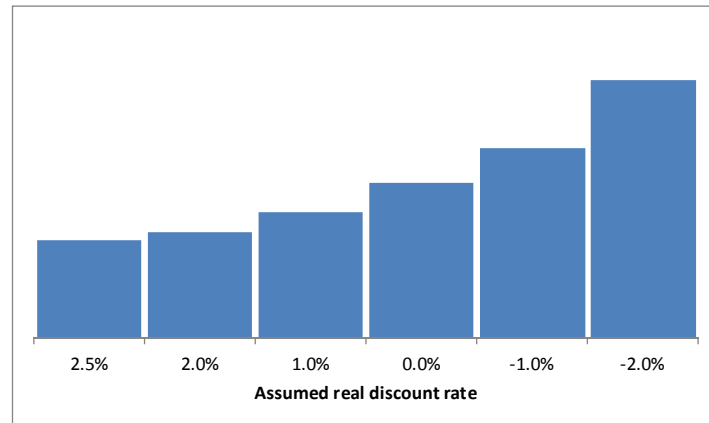
Comparison to insurer Ogden reserves

0% real discount rate assumption in survey reserve estimate
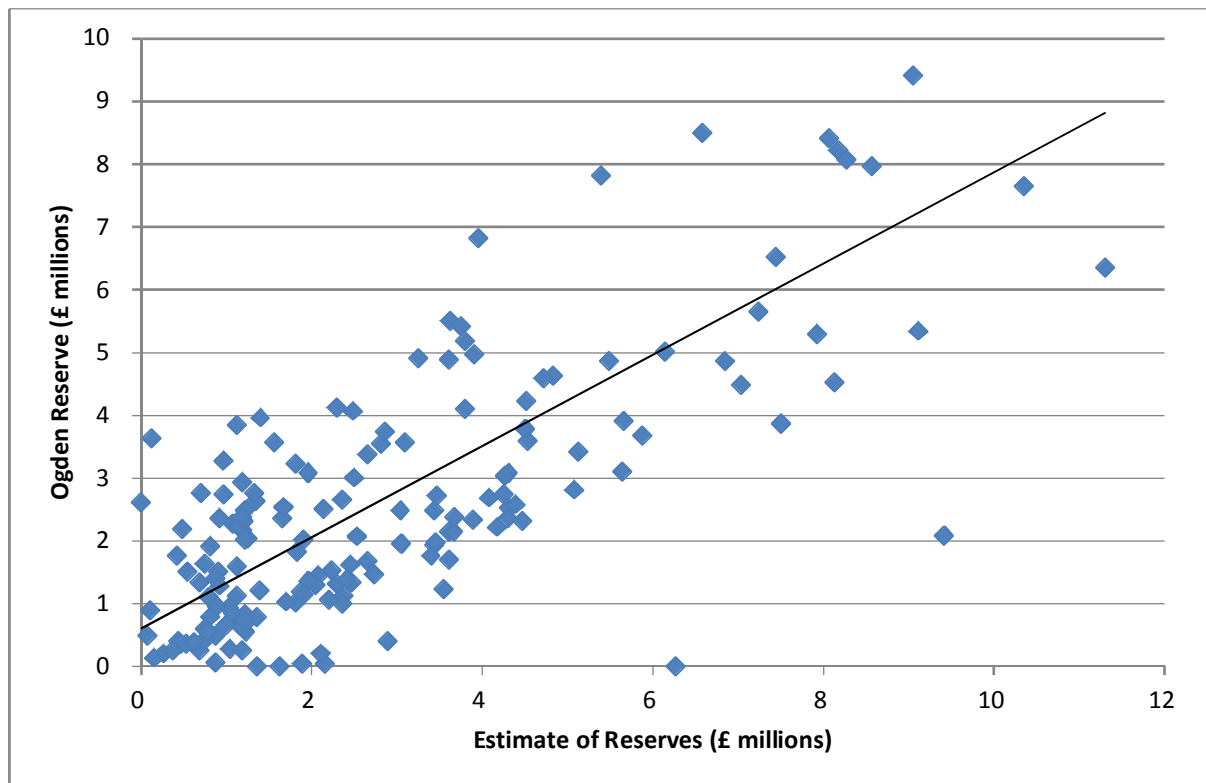
2% real discount rate assumption in survey reserve estimate
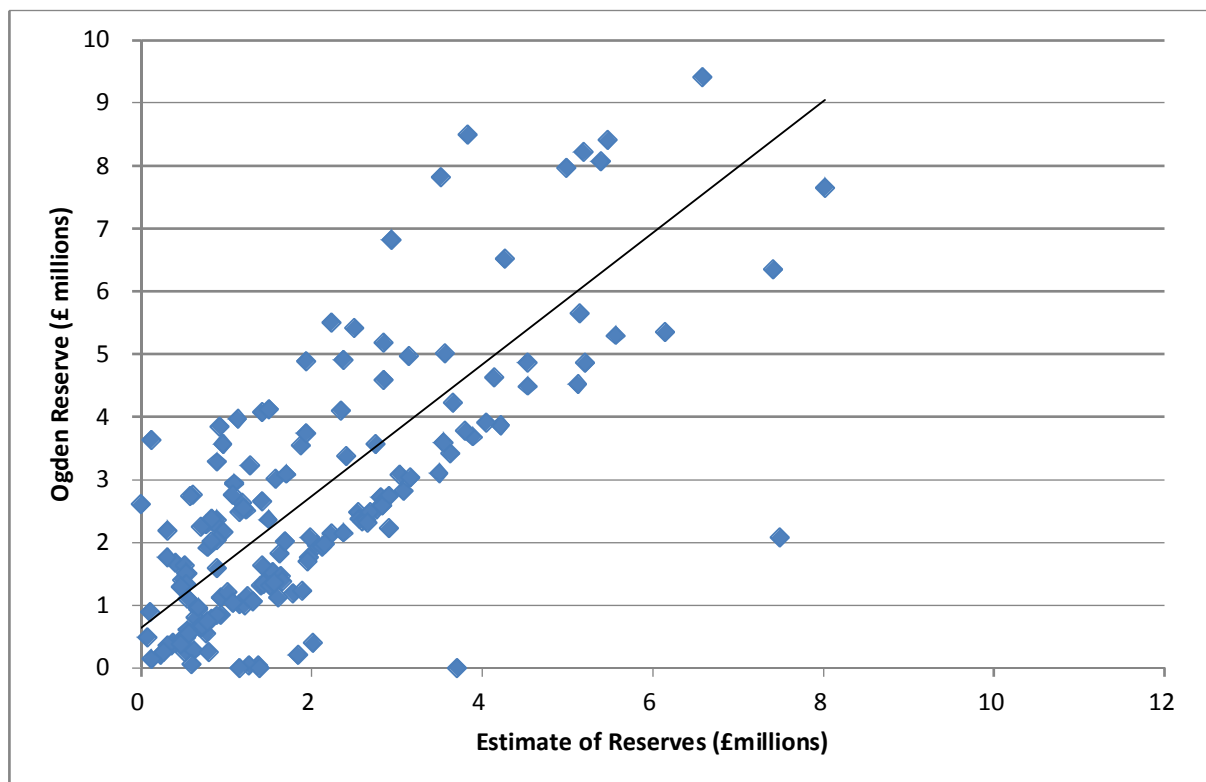
Comparison to insurer reserves held

0% real discount rate assumption in survey reserve estimate
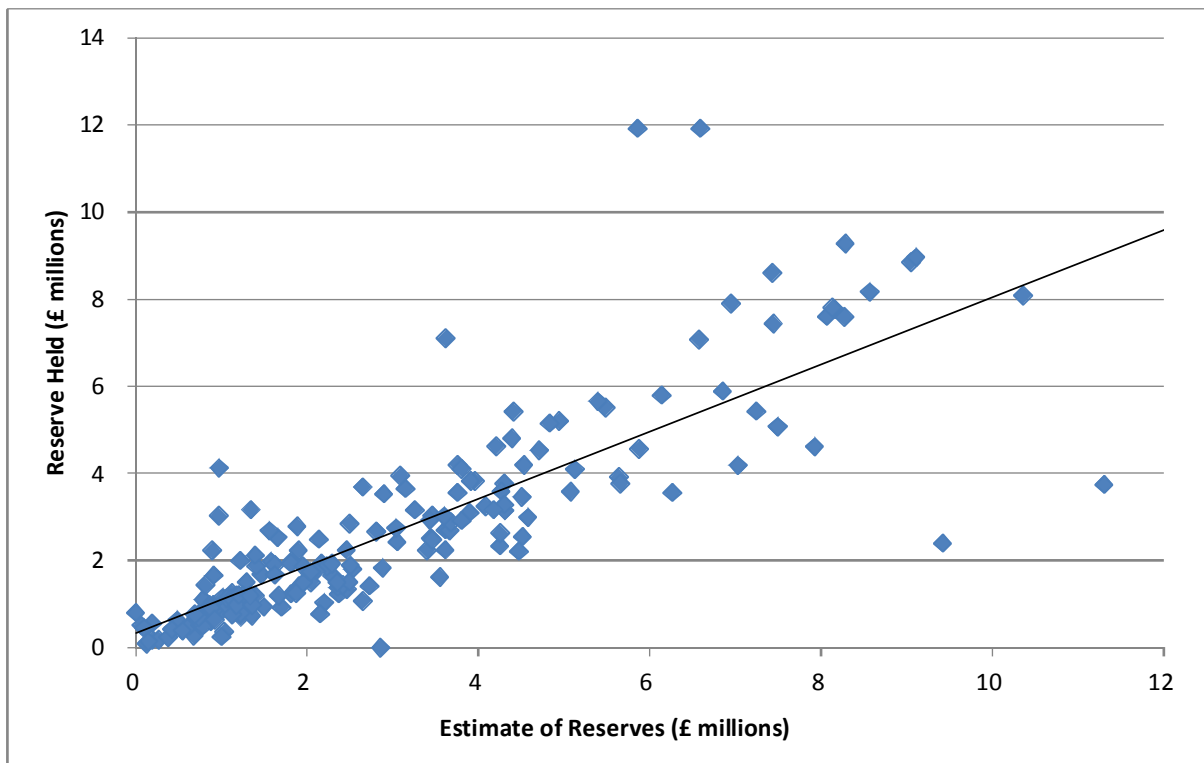
2% real discount rate assumption in survey reserve estimate
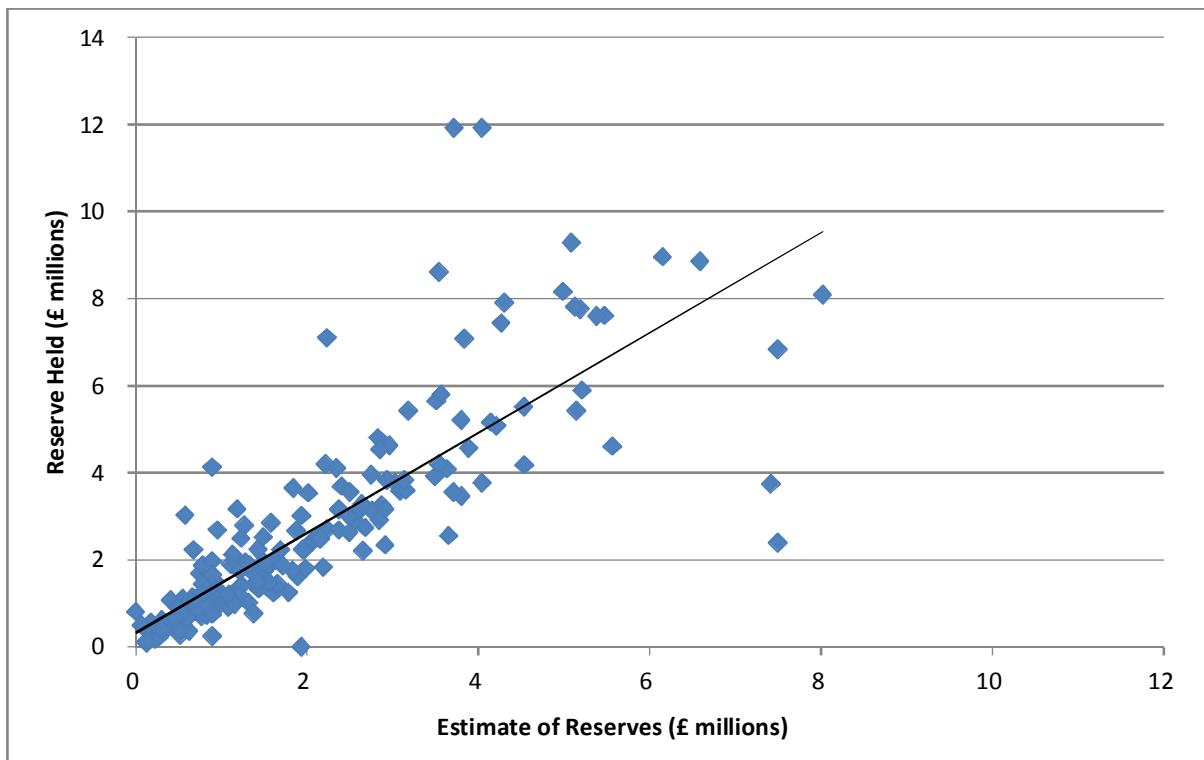
Distribution of lump sum as a proportion of total PPO claims costs

0% real discount rate assumption
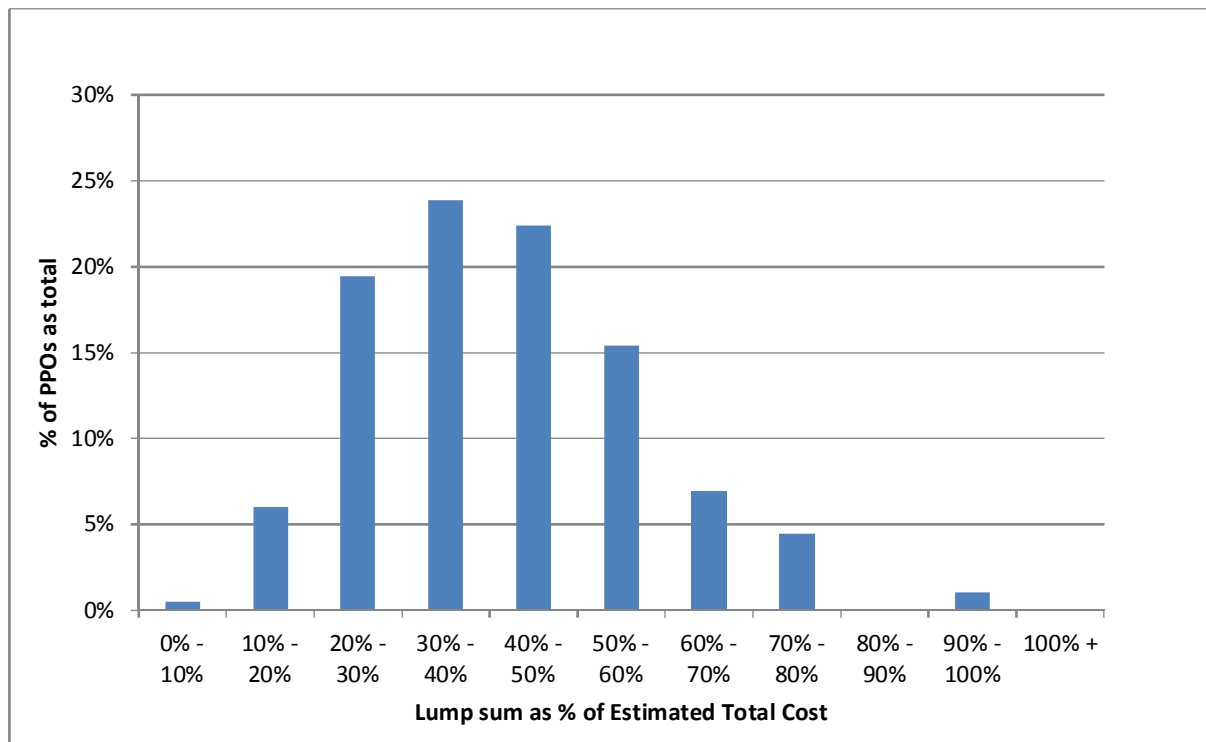
2% real discount rate assumption
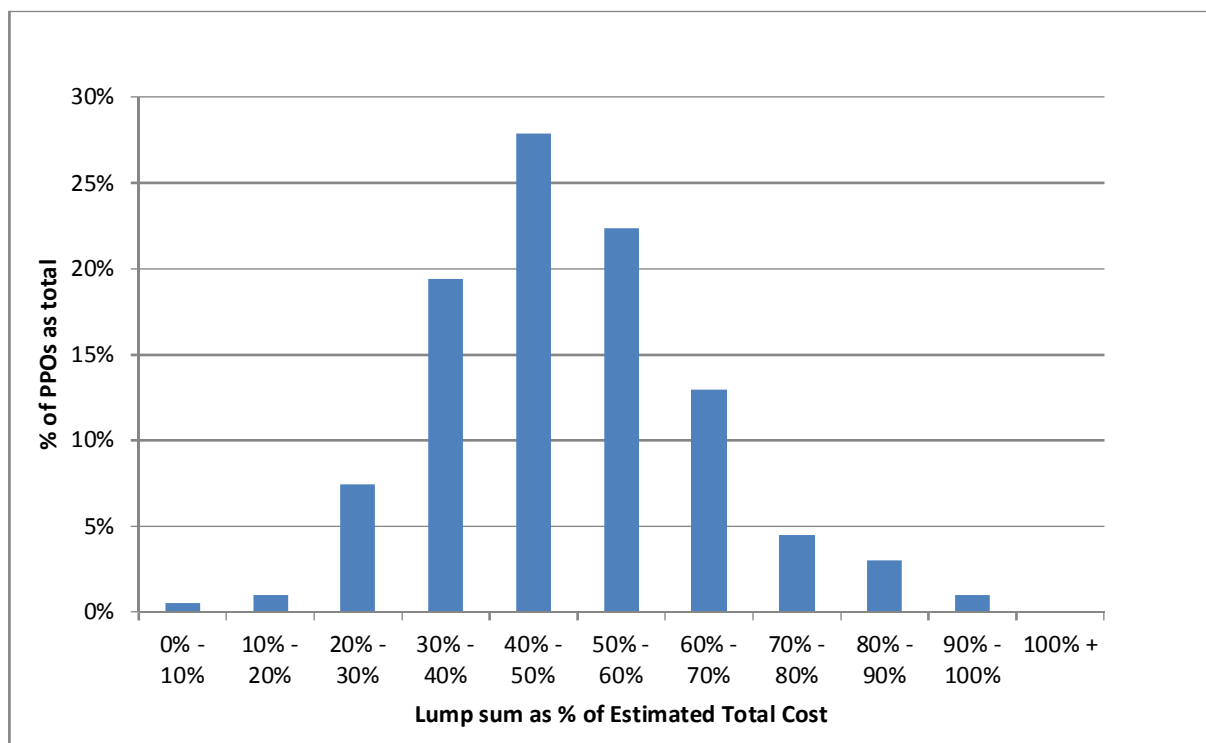
10.12. The calculation of individual estimate of PPO reserves has enabled us to analyse the size of PPOs by various factors such as PPO amount and life expectancy. The results of these analyses are shown below without commentary.

Distribution of reserves estimates by injury type – using 1% real discount rate assumption
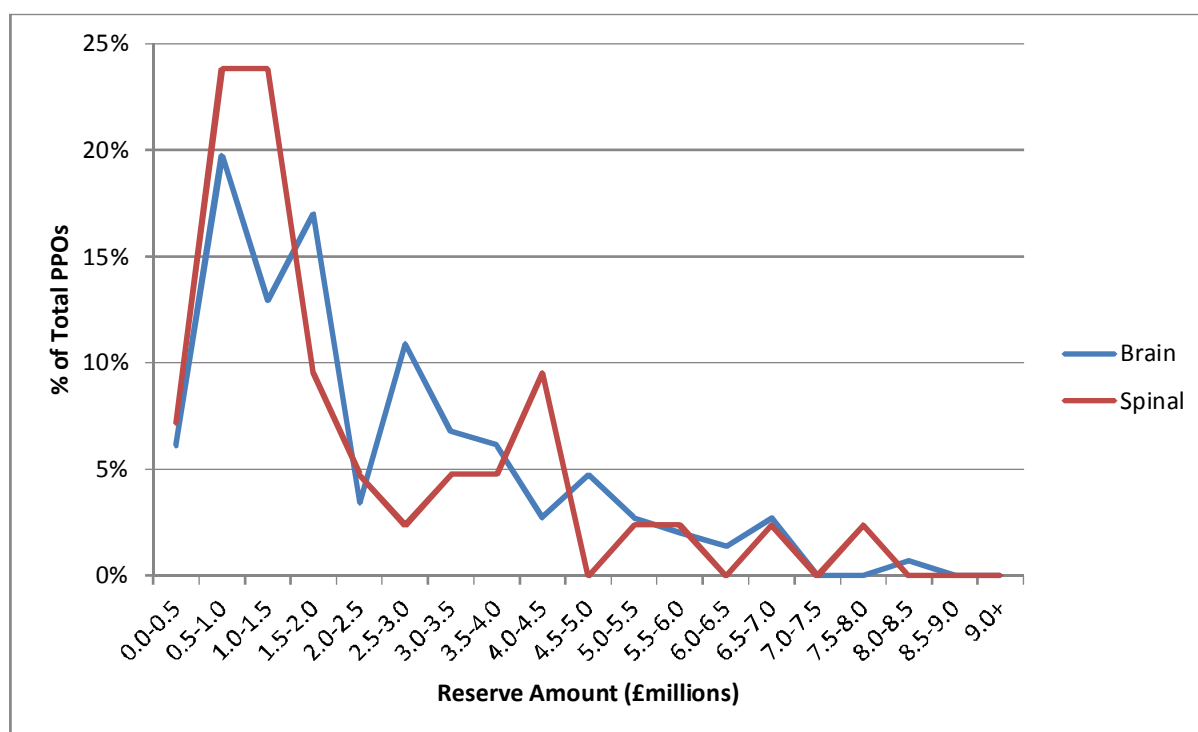
Distribution of reserves estimates by private and commercial – using 1% real discount rate assumption
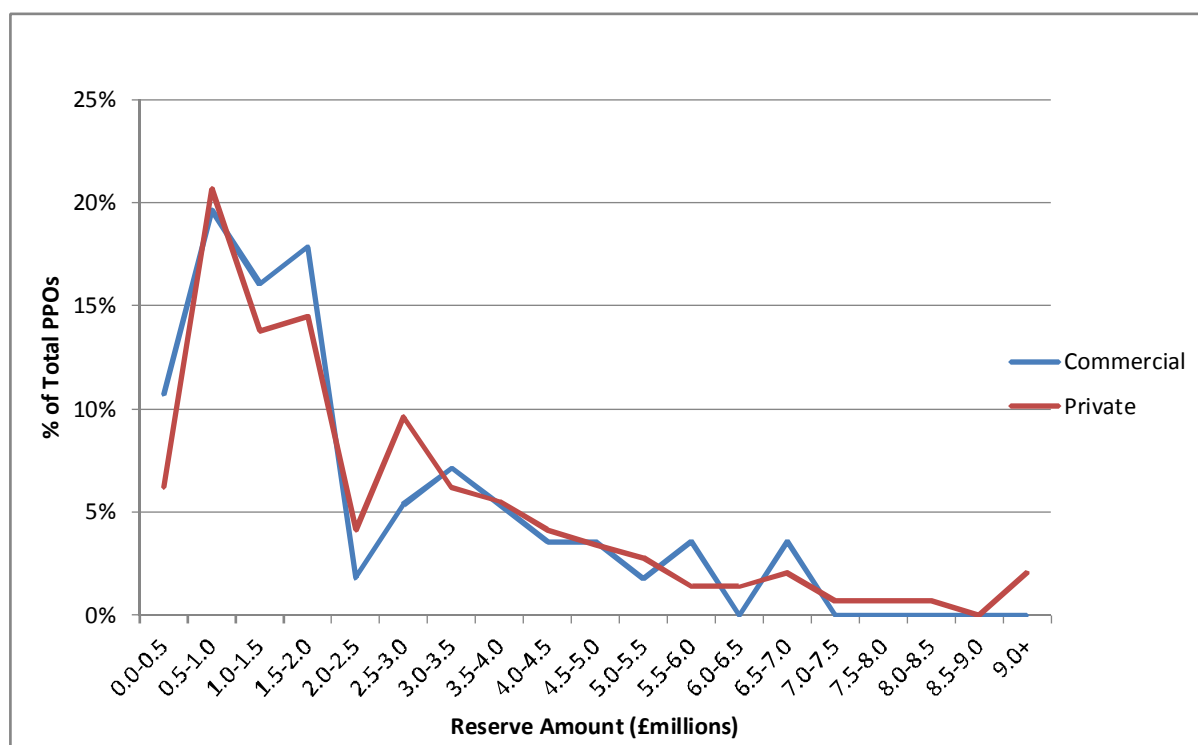
Scatter plots of reserve estimate (all using 0% real discount rate assumption) against:

Future life expectancy at settlement date
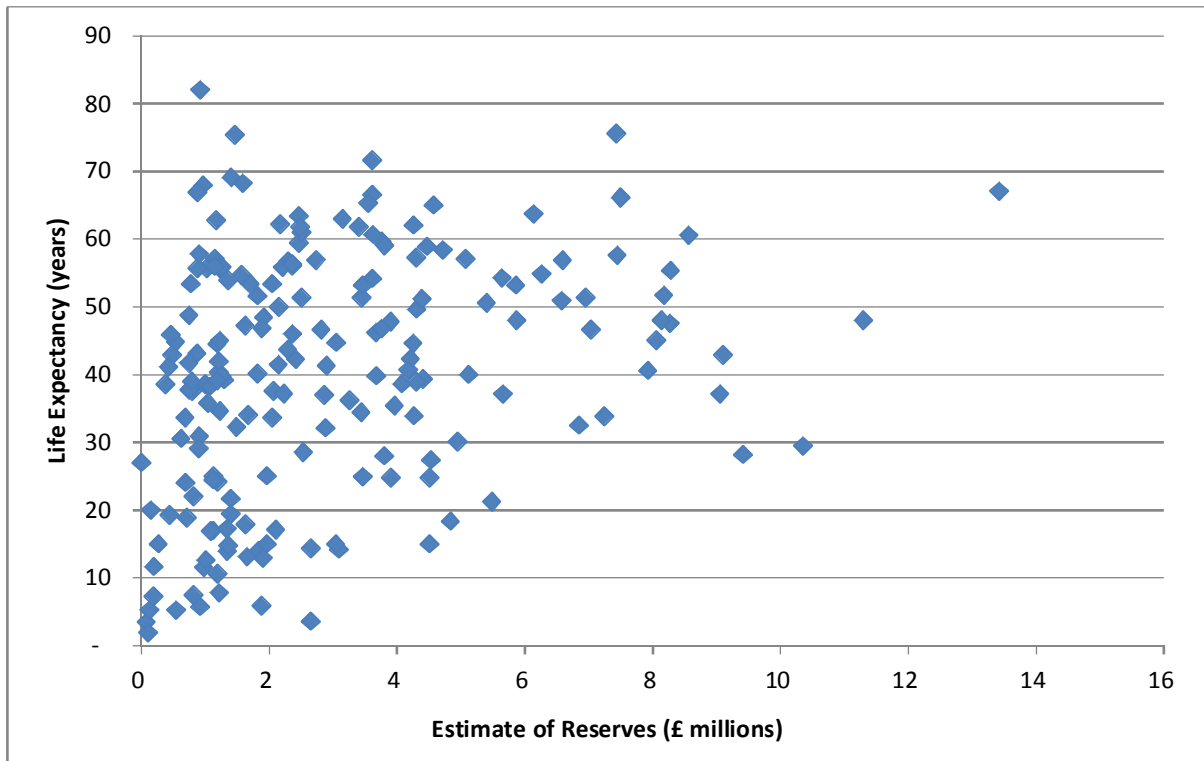
Age at settlement
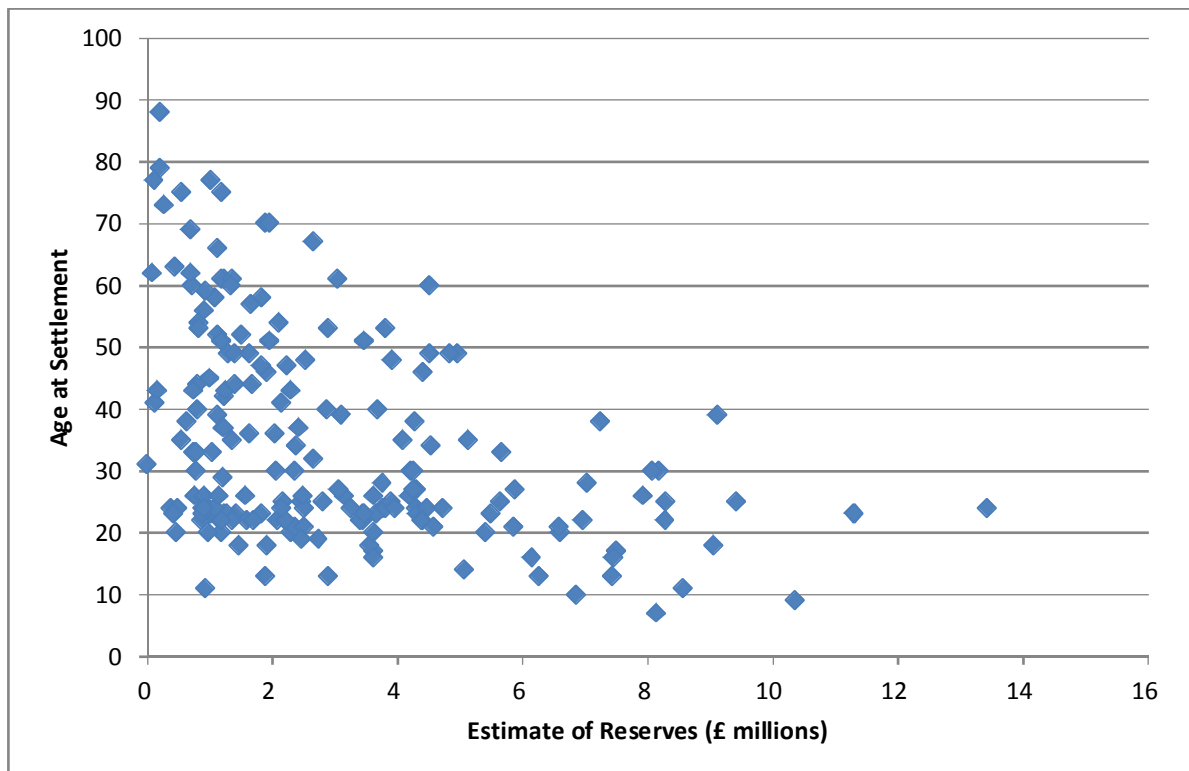
PPO amount
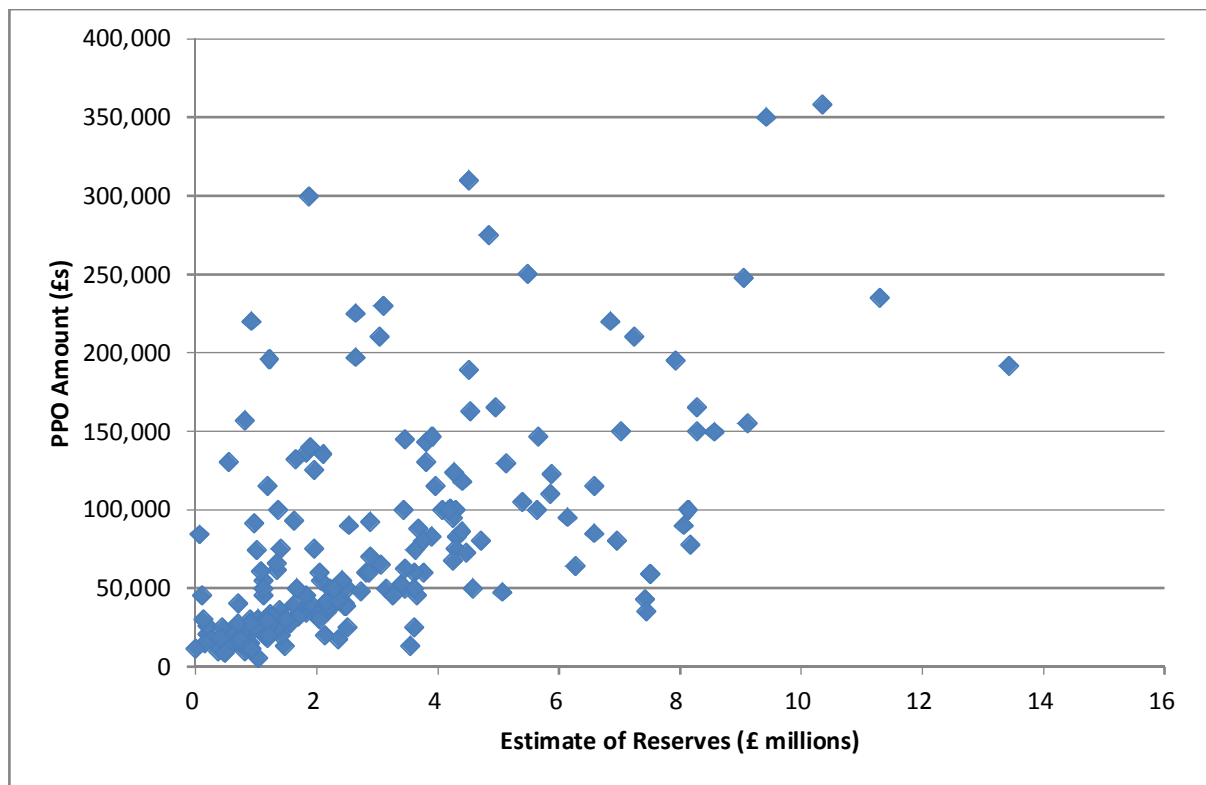
Lump sum
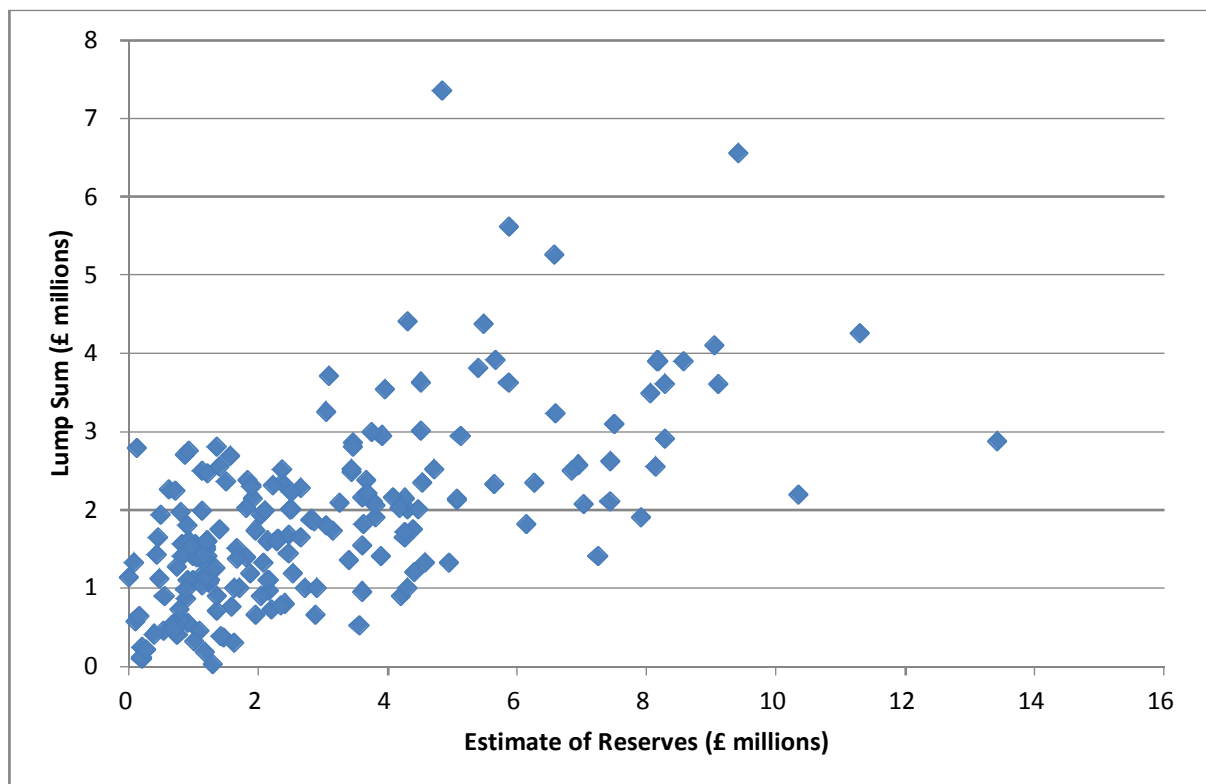
PPO amount split by stepped payments
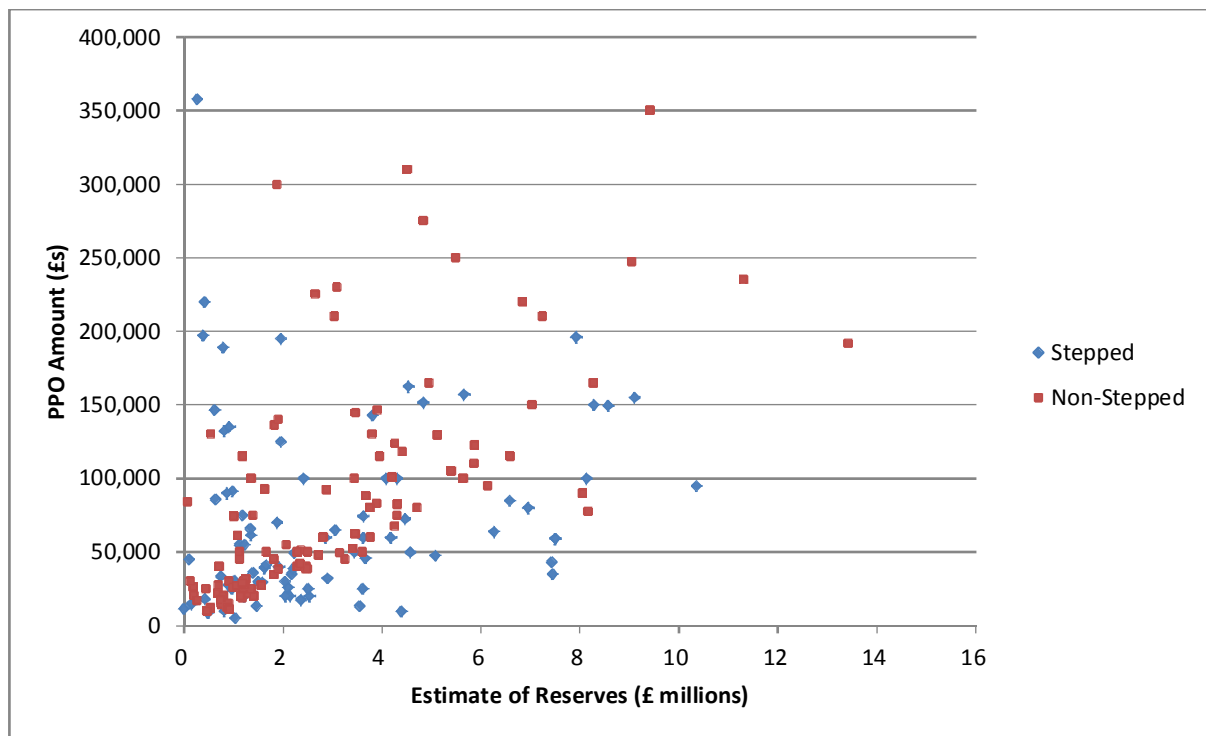
Settlement delay
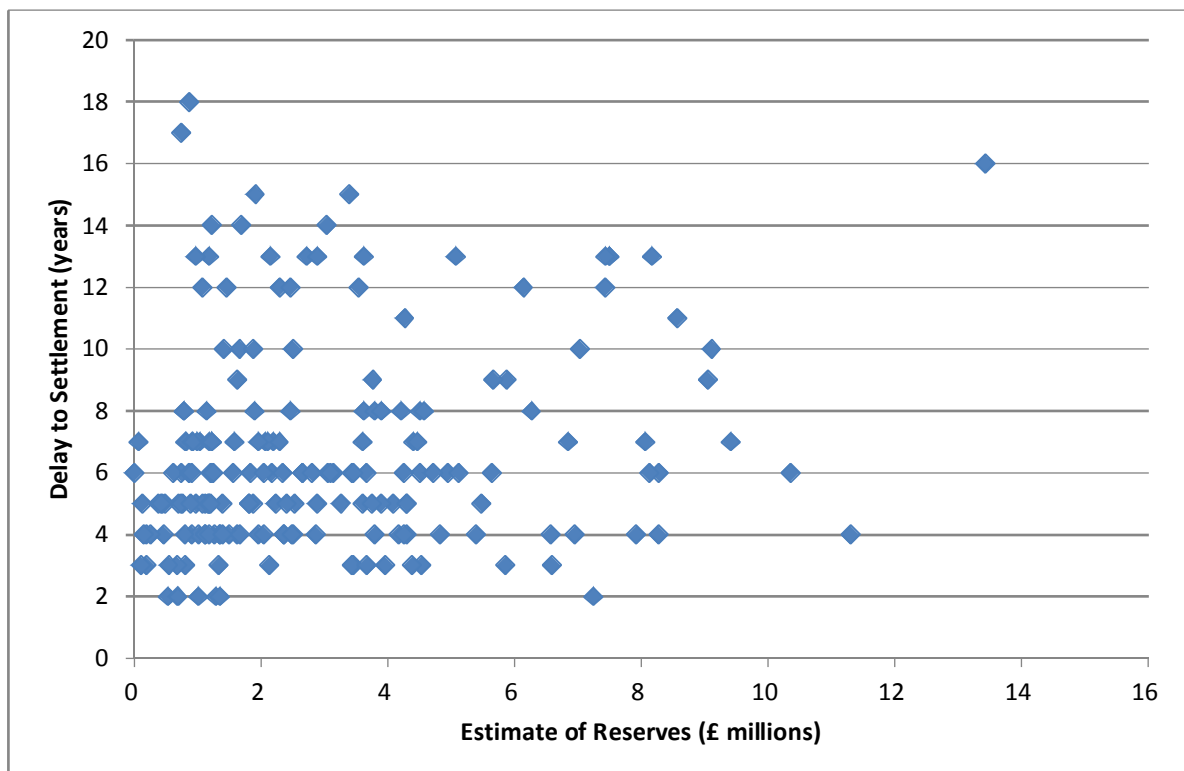
10.13. The correlation observed will change depending on the real discount rate assumed in the estimation of the PPO reserve. This is shown below by comparing the trend lines on the scatter plots of PPO amount against individual reserve estimates on a -2%, 0% and 2% real discount rate basis respectively.
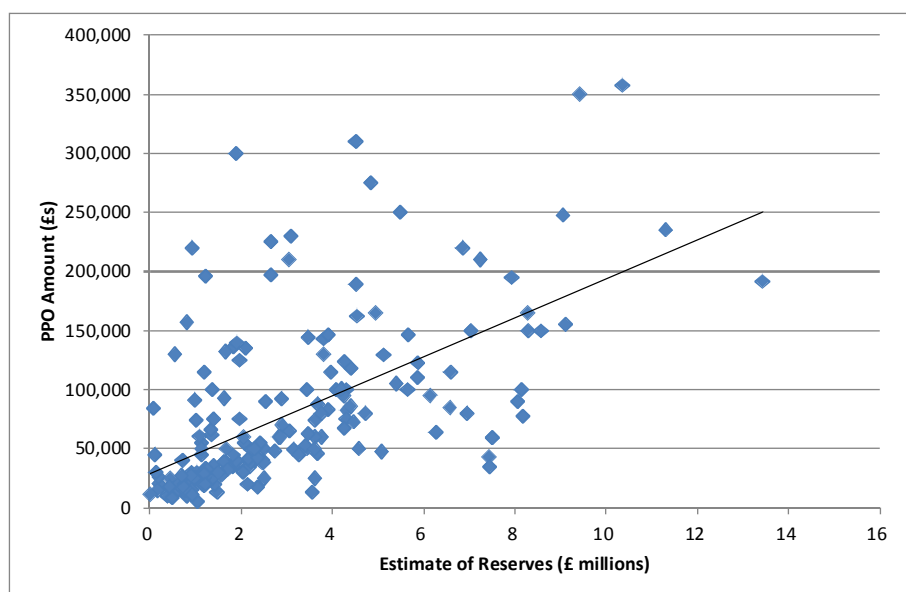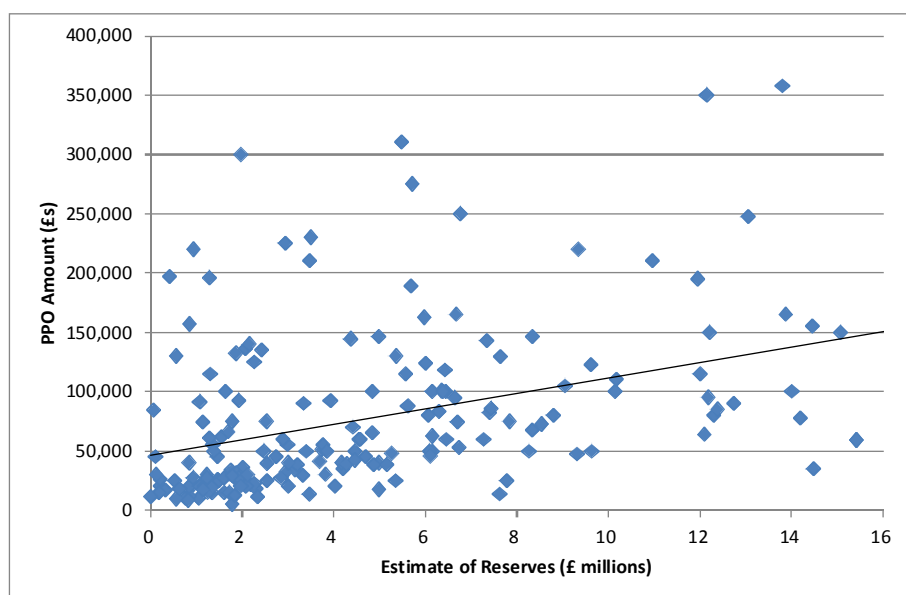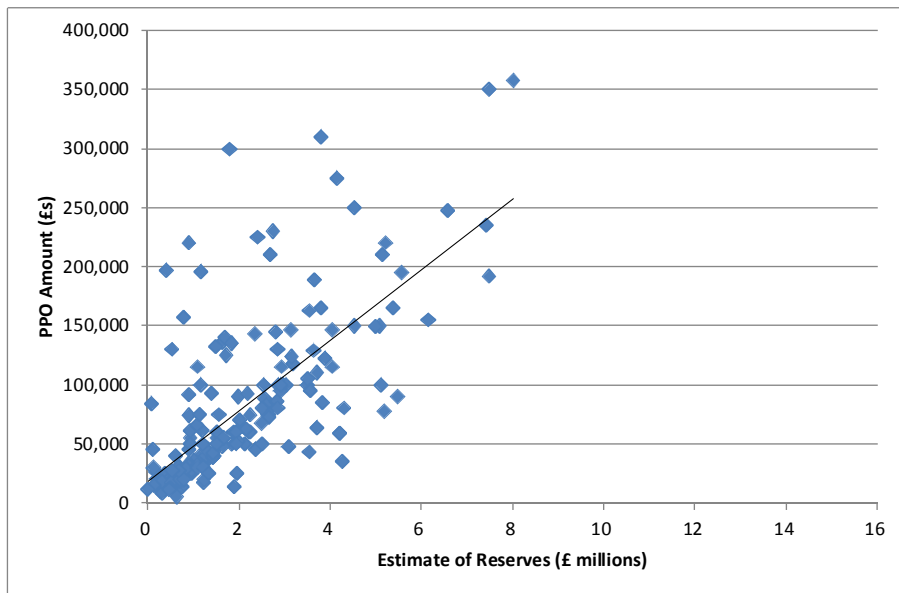
11. Qualitative Survey

11.1. We conducted (typically) 1 hour telephone interviews with senior actuaries from 10 of the respondents. With one exception, it was only the very smallest insurers who did not contribute to this part of the survey, as they typically felt that as they had so few PPOs there was little they could add here.

11.2. What are your current issues with respect to PPOs?

11.2.1. There were a range of opinions, with many companies commenting that there were no particularly new issues as this was an area they were already familiar with. Future propensity was mentioned as a concern by three respondents, and a potential change in the Ogden discount rate was also mentioned, though one company commented that the effect of a change in the Ogden rate on claims other than PPOs concerned them more. Longevity, reserve uncertainty and reinsurance were all mentioned by two companies. Others areas of concern cited were balance sheet uncertainty and future administrative burden.

11.3. How do you allow for PPOs in your capital models?

11.3.1. Three respondents explicitly model PPOs in their capital models – the approach taken varies, typically mirroring the approach used for reserving PPOs (see sections on reserving below for details). One more said they were about to move to an explicit modelling approach.

11.3.2. However, the majority of respondents do not explicitly model PPOs in their capital models:

– four take a simplistic approach, typically applying a range around the best estimate for PPOs coming out of their reserve review.

– two said it was implicit in their large claim variability model.

– one did not know how it was done.

11.4. How do you allow for PPOs in your pricing?

11.4.1. The market was more consistent in its approach to pricing in that no company adopted an explicit methodology for PPOs. PPOs were either implicitly taken account of in a company's large claims modelling process, sometimes with an additional uplift for PPOs applied, or an allowance for PPOs was implicitly made in the reserve estimate which flowed through to the pricing methodology.

11.4.2. One respondent commented that "pricing is difficult if you allow for it but competitors don't".

11.5. How much have you changed your approach as a result of Solvency II?

11.5.1. Overall companies hadn't changed their approach specifically as a result of Solvency II. In general this was because they said they had already moved to other techniques, such as using an individual cash flow approach.

11.5.2. Two companies commented that it may well not be relevant to them under the materiality clause of Solvency II, another said that with the SII deadline lengthening they were not focussing on this now as much as they had in the past.

11.5.3. One insurer specifically said that as they were using the standard formula approach they were moving towards using life techniques. Other changes mentioned were segmentation (i.e. separating out for reporting purposes), and the use of a risk free yield curve. One company also mentioned the issue of using a one year time horizon under Solvency II - uncertainty on PPOs does not look very great over a one year time horizon, however the complete opposite is true when an ultimate time horizon is considered,

11.6.   a   Do you think a buyout vehicle is a realistic option over the short/long term?

11.6.1. There seemed to be a consensus that this wouldn't happen over the short term (one comment was that there is not sufficient information available to set the terms at the moment, and another that "current offerings are too expensive") but that it could be possible over the longer term. All companies had obviously considered this, however the appetite to participate in such a venture was not clear; with a couple of companies saying they would not need to use such a vehicle and one specifically saying they would like to participate in one. The reason for the lack of clarity is likely to be that there are a number of issues in setting up such a vehicle and until how those are to be addressed is decided it would be hard for companies to assess the benefits. Specific issues cited were

– that it would have to be compulsory,

– and conversely, that companies would not necessarily want to give all their PPOs away,

– that you would have to police who goes in/comes out,

– loss of control over claims handling,

– cost effectiveness,

– would not want to pay profit premium.

b   What do you think it would look like?

11.6.2. There was little consensus on what a buyout vehicle would look like, with a number of respondents not expressing a particular view. Some commented that it would have to be compulsory, though opinions on who would own it varied between the government, the companies themselves and a private commercial model.

11.7.   a   Would you be interested in a capitalisation/commutation clause in your reinsurance contract?

11.7.1. A capitalisation clause allows (or even compels) the reinsurer to settle an individual PPO liability as a lump sum with the insurer, usually on a pre-agreed basis, once such an award has been made/agreed. A commutation clause generally allows (or compels) the settlement of all liabilities on a contract at a given point in time (say after 15 years), so groups together all PPO and non-PPO liabilities remaining unpaid at the time of commutation.

11.7.2. Most insurers said it would depend on the specific terms. One insurer said they have looked into this with specific reinsurers and commented that the terms all seemed to be one way, e.g. an option to change the interest rate, or a claw back clause if the claimant dies early.

11.7.3. Three insurers commented on the credit risk; including one respondent who pointed out that consideration of whether the reinsurer would still exist in many years to come could make capitalisation clauses more attractive.

11.7.4. Three insurers specifically said they would not be interested in a capitalisation clause saying that reinsurance was their biggest asset and they did not want to lose it, or that reinsurance was a longevity hedge.

b   What is your view on a compulsory clause?

11.7.5. Most said they would not be interested, with some specifically commenting that they would look to other reinsurance providers. However a number of others said it would depend on the terms, with one commenting that they would have to "negotiate a big reduction in price".

11.8. Have you commuted any of your PPOs?

11.8.1. Universally the answer was no, though one insurer had bought an annuity for one of their PPOs.

Reserving

11.9. Do you monitor open claims and assess the possibility/probability of them becoming PPOs? How is this done?

11.9.1. Universally every insurer monitored large claims in some way. There were differences in the way this was done and how the output was used. Some companies had a traffic light system or high/medium/low rating for the chance that the claim would end up as a PPO. Others assigned a probability of it turning into a PPO. One company commented that they used this information to give advice to their claims department, helping the claims team to decide on an appropriate level of lump sum to award.

11.9.2. Usually the expertise of the claims team was used, but a handful of companies had started to move more toward use of objective measures to predict which claims would turn into PPOs. What was interesting was that these measures, or triggers, were not consistent across the market with different insurers using different triggers. The two most commonly mentioned were size of care costs and injury type.

11.9.3. Virtually no insurers rigorously monitored the accuracy of these predictions, though many now had a history of data for which triangle type analyses could be derived, showing how the prediction for each claim would have moved over time and what the final outcome was.

11.9.4. Without an objective measure of success, and use throughout the industry of different trigger measures, views inevitability varied as to the efficacy of these predictions. A couple of respondents felt the predictions had been good, or reasonable at an overall level, and at the other extreme some felt that the predictions had been poor. Most however did not have a particular view on how accurate the predictions had been.

11.10. Are reserves held for future PPOs? How is this done?

11.10.1. As has been seen in previous years of this survey market practice varies widely and is too numerous to cover all permutations here. A sample of the typical range of methodologies is listed below:

- Large claim stochastic model with PPO propensity and uplift adjustments applied. Only 2 respondents doing this, but a couple more saying they are moving to this approach soon.

- For the IBNER element: cashflow modelling of list of large claims with probability of becoming a PPO applied. This approach is relatively widespread, which is interesting given the lack of certainty over the probability parameters used as discussed in section 11.9 above.

- For IBNYR or total IBNR (including IBNER): a numbers and amount approach is common. However the way the amount is derived can vary a lot.

- Two companies hold an overall IBNR lump sum for large claims which covers PPOs too. One company did not calculate IBNYR for PPO s at all (but did estimate the IBNER element).

11.11. What method of reserving do you use for known PPOs?

11.11.1. A cashflow approach was used by all respondents but one. The insurer who didn't use a cashflow method used the Ogden value but with an alternative discount rate.

11.11.2. The way mortality was applied varied throughout the industry. Three respondents used annuity certain methods. For those using qxs, the method varied, but using 2 way Ogden 7 tables and an age adjusted method for impairment was not uncommon.

11.12. Do you discount your PPO reserves?

11.12.1. There is inconsistency in the market as to the real discount rate used. Most companies provided details of the rate they are currently using – this ranged from 0% to 2.25%.

- Two used the risk free yield curve, one under advice from auditors; the other said they were planning to move away from this to a more simplistic apoprach given the uncertainty. One other uses the rate on long term real gilt yields.

- Three take advice from their investment departments, and two of these specifically use rates which reflect the assets backing the PPOs.

11.13. How did you derive your nature of injury categorisations?

11.13.1. Injury categorisations were not done by four respondents and one commented that they thought the categorisations were probably done only in response to this survey as they did not use them apart from to decide if a large claim will become a PPO.

11.13.2. Those that did record them said it was done by the claims team. One respondent said they were done in line with the categories in the JSB guidelines.

11.14. Do any of your PPOs have provision to go back to the claimant to get an update on their medical condition?

11.14.1. A number of respondents did not immediately know the answer to this question and a few went back to their claims teams to clarify. In terms of whether insurers have provision to go back to the claimant to get an update on their medical condition:

- three did not know

- one did not have any provision

- five had started asking for it more recently

- one said that for all their PPOs they can check the medical condition at a subsequent point in time.

11.14.2. One insurer said that their later PPOs have a clause that allows them to go back in the event of medical advancements to potentially change the annual amount paid.

12. Summary Statistics

Motor

All Motor PPOs

	Mean	Median	Standard Deviation	Sample Size
Age at settlement	35.3	28	17.5	251
Delay until settlement	6.5	6.0	3.5	249
Future life expectancy at settlement	40.5	41.5	17.7	244
Life expectancy reduction	13.5	11.2	11.1	244
Annual PPO payment (£)	78,202	52,500	66,340	252
Lump sum (£)	1,844,531	1,643,460	1,121,141	243

Private Motor PPOs

	Mean	Median	Standard Deviation	Sample Size
Age at settlement	33.5	25	17.3	182
Delay until settlement	6.5	6.0	3.5	179
Future life expectancy at settlement	42.8	44.0	16.7	177
Life expectancy reduction	13.2	10.3	11.2	177
Annual PPO payment (£)	73,169	50,000	63,930	182
Lump sum (£)	1,887,786	1,727,500	1,115,347	178

Commercial Motor PPOs

	Mean	Median	Standard Deviation	Sample Size
Age at settlement	40.0	38	17.3	69
Delay until settlement	6.4	5.5	3.3	70
Future life expectancy at settlement	34.3	37.0	19.0	67
Life expectancy reduction	14.4	12.9	10.8	67
Annual PPO payment (£)	91,286	70,000	71,050	70
Lump sum (£)	1,726,080	1,600,000	1,137,091	65

Private Motor Comprehensive PPOs

	Mean	Median	Standard Deviation	Sample Size
Age at settlement	35.0	29	17.9	111
Delay until settlement	6.0	5.0	3.0	111
Future life expectancy at settlement	40.6	41.2	17.2	108
Life expectancy reduction	13.6	9.9	12.1	108
Annual PPO payment (£)	75,718	50,000	67,194	111
Lump sum (£)	1,816,244	1,639,418	1,078,874	111

Private Motor Non-Comprehensive PPOs

	Mean	Median	Standard Deviation	Sample Size
Age at settlement	30.9	25	16.0	31
Delay until settlement	7.1	6.0	4.2	31
Future life expectancy at settlement	48.9	51.5	14.2	30
Life expectancy reduction	10.2	10.5	7.3	30
Annual PPO payment (£)	73,565	52,500	67,399	31
Lump sum (£)	1,945,550	1,873,008	889,110	31

Liability PPOs

	Mean	Median	Standard Deviation	Sample Size
Age at settlement	43.6	45	16.8	33
Delay until settlement	5.2	4.0	2.4	33
Future life expectancy at settlement	27.7	28.1	13.4	33
Life expectancy reduction	15.8	12.5	18.3	33
Annual PPO payment (£)	67,700	48,750	66,516	34
Lump sum (£)	1,266,578	1,100,000	869,214	33

Brain Injury PPOs

	Mean	Median	Standard Deviation	Sample Size
Age at settlement	34.5	27	17.2	197
Delay until settlement	6.9	6.0	3.6	197
Future life expectancy at settlement	42.0	44.7	17.8	194
Life expectancy reduction	12.5	9.9	11.4	194
Annual PPO payment (£)	70,465	50,000	59,536	197
Lump sum (£)	1,658,150	1,515,245	1,052,952	194

Spinal Injury PPOs

	Mean	Median	Standard Deviation	Sample Size
Age at settlement	40.0	38	18.3	70
Delay until settlement	4.8	4.0	2.5	70
Future life expectancy at settlement	30.5	30.6	14.4	67
Life expectancy reduction	18.0	15.7	11.4	67
Annual PPO payment (£)	96,175	65,000	81,340	70
Lump sum (£)	2,101,985	1,955,097	1,208,918	68

13.   Glossary

Definition of terms used in this document. (Note these are not necessarily universally held terms, but are just intended to relate to this specific document.)

Annual amount	See definition of 'PPO amount' below
ASHE	Annual Survey of Hours and Earnings
Large claim	£1 million in 2011 values, indexed back at 7% per settlement year
Life expectancy	Future life expectancy at the time of settlement
Lump sum	Lump sum element of the PPO, over and above the regular PPO payment
MIB	Motor Insurer's Bureau
PPO	Periodical Payment Order
PPO amount	The regular payment associated with the PPO as defined at the time of settlement
Unimpaired life expectancy	Life expectancy based on Ogden 7 tables
% reduction in life expectancy	reduction in life expectancy as at the time of settlement as a proportion of unimpaired life expectancy as at the time of settlement

C. Impaired life mortality update

Introduction

This section covers a brief discussion on life expectancy adjustments in PPO awards which leads into the future aspiration to create Impaired Life Mortality (ILM) tables for the most common categories of injury impacting PPO claimants. We also cover pertinent research from elsewhere on the impact of head injury on life expectancy over time.

Life expectancy adjustments

There are still no definitive UK ILM tables to use for such purposes as valuing a PPO and therefore the methods of valuation are still dependent upon the more subjective alterations to standard mortality tables. The general approach to valuing PPOs with life tables was addressed in last year's paper – under both an annuity certain and the more probabilistic approach. The scope this year goes beyond this and makes the first steps towards the creation of a UK-specific Impaired Life Mortality table.

Presently, the method used to obtain expected alterations to life expectancy is unclear with a few, more prominent names in the medical field providing judgement. They are reliant on their own expert judgement and information from a few relevant studies (statistical or otherwise), which in the main do not pertain to UK personal accident, in order to determine the anticipated adjustments to normal life expectancy.

Typically, adjustments to life expectancy will be made for the following reasons beyond the main injury:

- Obesity
- Smoking
- Potential future development of epilepsy
- Family medical history
- Pre-existing conditions
- Lifestyle prior to the accident
- Alcohol consumption
- Conditions related to the change in lifestyle becoming more sedentary – circulatory or cardio-vascular related for example

One prominent source of adjustments comes from the text *Brackenridge's Medical Selection of Life Risks by Brackenridge, Croxson and Mackenzie.* This text supplies a methodology to assign changes to mortality based on such features such as smoking and others listed above which is then converted to a total percentage – with an end value of 100% implying normal life expectancy.

The percentage is then converted to a 'number of years' adjustment to apply for the case.

The presence of clear experts and the fact that they are consulted across many cases, in person or via such references as above, means that there is at least an element of consistency between the adjustments within the sector. However, the accuracy in these views may take some time to be validated.

A lot of the studies and adjustments come from abroad, particularly the United States, and there is an issue concering how appropriate such experience is when applied in the UK. This is especially true when it is considered that two key factors impacting mortality are obesity and smoking – two areas well known for differing in spread and penetration in the US versus the UK.

The expectancy from injury should, though, be broadly comparable where medical standards are in line. The focus then turns to creating tables where the primary concern is the injury rather than the other contributors to mortality. The assumption necessarily being that, across a sufficient sample size, these factors will be in line with the mortality of the general population against which we are comparing, or that a control sample is selected that has the same characteristics (age, gender, lifestyle, etc).

We believe there is significant benefit in having a transparent, well defined categorisation of injury, which correspond to specific ILM tables. These benefits include:

- More consistency in valuing PPOs across the industry as mortality is a key assumption and a key area of difference;

- Early feedback into reserving process and other valuation exercises;

- More consistency and benefits in lump sum reserving.

To this end, we have begun to derive a categorisation of these injuries, and calculating specific ILM tables for each category, based on actual data! We cannot stress enough the benefits of the categorisation of injury types and hope that insurers will improve this aspect of the claims handling process going forward. The better categorisation in claims data within individual companies will also help the industry to see from its own PPO experience what the impacts are over time by contribution of data to the working party in future years.

Creating a UK-specific Impaired Life Table

There are numerous sources of patient data in the UK – two of which are:

1. CPRD (http://www.cprd.com/intro.asp)

2. THIN (http://www.thin-uk.com)

These companies hold the data of numerous patients served by the network of GPs across the breadth of the country resulting in a dataset broadly representative of the general population. In addition, this means that control groups to test the impact of injury (or otherwise) can be selected to increase the validity of the study. In theory, using this information, an attempt could be made to tabulate the mortality expectation based on UK data.

One of the first hurdles to cross when creating an ILM table is determining how to group the injuries. There are various ways this can be done such as assessing the damage caused to either the brain or spine, or by looking at impact on the patient (specifying the loss of use of limbs, reduction in motor response, reduction in sensor response etc). Arguably, the latter will be more reflective of the reduction in life expectancy because it allows for the effect on the way the body usually operates (for example many patients with these injuries die not from the original injury, but of a secondary illness such as an infection that the body can no longer deal with as effectively).

One such way of categorising spinal injuries is the internationally-recognised International Standard For Neurological Classification of Spinal Cord Injury (ISCOS), which has been adopted as a method of categorisation of injury in New Zealand. It has been compiled by the American Spinal Injury Association (ASIA) and allows the courts to assess the nature of injury and then apply the appropriate

mortality table. (Note: we do not know the source of these tables). There are ten such categories within this scale and the 6 or so most severe of these we believe are likely to result in a PPO.

We are in the initial stages of compiling a set of ILM tables based on a categorisation by using the THIN patient data. We aim to produce a set of tables for each category based on the THIN dataset by mapping the 200 or so relevant injury codes in this database. By relevant we mean those injuries that result in long term neurological damage and were sustained as a result of trauma (we are not, for example, interested in those cases which have been sustained as a result of cancer). We aim to map these codes to the ASIA scale, or some other comparable categorisation of injury, and then carry out an analysis of the data in order to derive an ILM table for each category.

In order to create these tables, the additional data requirement beyond the injury code would be:

- Gender

- Date of birth

- Location

- Social background – may be determinable from location

- Date of death (if applicable)

- Date of entry into cohort – either injury date or date entered data set

Whilst we hope to compile theses tables using the THIN data we also recognise that there are still limitations within the dataset. Namely:

- An injury/condition is listed but there is no way of knowing if the patient recovered from the injury and whether the primary cause of death was the injury or otherwise. However, this isn't vital: we are interested in the overall death rate regardless of eventual reason just as long as the patient experienced the initial injury.

- A patient could leave the dataset via moving surgery/home rather than through death so the risk exposure is incomplete and the cohort inconsistent. This attrition is about 7-10% per annum.

- Not all GP surgeries contributed to the data set – it covers 6% of patients across the UK. However, this should be seen as being a relatively large dataset when compared with many studies.

- In addition the patient could be double-counted as the identifier is unique to each practice and hence if they move practice that patient could be recounted. This could alleviate some of the attrition issue in the exposure though.

- Data only started to be collected from the late 1980s, and far more recently for some contributors, and there is no development from older periods although changes in medical treatment over time casts doubt over the suitability of the older data to begin with.

- The average length of monitoring for the patients in the dataset is only about 6 years which doesn't yet give an adequate follow up time.

We aim to report back more fully on this in 2013.

Other Research

There are lots of papers in the scientific domain that illustrate the impact of different injuries on future life expectancy. The big shortfall to this information is that it tends to cover the period immediately following the injury with little or no follow up past a year. This is usually well within the settlement period of an injury claim and, at the time of settlement as a PPO or otherwise, the information is largely irrelevant.

In addition, other key contributors to mortality are not taken into account, for example knowledge of the level of social deprivation. Further, the data sets can be relatively small.

Prior research draws the main following conclusion:

Mortality risk increases massively in the year post injury

However, this is of less use to the valuation of PPOs given that more than one year has typically passed post injury when the claim is settled as a PPO.

McMillan at al

We have discovered one potentially useful medical research paper: *Death after head injury: the 13 year outcome of a case control study (T M McMillan, G M Teasdale, C J Weir et al; Journal of Neurology, Neurosurgery and Psychiatry, 2011 – jnnp.bmj.com).*

This new survey supplies us with a better knowledge of the longer term impacts of head injury on life expectancy. The credibility of the findings in the paper are increased by the following factors:

- better monitoring of the cohorts;
- similar control groups from a local population calibrated with gender, age and level of deprivation.

There are still some factors to bear in mind:

- small sample – just 757 head injury cases (with same sized control groups);
- based on a population from across Glasgow;
- short period of time covered for injury to have occurred.

The overall finding of this paper is that head injury has a large impact on life expectancy even beyond the initial year as found in other research. The impact is far more pronounced in younger people as the impact of the head injury over time dwindles as the claimant's initial age increases.

Overview of survey -

Dataset:

The main cohort of interest involved 757 head injury patients selected from 2,995 patients admitted at five Glasgow hospitals between February 1995 and February 1996. This group encompassed all patients admitted with a severe head injury, all those with a moderate head injury and a sample of those admitted with mild and unclassified head injuries. This was set up along with two control groups picked from across a similar demographic in Glasgow. The first group was made up of other people who had been admitted to the hospitals across the same period for injuries other than to the head. The second was a community group.

Particular attention was paid to the classification of injuries for these control groups to ensure that neither the injury the patient was hospitalised for originally nor any prior injury was related to head injury.

These were matched by age, gender and deprivation.

The patients were monitored over the following 13 years and a conscious effort was made to reduce bias by regular checking and updates.

The data kept was name, surname, date of birth, postcode, whether survived or date of death.

Results:

The following table contains the rates of death per year per 1000 people from the three groups covered by the research split by age.

	No. of deaths per 1000 people					
	First year			Years 2 to 13		
Age	**15-54**	**55+**	**Combined**	**15-54**	**55+**	**Combined**
Head Injury	40.15	235.04	100.4	17.36	61.47	30.99
Other Injury	15.3	166.67	62.09	8.82	50.95	21.85
Community	0	81.2	25.1	2.21	39.45	13.72

Note that the results from the community control group are similar to the general population results for Glasgow and Scotland.

The impact for the age band 15-54 especially after the 2nd year is around 8 times the level of the general population but for over 54 this is less than twice the level. The hospitalised control group was still 4 times more likely than the average population to die in this period for the younger age group.

Drilling into the detail Teasdale also found:

- Unsurprisingly, patients with an older age at onset were more likely to have died in the study period.

- A higher proportion of the females in the study died, but this was influenced by the deprivation and age of the female population involved. Once these factors were allowed for there was no impact from gender. The community group showed a higher instance of survival for females as would normally be expected.

- The community group also showed that deprivation had a slight impact on mortality, again as normally expected (adding credibility to control group suitability).

- Higher death rates in the first year for the two hospitalised groups over the community group.

- The difference in mortality between the groups diminished over time, especially for those older to begin with.

- Any category of hospital admission is associated with an increased likelihood of death

- Younger people (defined in the report as age 15-54) saw a relatively greater impact from the injury and increased frequency of death

Frequency of deaths

Head Injury Severity	Year 1	Years 2-13
Severe	28.3%	32.4%
Moderate	12.1%	37.9%
Mild	5.6%	32.4%

The initial year makes the difference and thereafter the impact is lessened. The years 2-13 frequency was the same for mild and severe injury. For mild cases the mortality rate was still higher than that of the community control group and this was further emphasised in the younger age group.

The eventual causes of death were similar to those observed in the general population – respiratory, circulatory, neoplasms, digestive and so on.

Overseas experience

We have also begun investigations into overseas experience outside the UK and USA. We have received some data and we have started analysing the data, particularly from Accident Compensation Corporation, New Zealand and the Traffic Accident Commission, Victoria, Australia.

What lessons does this lend to the treatment of PPOs?

Given that the increased mortality risk after occurrence falls dramatically, especially for older people, there is a question of how much reduction we should still be seeing on head injury cases for PPOs. This is particularly true as it takes a long time to settle the PPO, which means that at the time of settlement the increased risk has mostly passed. When general reductions are placed on older claimants for the nature of injury, is too much of a reduction being allowed for. Are we under-reserving for these cases?

For younger claimants there is often a protracted wait until the extent of injury can be fathomed and the claim settled. At the point of settlement there is still an increased mortality amongst claimants and this could mean that future life expectancy adjustments for these claimants are more in line with where they should be.

D. Liability limits

It is clear from the survey data that there have been far fewer PPOs for the non-motor liability classes. This is due to two factors:

- the lower frequency of serious injury claims in these classes, and

- it is likely that the existence of indemnity limits on policies means claimants, their advisors and the courts are less likely to consider PPOs appropriate.

On the second point above, the industry survey this year indicates that the propensity of non-motor PPOs (number of PPOs as a proportion of claims with a value of £1m or more) is about half that of motor PPOs. The differential in PPO propensity appears to be greater for larger value claims although the data is very sparse at this level so as to make confidence in the results less.

Policy limits are much more likely to be an issue for PPOs than for lump sum settlements because:

- In the situation where all the assumptions made in calculating the lump sum are unbiased, the PPO and lump sum will have equivalent economic value. But the nominal amount of the claim in the PPO case will be larger (often considerably so) due to the unwinding of the discount. Since the indemnity limit is set in nominal terms its economic value decreases the later the claim is paid out.

- The variability in the nominal payment due to uncertainty in indexation and mortality counts against the claimant in the sense that the insurer pays less if mortality is worse than anticipated or the indexation is lower, but the insurer's downside is limited if the reverse is true.

Clearly these issues become more material the larger the expected value (severity of injury, future life expectancy) of the claim becomes.

It is difficult to carry out any credible analyses on the small sample of non-motor PPOs that we have, Based on simple calculations of the likely cumulative PPO payouts, we have not found any for which it looks materially possible that the limit of indemnity will be breached.

The observations in the survey of shorter future life expectancy for non-motor PPO claimants and lower lump sums may also be an indication that PPOs are avoided for the very large claims, although this could also just be a feature of the lower tendency for very large claims in these classes.

So, as expected, it looks like indemnity limits are being appropriately considered when cases are settled. It is perhaps worth asking the question whether there is a danger that the likelihood of a claim breaching the indemnity limit could be underestimated.

One possible cause of a PPO claim breaching the indemnity limit is a significant overestimate of mortality at the time the PPO award is made. While possible, it seems likely that the parties concerned are taking into consideration the possibility of the claimant living significantly longer than expected.

The possibility of inflation being materially greater than anticipated would appear to be a more likely candidate. The outlook for long term inflation is very uncertain and this could have a large impact on the nominal value of the claim.

The example below shows the impact on the nominal payment for two inflation assumptions (3% and 7%). While this example is simplistic and some might consider it a bit extreme, 7% is considerably lower than the average annual percentage change in the retail prices index between 1965 and 1985.

In this illustration, the initial lump sum is assumed to be £2.5m with the initial value of the periodical payment at £125k.
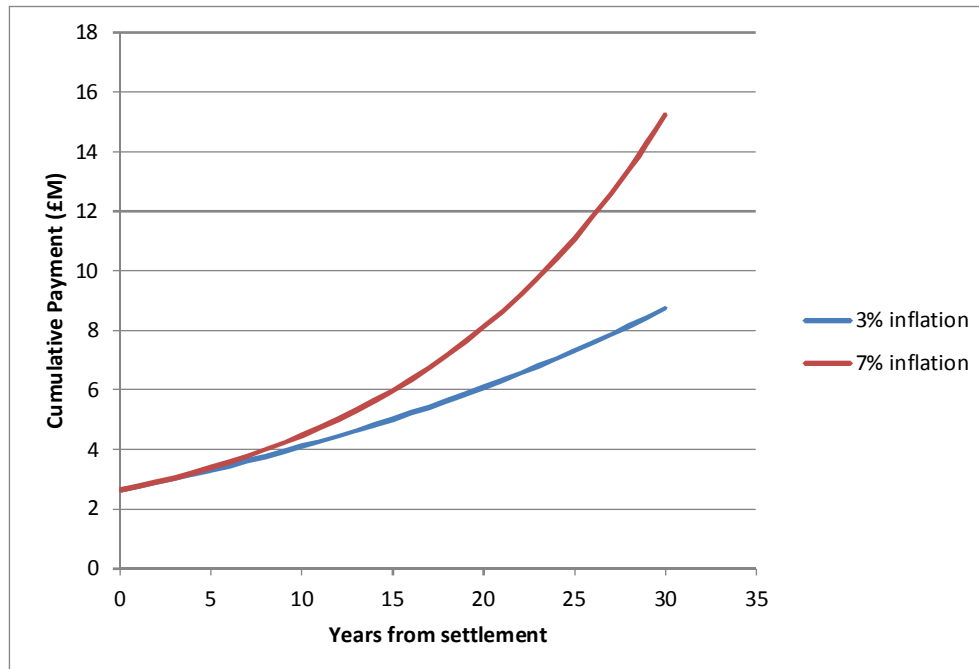
It is worth pointing out that, even in the absence of PPOs, there is the risk with nominal limits of indemnity, that greater than anticipated inflation can render the policy less valuable. However, for lump sums the payment term is much shorter and the risk is resolved at settlement. So the exposure for PPOs is much greater.

Additionally, the extent to which a lump sum may be preferable in these circumstances will depend very much on how it is invested and whether the investments prove a reasonable hedge for unanticipated inflation.

Whilst we have found no direct evidence that the courts are awarding PPOs inadvisably given policy limits, the question remains open whether courts are avoiding awarding PPOs owing to the same policy limits capping the nominal value of PPOs covered by standard liability limits.

E. Reinsurance

Appendix 5

Appendix 5 is part of the standard International Underwriting Association (IUA) motor questionnaire requested of insurers seeking Excess of Loss reinsurance. It is a template for reporting the details required to calculate a comparison of the cost of a PPO to a lump sum settlement. Appendix 5 was implemented by the IUA in 2010 for the 1st January 2011 renewals as a response to increasing PPO propensity and the need to cost the value accurately of these PPOs in pricing reinsurance.

The main purpose of Appendix 5 is to provide a consistent market approach to the reporting of PPOs and their value. In the most part the approach is reasonable, but there are a number of assumptions required and it is not possible to automate in full an approach to extracting the information. With a few adjustments, the information provided for renewal purposes should also be relevant as the basis of the submissions to future actuarial working party surveys.

Suggested improvements are to show:

1. Stepped payments

    The inclusion of stepped payments is currently via a comment box. Hence it is not possible to extract the information automatically. Stepped PPOs are increasing in use and hence capturing this information appears to be more important going forward. The amount and timing of each step should be shown where relevant, as well as whether the stated step amount is as at the time of the settlement or at the time of the step, which indicates whether the value requires indexing till the settlement date.

2. Settlement date

    The template currently includes the date that the lump sum is paid and the date the PPO commences. Both of these may be different to the settlement date, for example, if loss of earnings is settled as a lump sum in advance of a PPO settlement for cost of care, or if the PPO commencement is delayed. Including settlement date will assist in assessing the likelihood of a claim settling as a PPO, by removing reliance on an assumption as to the settlement date in assessing the proportion of claims settling as a PPO in a particular year. We understand that this is an improvement already implemented for the 1st January 2013 renewal questionnaire.

3. Indexation index

    This is currently specified at the claim level. Where multiple claimants or heads of damage are involved, it is possible for different indices to be used in the PPO for the different components.

4. Entry field for deputies' costs and case management expenses.

    Where these are compensated by an annuity, rather than by a lump sum, and are subject to different indexation, then it is necessary to display these cost separately. It will also enable tracking of this element of the cost of a claim.

5. Years of data captured

    The revised questionnaire for 2013 renewal requests 15 years of claims data. Where claims take longer than this to settle, for example if a small child is injured and settlement occurs at

maturity, then the proportion of claims becoming a PPO would be underestimated. These late settlement PPOs are also likely be the most expensive. Hence to report all PPOs settled against the insurer regardless of date of accident would improve the information available. To reduce the additional administrative burden, for claims beyond the triangle window, only the figures at settlement need be shown, as well as showing whether the claimant is alive or the date of death if not.

Reinsurance clauses

The biggest concern amongst insurers regarding the interaction of PPOs with the reinsurance contracts appears to be the indexation of the deductible, and the consequent continuing financial involvement of the insurer (i.e. the retention point will continue to increase as per the reinsurance indexation clause). Insurers will also be concerned with the credit risk associated with the large reinsurance recoveries that they will expect to make, continuing for many years into the future.

To address the indexation of the deductible there are a number of approaches that the insurers could consider:

Utilisation of a **severe indexation clause** as opposed to fully indexed cover will reduce the amount of indexation of the deductible. A sufficiently high percentile will result in a greater proportion of claims passing to the reinsurer. Where a reinsurer is required to pay more claims they may decide they require more premium to cover this risk, particularly as earlier first payment would result in reduced investment income.

Buying reinsurance cover at a **lower deductible** will result in more of the deductible being eroded by the lump sum element of the loss. Without amending the reinsurance clauses in place this may address a significant proportion of the insurers' concerns about not receiving a recovery for a long time. Buying at a lower deductible will result in an increase in reinsurance costs versus buying less cover.

A **gross quota share** would reduce the net reserve on an insurer's balance sheet as well as limiting the indexation to a smaller proportion of the claim. It may be more efficient from a capital perspective than non-proportional cover under the standard formula. Co-insurance of the gross business could have an even greater effect, depending on the structure of the agreement.

The insurer could pay for an **un-indexed deductible** if a reinsurer could be found who was willing to accept the risk. This would transfer much more of the claims cost and all of the longevity, investment and PPO indexation risk, barring credit risk, to the reinsurer, once a claim has breached the retention.

While the impaired life annuity portfolio remains as comparatively expensive and illiquid as now, reinsurers will wish to ensure that the **claims co-operation clauses** remain strong. This is because if the insurer purchases an annuity then there could be a significant increase in the claims burden such that any reduction in the capital required to support the reserving of the PPO is immaterial when compared against it.

To address insurer' reinsurance counterparty credit risk there are a number of possible approaches an insurer can adopt:

The approach which seems simplest is to purchase reinsurance from reinsurers with a **higher credit rating**. Solvency II requires more capital to be held when ten single A rated reinsurers are used, compared to a single double A rated reinsurer, although in practice insurers are likely to

want to retain a panel of reinsurers (e.g. to protect against a single reinsurer increasing the price of cover).

An alternative approach would be to include a **capitalization clause** (reinsurer pays a lump sum to commute its share of the PPO with the insurer). However, the insurer then retains on all the longevity risk and credit risk for the duration till date of capitalization would also remain. The considerations that would need to be given to any capitalization clause include:

- **Life expectancy**. The reinsurer would wish for the lowest life expectancy to be used, whereas the insurer would prefer to overstate the life expectancy. Perhaps the best approach might be to use either a jointly funded medico-legal expert, or to use the evidence of the insurer's expert for the defence of the original claim. Future trends in mortality improvement need to be considered.

- **Inflation & discount rates**. The reinsurer should be able to assess the change in the cost of increasing or decreasing the discount rate. This could be defined by including the discount rate as a net real discount rate (as used in determination of Ogden lump sums) or as a gross discount rate, e.g. by reference to government bond yields, and a separate inflation rate, e.g. implied future RPI/CPI derived from index-linked gilts, plus or minus a fixed margin as required. An insurer seeking to reduce their reinsurance spend could request the use of a higher net discount rate, whereas an insurer wishing to ensure an economically equivalent position to the value of a PPO could request a lower net discount rate and hence choose to bear the higher cost. Again it is reasonably straightforward for the reinsurer to assess the value of different options. Both parties should prefer to set the (implied) net discount rate either a fixed value agreed in the reinsurance contract or by reference to some published index.

- **Valuation date**. The valuation date has one of the biggest impacts on the discounting of the cashflows. Care will need to be taken that any interim payments are represented. For example, if there is a delay in settlement and an annual payment is made in the meantime, then the full amount of the payment need not be allowed for as this may be overstating the recovery by not allowing for the mortality of the claimant in the year.

- **Application of the deductible**. There will be a difference in recoveries dependant on whether the deductible is applied before or after discounting the cashflows. A capitalisation clause could allow for the calculation of discounted gross cashflows as at some point, say the date of settlement, and the recoveries calculated on the resultant lump sum, which would result in higher recoveries than if the deductible is assumed to be increasing in line with traditional PPO indexation and then the recoverable cashflows discounted.

- **Variation orders and stepped PPOs**. While variation orders are not seen frequently, consideration of how the cost may be calculated in the event of a capitalisation should be considered or a delay in the settlement could ensue. Stepped PPOs are relatively easy to allow for in the discounting calculation.

- **Treatment of early death**. A limitation to agreeing a capitalisation clause is that reinsurers may feel disinclined to agree to one if they feel the chance that the claimant may die in the very near term is greater than reflected in the life expectancy assumption. The insurer may wish to increase the reinsurer's appetite for the clause by allowing a reimbursement of some of the payment if the claimant dies in say the first five years. Given that a reinsurer would be unlikely to pay an additional amount if the claimant survives beyond specified dates, and it

would contravene the concept of a full and final settlement, to offer a clause with reimbursement on early death appears a little one-sided. An alternative is to delay settlement date until a minimum age or time since PPO settlement has elapsed.

- **Actions following a disagreement**. The key area of agreement is likely to be over life expectancy. Once a claimant is granted an award, then the insurer and reinsurer are in analogous previous positions to the claimant and insurer respectively, i.e. the insurer now arguing the life expectancy up rather than down as would have been the case in negotiating a potential lump sum with the claimant. An ideal approach would be to have a formulaic approach in the contract which removes choice at the point of capitalisation. The contract could state that, in the absence of agreement, the opinion of a specified third party is sought, the outcome of which is binding.

- **Which PPOs are eligible?** An insurer may wish to only capitalise claims where the impairment is below a certain level, as the uncertainty over the level of impairment may be too large for the insurer to bear for more severe cases.

- **Mortality**. The present value of the claim can be estimated by applying the expected mortality at each duration to the payment or by applying a fixed life expectancy. The former is a more accurate approach to reflect, but for the purposes of a capitalisation approach the more important consideration is that both parties are aware of the intention and application of the terms.

- **Purchase of an annuity**. In the event that an insurer purchases an annuity to meet the on-going payments, whether in full or in part, then the claim should be capitalised, in accordance with the prescribed formula. The methodology would depend on the wording of the clause. At the point of recovery an insurer would prefer that the capitalisation clause would be included in the settlement. The degree to which this is possible would depend on the timescale to perform the capitalisation. If it is automatic on settlement of the claim as a PPO, then it is unlikely that there will be sufficient time to arrange the purchase of an annuity. The inclusion of an annuity in the capitalisation clause would be expected to increase the reinsurance cost, at the very least because the profit margins of the company providing the annuities would need to be included in the price. How an annuity reacts to the clause if the basis of the annuity is different from the basis of the PPO would need to be reflected, e.g. if the annuity is based on RPI indexation, with a PPO based on ASHE indexation. If an annuity buy-out is likely, the parties to the reinsurance contract can still mutually choose to ignore some or all of the provisions of any capitalization clause and proceed on the basis of the annuity purchase. Any claims co-operation clause will also apply.

- **Statutory funding**. Similar to the issue of early death, it is possible that the existence of statutory funding changes subsequent to the settlement of a capitalisation. This could have a material effect on the value of a claim, potentially both positively and negatively to the insurer. If there is a possibility of statutory funding being withdrawn/provided, then the parties may consider whether to include a clause that allows for a reimbursement or additional payment in the event of a change in the statutory funding situation of the claimant, and the degree to which the annual PPO changes in response to this. The inclusion of a clause again would take away from the idea of a full and final settlement, and may require one or other of the parties to hold capital to cover the risk of the clause being triggered.

- It is increasingly common for reinsurance to be placed on several slips with slightly differing terms and conditions. The insurer will need to consider each slip in isolation as the effects of the differences can be material. There will also be multiple lead reinsurers to deal with.

The considerations mentioned above would also be relevant if an insurer wishes to commute a block of claims, or a reinsurance treaty. In a commutation situation, the parties would need to consider also whether they wish to commute only the settled PPOs or the whole treaty, and if the whole treaty, then how to allow for claims that are yet to settle becoming a PPO.

Lessons from the life side

There are some structural differences between the life and non-life reinsurance markets which limit the ability to make direct comparisons. One obvious difference is that longevity is not a new risk for a life company, which is therefore likely to be less concerned with transferring the risk from their balance sheet. In addition, life companies that have annuity risk will normally have a large number of small policies (relative to the overall portfolio size) rather than the small number of large risks that non-life insurers would expect from PPOs.

The frequency of a death under a normal annuity book (per contract per annum) is significantly lower than the frequency of an accident under a motor contract; hence life insurers will have lower confidence in the reliability of loss estimates derived from their own data than a non-life insurer would. This results in reinsurance contracts which provide the insurer with underwriting expertise in addition to capital and earnings protection. A consequence of this is that within life insurance proportional treaties are a superior match to the alignment of interest that exists due to the exchange of underwriting information required by the insurers.

Bearing these issues in mind we have tried to consider some factors of the life industry which appear to have some relevance for the non-life industry and discuss below whether there are ideas that can be transferred across:

Longevity swaps

As described above, longevity risk in life insurance is usually transferred by a proportional arrangement. The exact nature of this is often by a longevity swap. The process under which this works is that the insurer and reinsurer will agree on an expected cashflow profile for the portfolio of risks to be included. The insurer agrees to pay the reinsurer this expected amount each year, which takes into account the expected mortality of the underlying lives. In practice more or fewer lives will die than is expected. Consequently the actual claim payments will be more or less than the expected amount. The reinsurer agrees to pay the insurer the actual claims that are paid, based on the experience as described. Hence the insurer is swapping the expected cashflows for the actual cashflows that it expects to pay. In technical terms the difference between the cashflows is all that is transferred, to reduce transactional charges.

A pictorial diagram is shown below:

Expectation

£100m

| Insurer | → | Reinsurer |

£100m

Actual cashflow

Nil
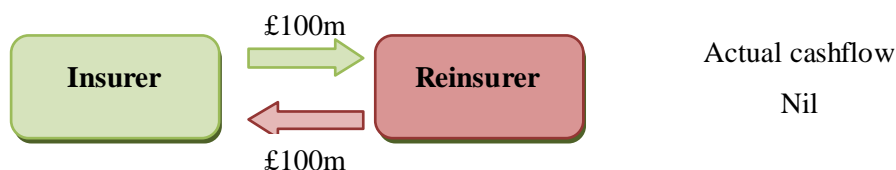
Scenario 1 – fewer people die than expected

£100m

| Insurer | → | Reinsurer |

£105m

Actual cashflow
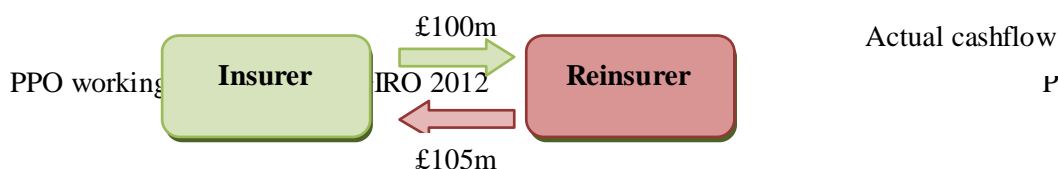
£5m

Scenario 2 – more people die than expected

£100m

| Insurer | | Reinsurer |

£95m

Actual cashflow

£5m
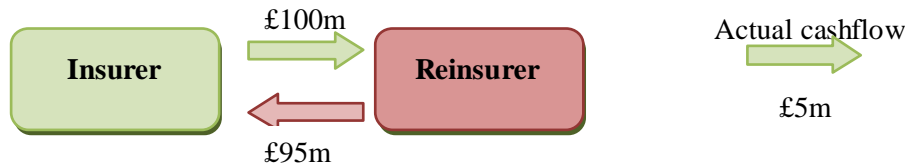
A point to bring to the attention of the reader is that it is only mortality risk that is transferred. The inflation risk remains with the insurer. The contracts generally allow for yearly recalculation of the expected losses, so that if 100 is expected previously, and inflation is 5%, then the adjusted expectation is 105, and the swap will be based on the 105.

But currently the use of this appears limited in non-life reinsurance.

The biggest difficulty is due to the make-up of a portfolio of claims. As mentioned, an annuity portfolio would be made up of lots of small annual payments, whereas a PPO portfolio would comprise a small number of large annual payments. Consequently, the predictability of the cashflows would be reduced and more capital would need to be held by the reinsurer, increasing the cost to the insurer. The volatility of the cashflows would also make the swap less attractive to the reinsurer from a result stability consideration. Depending on the future of the Ogden discount rate, there may be fewer PPOs in the future, making even the number of future PPOs less certain.

An additional reason is that the structure works most efficiently when the risk transfer is on a proportional basis. Longevity risk is one of the major risks in an annuity portfolio, whereas it is currently a lesser risk in the context of an overall motor portfolio, where most of the claims are damage to the vehicle, hire costs and small third-party injury costs. Consequently the decision to cede business on a proportional basis will not have longevity risk as one of the major concerns for the non-life insurer. The swap alleviates this to some degree, as only the expected annuity payments could be considered.

A longevity swap would appear to be most suitable for annuities in payment. For non-settled claims the fact that an annuity's start date is unknown (or even that there will be a PPO at all), as well as the uncertain annual amount, makes structuring a deal difficult. However, a deal could be reached to swap the cash flows as and when a PPO is agreed/awarded. A reinsurer would need to consider whether they are accepting moral hazard in terms of whether they are incentivising an insurer to settle claims via a PPO or not. How a swap interacts with the traditional excess of loss treaties would need to be considered.

One reason why the structure works for life insurers is that the inflation linkage of the annuities is usually RPI or CPI, dependant on the terms of the scheme. As these indices can be hedged in capital markets at least to some degree, the insurer can remove most of the risk from its balance sheet, leaving some credit risk from the swap and residual basis and/or reinvestment risk potentially in respect of the inflation hedge. As PPOs are almost all linked to ASHE, at least for the largest value head of damage, the current outlook for the possibility of hedging this risk appears remote.

Use of mortality tables rather than life expectancy

Life insurers will use mortality tables to assess the expected cashflows, rather than a fixed life expectancy. The former is a more appropriate approach, particularly when calculating the value to

different non-proportional reinsurance layers. This is discussed extensively in previous papers, so we do not discuss further here.

Use of medical underwriters

Life expectancy assessments in non-life are given often by GPs and medico-legal experts. Medical underwriters on the life and health side have experience of assessing the mortality and will provide adjustments to mortality rather than life expectancies, which will aid in the valuation of the claim. In contrast to GPs, medical underwriters are seen to be slightly removed from the claimant, and hence give a "disinterested" opinion on the severity of the injury. They will also see a wider number of patients than the GPs, who will normally see only those patients under their care and who consequently are unlikely to get as wide a view as a medical underwriter.

Where the view of a medical underwriter could be beneficial in the non-life sector is in setting claim reserves and in the life impairment assumption of a capitalisation. A capitalisation could be difficult to achieve in practice as there may be a reduced level of trust if the medical underwriter works for one of the parties involved. Additionally, there may be an additional cost of obtaining the advice of an underwriter from a third party company. There is scope for some bias, as the information presented to medical underwriters is usually from a third party expert.

Use of mortality adjustments rather than change in life expectancy

The typical approach when assessing the value of an impaired life in a non-life environment is to take the assessed future impaired life expectancy, use that to determine an equivalent age of the same future life expectancy from an unimpaired life mortality table, and use the implied mortality from there. The concern with this approach is that the **shape** of the mortality curve may be very different. For example, a 20 year old male could have a 20 year future life expectancy, which would correspond to an unimpaired 66 year old male. But using the mortality of the unimpaired 66 year old could give insufficient weight to the possibility of the individual outliving the 20 year future life expectancy.

Market consistent valuations

Life and health companies will adopt a market consistent approach to valuing the liability. This involves use of market prices for the inflation element of the claim and the observed yield curves for discounting. The degree to which a market price for ASHE can be found is a limiting factor, but these considerations will need to be dealt with in Solvency II framework.

Capital calculations

The amount of capital required to be held should be calculated on a consistent basis with a life and health approach. Factors which would traditionally be applied to outstanding non-life reserves would be inappropriate. Under Solvency II this will be a requirement, but in the interim, and in internal models, the risk should still be modelled using life and health techniques.

Discounting reserves

Traditionally non-life insurers have held undiscounted reserves for a variety of reasons. For the same liability a life insurer would discount the reserves for reporting purposes. Given the very long term nature of the liabilities it seems inappropriate to hold nominal reserves for this liability.

F.   Ogden tables version 7 and mortality improvements

Introduction

The Ogden tables are prepared by the Government Actuary's Department. They provide an aid for those assessing the lump sum appropriate as compensation for a continuing future pecuniary loss or consequential expense or cost of care in personal injury and fatal accident cases.

The tables set out multipliers that enable the user to assess the present capital value of future annual loss (net of tax) or annual expense calculated on the basis of various assumptions. Accordingly, to find the present capital value of a given annual loss or expense, it is necessary to select the appropriate table, find the appropriate multiplier and then multiply the amount of the annual loss or expense by that figure.

The revised Ogden tables are primarily to enable an update to the mortality assumptions underlying the calculations. In addition there are a number of items in the tables and accompanying explanatory notes which are worthy of highlighting.

The ONS provides mortality updates every two years. The 6th edition of the Ogden Tables used the 2004 projections. A 2006 edition was published which resulted in an increase in life expectancies. The 2008 edition of the mortality assumptions resulted in a further uplift. It is on the 2008 projections that the 7th Edition tables are based. They leave the door open for future improvements with the comment *"There is much debate among demographers about whether the factors that have led to the significant improvements in mortality in recent years can continue unabated, thus adding some uncertainty to any projections of future mortality. While the Working Party has continued to use the official projections made by the ONS of future mortality rates in the UK, we propose to monitor developments as new evidence becomes available."*

An additional point worthy of note is that the range of discount rates available has shifted. In the 6th edition the tables are provided from zero to 5%, whereas in the 7th Edition the tables range from -2% to 3%. This is explicitly commented on a reference to the review of the Ogden Discount rate, on which the Lord Chancellor is consulting at the time of writing, as well as a case in Guernsey, where a lump sum was awarded on a negative 1.5% discount rate. The Chairman comments *"It is not, we believe, the purpose of these Tables or the role of the Working Party to advocate a discount rate, but merely to provide the tools so that, whatever the rate should be, personal injury and fatal accident claims may be quantified".*

In respect of PPOs there is a reminder to Actuaries and CFOs of the cost of a PPO. The comments of the chairman are *"The revised spread of discount rates will assist comparison between lump sums and periodical payments, a process required by the Damages Act 1996, to be more accurately appreciated. The present value of periodical payments is substantially higher than lump sums calculated using the current discount rate of 2.5%."* This statement clearly assumes that the discount rate to be applied to PPOs in converting to an equivalent lump sum is lower than the 2.5% in respect of Ogden-based lump sums.

Impact

Assessing the impact of the revised tables on the non-life claims environment we must consider two elements, namely the multipliers used for lump sums and the life expectancy tables used to value PPOs. The impact on the latter is greatest.

1.   Impact on Lump sums

In respect of lump sums we consider the multipliers at a 2.5% discount rate. 2.5% is chosen because it is the current discount rate as specified by the Lord Chancellor. The tables below show the multiplier for future loss for whole life on a 2.5% discount rate basis

Table A – Ogden 2.5% Multipliers for whole life for Males

Age	6th Edition	7th Edition	Increase
5.00	34.59	34.90	0.90%
15.00	32.72	33.14	1.28%
30.00	29.05	29.60	1.89%
45.00	23.88	24.70	3.43%
60.00	17.30	18.30	5.78%

Table B – Ogden 2.5% Multipliers for whole life for Females

Age	6th Edition	7th Edition	Increase
5.00	35.18	35.47	0.82%
15.00	33.53	33.91	1.13%
30.00	30.15	30.68	1.76%
45.00	25.30	26.03	2.89%
60.00	18.94	19.83	4.70%

The increases shown in the above tables are the relative increases in the multipliers, and hence the relative increases in the total value of the compensation from that head of damage. The increases are greater, both in amount and relative size as the age of the claimant increases.

For the majority of claimants, the increase will be less than 2% and hence the impact on the industry should be relatively minor.

2.   Impact of future life expectancy

Of greater concern is the increase in the life expectancy and the impact on PPOs. The increase in life expectancy is not a large factor on a 2.5% multiplier because extra years are at the end of the duration, and will experience a significant amount of discounting, so the impact is reduced. As the Chairman of the Ogden report states, the present value of a PPO is substantially higher than that of a lump sum if we assume a lower discount rate in general for valuing PPOs, hence the impact of extra years at the end of a life has a more material impact.

Considering the whole life tables at a zero discount rate, we can see the changes in the life expectancy at each age level. We are comparing different cohorts in this example, but it indicates the average increase in the population as a whole.

Table c – Future life expectancies from Ogden 6 to Ogden 7
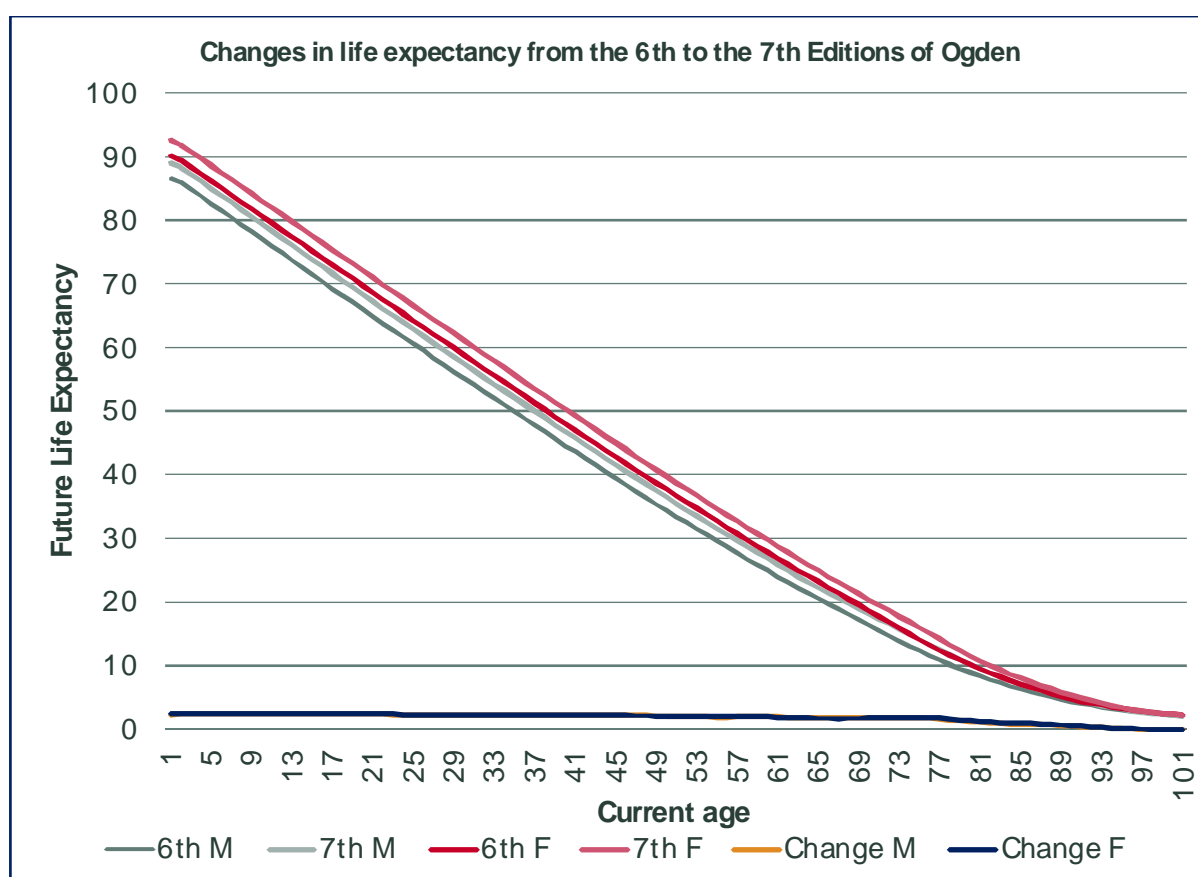
The increase in life expectancy can be seen to be reasonably consistent at all ages. The change is approximately 2 years until aged 75. The survey in this paper indicates a future life expectancy of around 40 years. A 2 year increase is therefore a 5% increase in cost of care element of the average PPO claim, using a simple approach to mortality. Using the more accurate probabilistic method would result in greater increases still.

3.   Impact on Typical PPO

To calculate the impact on the average PPO claim, as indicated by the survey, we have taken the mortality tables as requested from the GAD. We have then calculated the expected cashflows on survival assuming a 4% increase in the annual amount. The impact is a 10% increase in the nominal value and a 4% increase in the discounted value. The calculations are shown below. The yield curves are based on the government spot yields as at 20th August 2012. For simplicity of calculation, we have not included the possibility of someone surviving beyond the date of the PPO payment, but dying before the end of the year.

P(Survival) (Ogden 7)	P(Survival) (Ogden 6)	Cashflow on survival	Expected Value O7	Expected Value O6	Yield Curve %	Expected Present Value O7	Expected Present Value O6
0.9982	0.9982	1,938,700	1,938,700	1,938,700	0.24679302	1,936,312	1,936,312
0.9963	0.9962	81,848	81,545	81,541	0.14769229	81,365	81,360
0.9943	0.9941	85,122	84,635	84,621	0.26511606	84,077	84,063
0.9922	0.9917	88,527	87,832	87,796	0.47407675	86,390	86,354
0.9899	0.9891	92,068	91,139	91,063	0.71575028	88,261	88,187
0.9875	0.9862	95,751	94,556	94,425	0.96334374	89,699	89,575
0.9849	0.9829	99,581	98,080	97,882	1.20314608	90,745	90,561
0.9821	0.9795	103,564	101,711	101,438	1.42696369	91,457	91,212
0.9790	0.9758	107,706	105,449	105,098	1.63003918	91,908	91,603
0.9757	0.9719	112,015	109,297	108,868	1.81083942	92,164	91,803
0.9722	0.9678	116,495	113,257	112,748	1.97057097	92,274	91,859
0.9684	0.9635	121,155	117,330	116,736	2.11177797	92,265	91,798
0.9644	0.9589	126,001	121,517	120,827	2.23758325	92,152	91,629
0.9601	0.9540	131,041	125,816	125,014	2.35129077	91,934	91,348
0.9556	0.9487	136,283	130,232	129,290	2.45573265	91,609	90,947
0.9508	0.9430	141,734	134,764	133,650	2.55320441	91,172	90,418
0.9458	0.9368	147,404	139,409	138,087	2.64544836	90,612	89,753
0.9403	0.9301	153,300	144,153	142,588	2.7334994	89,921	88,945
0.9344	0.9229	159,432	148,974	147,141	2.81782251	89,093	87,997
0.9279	0.9152	165,809	153,857	151,745	2.89845777	88,134	86,924
0.9209	0.9070	172,441	158,800	156,405	2.9751387	87,064	85,751
0.9134	0.8985	179,339	163,804	161,128	3.0474662	85,906	84,502
0.9054	0.8895	186,513	168,860	165,909	3.11500816	84,681	83,201
0.8968	0.8802	193,973	173,961	170,732	3.17737479	83,410	81,862
0.8878	0.8703	201,732	179,100	175,573	3.23429063	82,112	80,495
0.8783	0.8599	209,801	184,262	180,405	3.23429063	81,832	80,119
0.8682	0.8488	218,193	189,436	185,204	3.23429063	81,494	79,674
0.8576	0.8370	226,921	194,615	189,944	3.23429063	81,099	79,153
0.8465	0.8246	235,998	199,773	194,593	3.23429063	80,640	78,550
0.8347	0.8112	245,438	204,863	199,096	3.23429063	80,104	77,849
0.8222	0.7968	255,255	209,864	203,393	3.23429063	79,489	77,038
0.8090	0.7814	265,466	214,751	207,422	3.23429063	78,792	76,103
0.7949	0.7647	276,084	219,457	211,109	3.23429063	77,996	75,029
0.7798	0.7467	287,128	223,899	214,399	3.23429063	77,081	73,811
0.7635	0.7275	298,613	228,005	217,235	3.23429063	76,036	72,444
0.7462	0.7070	310,557	231,726	219,552	3.23429063	74,855	70,923
0.7276	0.6851	322,979	235,005	221,269	3.23429063	73,536	69,238
0.7078	0.6618	335,899	237,741	222,305	3.23429063	72,062	67,383
0.6865	0.6372	349,335	239,816	222,605	3.23429063	70,413	65,360
0.6638	0.6114	363,308	241,146	222,119	3.23429063	68,586	63,174
0.6397	0.5843	377,840	241,704	220,776	3.23429063	66,591	60,825
0.6145	0.5559	392,954	241,470	218,434	3.23429063	64,442	58,294
0.5882	0.5257	408,672	240,398	214,834	3.23429063	62,146	55,537
0.5610	0.4937	425,019	238,423	209,824	3.23429063	59,704	52,543
0.5327	0.4604	442,020	235,456	203,507	3.23429063	57,114	49,364
0.5034	0.4262	459,701	231,421	195,943	3.23429063	54,377	46,040
0.4730	0.3913	478,089	226,120	187,086	3.23429063	51,466	42,582
0.4413	0.3563	497,212	219,416	177,156	3.23429063	48,376	39,059
0.4091	0.3219	517,101	211,523	166,460	3.23429063	45,175	35,551
0.3767	0.2881	537,785	202,591	154,926	3.23429063	41,911	32,051
0.3440	0.2543	559,296	192,420	142,229	3.23429063	38,560	28,502
0.3109	0.2212	581,668	180,815	128,663	3.23429063	35,099	24,976
0.2775	0.1903	604,935	167,891	115,106	3.23429063	31,569	21,644
0.2447	0.1621	629,132	153,927	102,003	3.23429063	28,037	18,579
0.2129	0.1367	654,297	139,300	89,464	3.23429063	24,578	15,785
0.1829	0.1140	680,469	124,445	77,560	3.23429063	21,269	13,256
0.1550	0.0937	707,688	109,704	66,321	3.23429063	18,162	10,980
0.1295	0.0758	735,995	95,341	55,799	3.23429063	15,290	8,948
0.1066	0.0602	765,435	81,602	46,058	3.23429063	12,677	7,155
0.0863	0.0468	796,053	68,706	37,216	3.23429063	10,339	5,600
0.0687	0.0355	827,895	56,837	29,395	3.23429063	8,285	4,285
0.0536	0.0264	861,010	46,139	22,712	3.23429063	6,515	3,207
0.0410	0.0192	895,451	36,711	17,225	3.23429063	5,021	2,356
0.0307	0.0138	931,269	28,597	12,840	3.23429063	3,789	1,701
0.0225	0.0097	968,520	21,793	9,394	3.23429063	2,797	1,206
0.0161	0.0067	1,007,260	16,235	6,734	3.23429063	2,018	837
0.0113	0.0045	1,047,551	11,816	4,726	3.23429063	1,423	569
0.0077	0.0030	1,089,453	8,399	3,247	3.23429063	980	379
0.0051	0.0019	1,133,031	5,830	2,184	3.23429063	659	247
0.0034	0.0012	1,178,352	3,950	1,439	3.23429063	432	158
0.0021	0.0008	1,225,486	2,612	929	3.23429063	277	98
0.0013	0.0005	1,274,506	1,687	587	3.23429063	173	60
0.0008	0.0003	1,325,486	1,065	363	3.23429063	106	36
0.0005	0.0002	1,378,505	656	221	3.23429063	63	21
0.0003	0.0001	1,433,646	395	133	3.23429063	37	12
0.0002	0.0001	1,490,992	232	80	3.23429063	21	7
0.0001	0.0000	1,550,631	136	50	3.23429063	12	4
0.0000	0.0000	1,612,656	80	31	3.23429063	7	3
0.0000	0.0000	1,677,163	48	-	3.23429063	4	-
0.0000	0.0000	1,744,249	32	-	3.23429063	3	-
0.0000	0.0000	1,814,019	25	-	3.23429063	2	-
0.0000	0.0000	1,886,580	12	-	3.23429063	1	-
0.0000	0.0000	1,962,043	1	-	3.23429063	0	-
0.0000	0.0000	2,040,525	-	-	3.23429063	-	-
0.0000	0.0000						
0.0000	0.0000						
0.0000							
0.0000							
0.0000							
0.0000							

| | | | Total | 12,067,101 | 10,971,312 | | Total | 6,038,240 | 5,796,763 |
| | | | Impact | 9.99% | | | Impact | 4.17% | |

Clearly the importance of mortality assumptions in the estimation of the cost of a PPO claim must not be underestimated and any actuary involved needs to consider very carefully the approach he or she uses and whether to make an allowance for future improvements in mortality above those assumed in the Ogden tables.

G. Ongoing reserving

This section considers the actions reserving actuaries need to take to monitor and update reserves for PPOs already in payment. Many issues are due to Solvency II requirements, but are in any case good practice for reserving actuaries to follow.

It is important for insurers and reinsurers to face these issues as it has been estimated that ongoing PPOs could eventually account for 35% of insurers' motor liabilities (source: *Towers Watson Insight Feb 2012 – Beware the PPO Iceberg*). For XoL reinsurers, that percentage will be much higher.

Already the differences in approach to reserving for PPOs are making comparisons between results for companies difficult. Similarly, XoL reinsurance underwriters will need to take note of the reserving practice adopted for actual and potential PPOs shown by cedants so as to price cover on a consistent basis.

In practice, reserving for PPOs is very uncertain: PPOs are, by comparison with standard motor and liability losses, low frequency and high severity with the results not known for many more years. Therefore, communicating the uncertainty to management and getting its buy-in to the assumptions and techniques is vital.

Setting initial reserves

The starting point for reserving PPOs-in-payment is the point at which the PPO becomes a reality. Solvency II QIS 5 technical specifications call this the "annuitisation" event: when the insurer becomes obligated to pay an annuity to a claimant. Before this event, the insurer can use its traditional techniques. After the annuitisation event, different techniques are required, which are explored in depth in previous GIRO PPO papers. Suffice to say that Solvency II QIS 5 requires the use of life insurance techniques (discounted projected cash flows) post-annuitisation.

The reserving techniques that apply pre- and post-annuitisation are very different for the vast majority of insurers. Further, by including the post-annuitisation cumulative payments in the usual chain-ladder triangles, there is a big danger that the triangles will become distorted by calendar year effects: payment profiles are changing. Thirdly, insurers' chain-ladder triangles are usually undiscounted so the cumulative payments will eventually show a paper underwriting loss if no adjustment is made.

One technique to overcome these problems for Solvency II purposes is to separate the reserving of likely PPOs and PPOs-in-payment from the rest of the motor liabilities. The usual chain-ladder triangles retain the lump sum equivalent of the likely or actual PPO, and the insurer establishes a separate reserving category for the likely PPOs and the PPOs-in-payment with an initial, notional payment inwards from the old motor liabilities book: effectively an internal buy-out.

The remainder of this section deals with the new PPOs-in-payment account.

Reserving methodology

As we have found in this and last years' surveys of the insurance industry, the majority of insurers are using a discounted cash flow technique to derive a net present value for PPOs. The differences were in the assumptions (earnings inflation, investment return, life expectancy) and their mortality methodology. Please see section B in this paper on the qualitative survey responses for more details of the variety of reserving methodologies used in practice.

On allowance for mortality, the difference is between an annuity-certain approach, in which PPO payments are made until the last year of life expectancy and then cease, against a probabilistic whole-of-life approach which uses a life decrement table to multiply future payments by the probability a PPO is payable in that year (including years beyond the estimated life expectancy). In the latter, a life decrement table is chosen that gives the same initial selected future lifetime; it can be derived from a basic unimpaired life table using techniques such as constant annual addition to mortality or addition to actual age as at time of settlement.

The effects on undiscounted and discounted reserves are illustrated by the following graph taken from last year's GIRO PPO workshop presentation, which shows the reserves for an example case (male, age 49 with future life expectancy of 31 years at settlement) over time assuming no change to reserving assumptions:
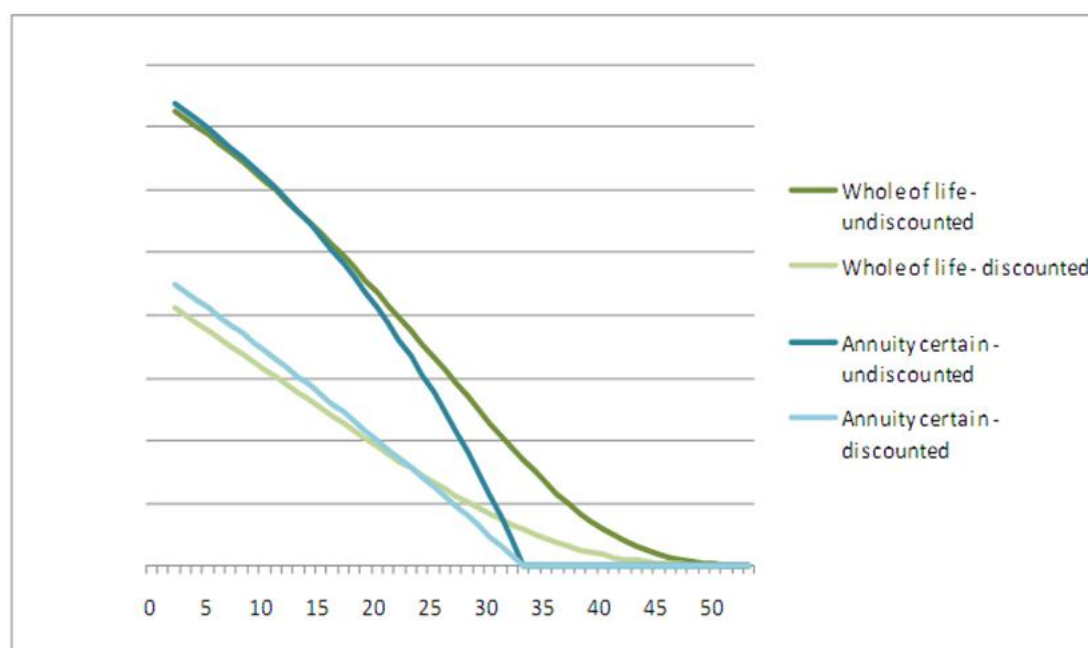
The probabilistic, whole-of-life approach is particularly advantageous for ongoing reserving as it automatically provides for the contingency that a claimant survives another year (assuming the initial estimate of future life expectancy remains valid).

For the annuity-certain approach, or indeed any non-NPV approach, a revised assumption regarding life expectancy is needed each year for the reserves to keep pace. Under Solvency II, if the PPOs-in-payment liabilities are material, the probabilistic approach is required anyway.

Data requirements

Ongoing reserving for PPOs-in-payment means it is important to keep track of the many assumptions and data that are needed to calculate the initial reserve and to re-apply them in each reserving cycle. A probabilistic, whole-of-life approach to reserving PPOs-in-payment reduces the need to re-estimate expectancy of future lifetime manually each time, assuming the claimant survives another year. However, each assumption in any calculation should be monitored and changes fed into the reserving calculation.

Some assumptions will change over time only slowly and will therefore need less attention each reserving cycle; some assumptions need constant appraisal.

Those assumptions that need re-visiting each reserving cycle include:

- Actual deaths of PPOs-in-payment claimants;

- PPO index inflation in the previous year, to update the current PPO payment amount and reinsurance retention because of indexation;

- Real discount rate (i.e. investment return less PPO index inflation assumption) – especially if the discount rate is fixed relative to the prospective yield curve of the underlying invested assets;

- Expense load.

Assumptions that are likely to need revisiting less frequently include:

- Mortality trends – underlying population trends and impaired life mortality;

- Claimant health (see below) – including whether variation orders are more or less likely to be triggered;

- Proportionality – are PPOs-in-payment becoming material to insurer liabilities and therefore requiring greater level of detail and accuracy.

Links to business planning and risk management

For PPOs in payment, reserving is highly sensitive to a few particular assumptions. Most critical are the real discount rate (investment return less PPO index inflation) and longevity/mortality. Getting these accurate is paramount and therefore detailed modelling should be considered. These critical assumptions will drive what is likely will be the most material single aspect of an insurer's eventual motor liabilities.

Capital modelling can also be used to assist reserving: using the capability of a stochastic capital model to calculate a probabilistic net present value reserve is very likely to be only a small stretch of the model. This automatically aligns reserving with the internal model.

However, the links between reserving for PPOs-in-payment and business planning do not stop there. An insurer's management and underwriting strategy will dictate how that insurer reacts to PPOs. Some insurers will see PPOs as a part of normal business and will be prepared to carry the reserves until natural expiry (subject to adequate pricing and reserving). Others will seek an active strategy to remove or mitigate some of the risk factors, including:

- Seeking claim buy-out and pooling opportunities;

- Engaging in hedging and other risk containment activity;

- Capitalising or commuting reinsurance, including having compulsory capitalisation or commutation as part of the reinsurance contract;

- Engaging third-party administration support services.

These issues are discussed elsewhere in this and previous GIRO PPO papers. If these strategies are pursued, then it is important that reserving and capital modelling reflect such management attitudes. For example, a PPO claim in payment that is subject to a compulsory capitalisation with reinsurance should be reserved in line with the terms and conditions of the capitalisation clause when calculating the net reserve from the gross reserve.

Claimant health

The ongoing health of a claimant can impact a PPO-in-payment in two main ways. First, if the PPO order contains a variation order, is now more or less likely to be triggered by a change in the claimant's health? Second, is the claimant now more or less healthy in general than would be expected by someone with the future life expectancy as assumed initially at the time of settlement? Just by surviving each year, there is an increase in the claimant's total expected future lifetime from date of settlement. Since future longevity/mortality is a key assumption in the level of a PPO reserve, it is important to keep the expected future lifetime assumption up to date.

Whilst there are general population trends in mortality, and our understanding of impaired life mortality is increasing quickly, each case is specific and the variations in mortality (and its variability) are high, especially considering that high-quality care is likely to improve a claimant's life expectancy from where it would be without such care. Therefore, knowing about the claimant's own ongoing health is valuable.

Getting access to a claimant to assess their health could be problematic. Apart from the basic "proof of life" at each payment date, and if the claimant returns to court to try to trigger a variation order, there is not necessarily an automatic right for an insurer to have access to a claimant's health record. An insurer can, of course, request such access to be granted voluntarily. But such requests are likely to be resisted by the claimant or their representatives on the grounds that the insurer "is trying to get the payments reduced". The only sure-fire way to get such access by right is for it to be written into the PPO order itself, which we are aware that at least one UK insurer is doing and others may like to consider following.

There is also the issue of frequency of access. Too frequent and the claimant may start to deny access (especially if given voluntarily) and the cost of re-assessing health will become exorbitant for the insurer. Not frequent enough means the reserves, and the consequent feedback mechanism to pricing and capital modelling, are in danger of becoming out-of-date. There is no single recommended "middle ground": this is a new field in claims management and reserving. However, insurers perhaps should consider targeting a minimum of two equally-spaced re-assessments in the claimant's expected future lifetime (for example at 5 and 10 years post-settlement where the expected future lifetime of the claimant at time of settlement is 15 years).

Attribution of run-off profit

Non-life insurers are used to reporting profit and loss showing the contribution to profit from prior years, typically through reserve strengthening or releases. If the claims settle in line with the reserves and there is no change to reserve strength, then there is no contribution, positive or negative, from prior years on an insurer's bottom line.

For a life insurer, the situation is not so clear cut. Even if there is no change to reserve strength and payments are in line with reserves, there can still be a run-off profit or deficit from an unwinding of the discount and the probability-weighted future mortality over the period.

Part of reserving PPOs in payment has to be analysis of surplus to determine if the run-off is better or worse than expected. With few PPO cases each year, the run-off is likely to be very uncertain with timing of individual claimant deaths having a major impact on carried reserves. As well as reserves for the PPO payments themselves, the expense load and reserve capital should be assessed at each reserve cycle and be part of the analysis of surplus.

H. ASHE

What is ASHE?

ASHE is the Annual Survey of Hours and Earnings, which as the name implies is an annual survey of earnings results. It is produced by the Office for National Statistics (ONS; www.ons.gov.uk). The information is based on a sample of one percent of jobs drawn from HM Revenue and Customs Pay As You Earn records from the month of April. Results are expressed in the mean and percentiles of the survey results, and in several formats such as hourly earnings and annual earnings, different genders and types of pay, comparisons of the public vs. private sector, etc.

ASHE is often produced on a provisional basis, which potentially is revised the next year in light of new data. It is unknown how different companies allow for revisions when calculating PPOs to claimants.

The results are broken down by job types using the Standard Occupation Classification (SOC) codes. The most common SOC Code for PPOs to be associated with is 6115 – "Care assistants and home carers".

ASHE replaced the National Earnings Survey (NES) in October 2004. A created back history of results to 1998 was also published. There are however a number of changes that were incorporated into the back history or have occurred since. These are:

- There is disconnect between the 2001 & earlier and the 2002 & later results due to the SOC codes being switched from SOC 1990 series to SOC 2000. Code 6115 "Care assistants and home carers" did not exist in SOC 1990 – the closest match was 644 "Care assistants and attendants".

    o This means the 2001 to 2002 inflation cannot be calculated, and inflation in the 2001 and prior years may have differed if the 6115 code had been in use.

- In 2007 there were two methodology changes. These impacted the weight given to certain employers and automatic SOC coding. These created a slight disconnect with previous versions. Therefore the ONS reproduced the 2006 results on the new methodology.

    o Thus allowing calculation of inflation from year to year from 2003 onwards.

- In 2012 the ONS switched from SOC 2000 to SOC 2010. Code 6115 was split into two codes in the new system: 6145 (care workers and home carers) and 6146 (senior care workers).

At this time ASHE 6115 is still being created. The ONS statement on this reads as:

"Due to the importance of the 6115 code for a number of ASHE users, ONS has agreed to continue to publish figures for this code on a SOC 2000 basis following the move to SOC 2010, and for the foreseeable future. These figures will be published on the ASHE homepage of the ONS website separately from the SOC 2010 tables."

The following table from the ONS[2] shows the relationship between SOC 2000 code 6115 and the previous SOC 1990 codes:

6115 Care assistants and home carers							
Male LFS 2000	LFS 1996/97	Census 1991	SOC90	SOC90 Unit Group Title	Female Census 1991	LFS 1996/97	LFS 2000
-	-	-	291	Other social and behavioural scientists	-	20.0	-
7.6	15.7	23.2	293	Social workers, probation officers	17.2	17.1	15.0
14.3	-	-	349	Other health associate professionals n.e.c.	-	-	-
18.8	-	-	370	Matrons, houseparents	-	-	-
18.9	14.0	-	371	Welfare, community and youth workers	5.5	18.8	22.7
-	-	-	544	Tyre and exhaust fitters	-	*100.0	-
-	7.1	-	640	Assistant nurses, nursing auxiliaries	-	6.1	7.5
-	5.6	-	641	Hospital ward assistants	-	8.0	11.8
78.4	89.0	79.5	644	Care assistants and attendants	96.1	95.1	91.3
-	-	11.1	659	Other childcare and related occupations n.e.c.	-	-	-
-	-	-	923	Road construction and maintenance workers	*100.0	-	-

The different sources show the share of different SOC 1990 codes now part of SOC 2000 code 6115. It can be seen that while a large share of code 644 is in code 6115, there is not a one-to-one correspondence.

Although the exact number of workers surveyed is unknown, the ASHE tables do provide an indicative estimate of the total number of jobs for each SOC code. If we apply the 1% sample size used at a total level to SOC 6115 we can get a feel for the possible sample size. In the case of ASHE SOC 2000 code 6115 the 2011 tables have 831,000 as the indicative number of jobs. This would imply a sample size of between eight and nine thousand employees.

In 2009 and 2010 the most common percentile for PPOs to be linked to in ASHE SOC 2000 code 6115 was the 80th percentile, with the 75th being the next most common.

Inflation in ASHE 6115

When considering historical inflation for 6115, a number of factors should be considered which may add to the variability observed and the levels observed.

First, there are a number of legislative, regulatory and social changes that may have disproportionately impacted carers' wages compared to overall wage levels, or particular percentiles. Some examples are:

- The introduction of the minimum wage in 1999 caused particularly high inflation in the lower percentiles of ASHE 6115;

- The Care Standards Act 2000 and the amendments to the Manual Handling Operations Regulations, which were both implemented during 2002, are likely to have been a contributing factor to the particularly high inflation in 2002 and 2003; and

- The European Working Time Directive and increasing demand for care in an ageing population are likely to have caused increases in hourly wages.

Second if the sample size is too small, there is a potential that natural sample variations will create material differences compared to the actual population wages. This would create distortions in the

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[2] From the guide "OOSS USER GUIDE 2000: 22 – Relationship between Standard Occupational Classification 2000 (SOC2000) and Standard Occupational Classification 1990 (SOC90)" located http://www.ons.gov.uk/ons/guide-method/classifications/archived-standard-classifications/standard-occupational-classification-2000/index.html

inflation on an individual year basis, although it should be offset over a longer term if an average inflation is calculated.

If the sample size is indeed eight to nine thousand employees as discussed above, then we can have a reasonably high degree of confidence in the percentiles values published. Where the sample from the population is of that size then we would expect the 95% confidence interval to be only a variation of 0.02% in the observed wage at each percentile[3]. Obviously if the actual sample size is smaller, the possible variation on a year would increase.

The table below shows the year on year percentage change that has been observed over time for a number of the percentiles:

Calendar	Percentage Change							
Year	10th	25th	50th	60th	70th	75th	80th	90th
1997								
1998	5.3%	5.6%	3.6%	4.1%	3.1%	3.3%	2.6%	4.2%
1999	13.9%	8.5%	7.8%	6.9%	6.1%	5.2%	4.9%	3.9%
2000	2.8%	3.2%	3.0%	1.9%	2.4%	3.0%	3.3%	2.6%
2001	5.7%	7.6%	5.7%	5.5%	4.9%	4.2%	4.0%	4.3%
2002	9.1%	7.0%	6.4%	8.2%	8.6%	8.5%	9.3%	7.7%
2003	5.9%	8.7%	8.4%	8.6%	8.1%	8.0%	8.1%	8.9%
2004	7.8%	6.5%	5.5%	4.7%	3.1%	3.5%	4.0%	4.6%
2005	5.2%	4.3%	5.2%	4.5%	4.6%	4.7%	4.2%	3.3%
2006	4.9%	3.6%	3.3%	3.2%	3.1%	2.6%	2.2%	2.7%
2007	5.2%	5.1%	5.3%	5.5%	5.6%	5.7%	5.8%	6.7%
2008	3.5%	2.0%	2.5%	2.6%	3.6%	3.8%	3.3%	2.6%
2009	2.6%	2.9%	2.7%	2.2%	2.3%	2.7%	2.5%	3.6%
2010	1.0%	1.8%	1.8%	2.2%	1.3%	0.9%	0.8%	0.5%
2011	0.5%	-0.7%	-1.7%	-2.1%	-1.4%	-1.1%	-1.1%	-1.1%

The table above uses hourly gross pay. There are some small differences observed with different data sets. The 2002 year is highlighted as this represents inflation including a change in coding from SOC 1990 code 644 to SOC 2000 code 6115, so these values are almost certainly are not correct. The 2011 year is using SOC 2000 code 6115, and not the new SOC 2010 codes.

A key observation is that the 6115 period only covers nine inflation points. This is by any measure a small sample from which to observe a time series.

A second observation is the very low level of inflation in 2010 for most percentiles and that the 2011 year had negative inflation for almost all percentiles. These coincide with a period of recession and/or low economic growth that has also exhibited very low investment returns. To what degree do these two points represent a return period event of twice in 9 years (the weighting implicitly applied) or should they be given a lower weight? We can be sure there will be recessions in the future. But will they result in similar low wage inflation outcomes for care workers? Or should 2010 and 2011 be treated as outliers that should be removed?

The third element is the very high inflation observed in 2003. This year presents a slight problem when estimating a long term view of ASHE carers' inflation. 2003 inflation has been impacted by changes in regulation and legislation – to what degree do these changes represent a once in 9 year event (the weighting implicitly applied) or should it be given a lower weight? Is 2003 an outlier that should be removed?

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[3] Calculated based on the paper "A Note on the Asymptotic Distribution of Sample Quantiles, A.M. Walker, Statistical Laboratory University of Cambridge

The following table shows the average inflation over a number of time periods:

	Percentiles							
	10th	**25th**	**50th**	**60th**	**70th**	**75th**	**80th**	**90th**
644 + 6115	4.9%	4.5%	4.0%	3.8%	3.6%	3.6%	3.4%	3.6%
Including 2002	5.2%	4.7%	4.2%	4.1%	3.9%	3.9%	3.8%	3.9%
6115 Only	4.0%	3.8%	3.6%	3.5%	3.3%	3.4%	3.3%	3.5%
6115 Exc 2003	3.8%	3.2%	3.0%	2.8%	2.8%	2.8%	2.7%	2.8%
6115 2004 => 2009	4.8%	4.1%	4.1%	3.8%	3.7%	3.8%	3.7%	3.9%

The four categories show the average annual inflation over several distinct periods:

"644 + 6115" averages the inflation over 1997 to 2011 excluding 2001 to 2002

"Including 2002" averages the inflation over 1997 to 2011

"6115 Only" averages the inflation over 2002 to 2011

"6115 Exc 2003" averages the inflation over 2003 to 2011

"6115 2004 => 2009" includes only 2004 to 2009 years inclusive, i.e. no observed outliers

The key decisions are over the treatment of the period covered by SOC 1999 code 644, and whether it should be included or not, and the treatment of the two possible outlier periods in the 6115 era. The inflation in 2003 averages 8% across the percentiles and so has the capacity to pull up the overall averages materially. The average inflation across 2010 and 2011 is 0.1%, which will pull the averages down just as materially. Including the SOC 1990 644 codes increases the sample size, but occupations included are not exactly the same: it raises the question whether 6115 inflation would have been different to the inflation observed.

Most people would exclude the transition in 2003 from 644 to 6115 as it is impossible to know which part of the inflation is real and which part arises from the change in the occupation codes.

The decision on what to include is subjective, but differences of opinion could potentially lead to material differences between actuaries and across companies. At the 80th percentile using 6115 only excluding 2003 compared to using all periods including 644 is over a full point of inflation a year higher. Compounded up for the several decades of a typical PPO in payment, the impact on valuing PPOs is enormous.

Generally, the inflation observed in the ASHE percentiles are correlated, highly so where the percentiles are of a similar level. This can be seen in the following tables:

Correlation (All years)

	10th	25th	50th	60th	70th	75th	80th	90th
10th	100%	82%	80%	76%	70%	65%	64%	55%
25th		100%	95%	93%	84%	80%	79%	81%
50th			100%	96%	91%	89%	86%	85%
60th				100%	96%	94%	92%	90%
70th					100%	99%	97%	91%
75th						100%	99%	94%
80th							100%	94%
90th								100%

Correlation (6115 Only)

	10th	25th	50th	60th	70th	75th	80th	90th
10th	100%	86%	84%	78%	71%	73%	76%	75%
25th		100%	98%	96%	88%	88%	92%	93%
50th			100%	99%	94%	94%	96%	93%
60th				100%	96%	95%	96%	93%
70th					100%	99%	98%	94%
75th						100%	99%	95%
80th							100%	97%
90th								100%

Future ASHE inflation

The analysis above identifies that analysing the history of ASHE is difficult. However, the key reason for this analysis is to help educate an estimate of the future ASHE rate. In the absence of a market forward projection of ASHE how do you estimate the future rate?

A key decision is around the forward rate adopted in respect to discounting PPOs, or rather the relationship between ASHE inflation and the discount rate. Do you use long term inflation and discount assumptions, or assumptions that reflect the yield curve and forecast inflation by period?

If the first approach is used then the exact market rates by period can be ignored, and long term assumptions around ASHE and investment return can be assumed. If the second method is used, then for the economic assumptions to make sense ASHE needs to reflect the economic conditions by period which is driving the view of the yield curve selected.

Solvency II requires the second method while either approach can be used under IFRS.

When projecting ASHE one method is to analyse the relationship between ASHE and other indices. Choosing one such index and its relationship to ASHE, the selected index is then projected forward (or market rates are taken if available) and ASHE is then calculated for each period based on the assumed relationship. Indices that can be used include ones based on Price Inflation (usually RPI), wage inflation or investment return.

Relationships to other Indices

When comparing inflation for ASHE occupation codes to other indices there is one small problem – over which period should the inflation on second index be calculated? From a technical point of view April to April makes sense as this is when ASHE is calculated. However, it is published in November and it is from that point on that PPOs linked to ASHE will be inflated. So should it be compared to a November to November period?

Obviously for longer term inflation it does not matter but it does for correlation analysis. The inflation observed over the same period as ASHE is:

Calendar Year	April to April Percentage Change					November to November Percentage Change				
	RPI	LNMM	LNMQ	KAB9	KA5Q	RPI	LNMM	LNMQ	KAB9	KA5Q
1997										
1998	4.0%	5.8%	5.8%			3.0%	4.5%	4.7%		
1999	1.6%	3.7%	4.1%			1.4%	4.9%	5.2%		
2000	3.0%	4.3%	4.6%			3.2%	4.1%	4.4%		
2001	1.8%	4.9%	5.1%	5.7%	5.8%	0.9%	3.7%	3.7%	4.3%	4.4%
2002	1.5%	3.8%	3.8%	3.6%	3.5%	2.6%	4.5%	4.2%	2.7%	3.3%
2003	3.1%	2.6%	2.9%	2.9%	2.5%	2.5%	2.9%	3.3%	3.7%	3.4%
2004	2.5%	4.5%	4.6%	4.0%	4.0%	3.4%	4.5%	4.7%	5.0%	4.1%
2005	3.2%	4.3%	4.4%	4.3%	4.3%	2.4%	3.2%	3.6%	4.7%	4.4%
2006	2.6%	3.5%	3.9%	4.4%	4.1%	3.9%	3.9%	3.9%	4.3%	4.1%
2007	4.5%	3.1%	3.3%	4.7%	4.2%	4.3%	4.5%	4.1%	4.3%	5.2%
2008	4.2%	3.5%	3.6%	4.8%	4.8%	3.0%	2.5%	2.5%	2.3%	2.3%
2009	-1.2%	3.5%	3.3%	1.6%	1.7%	0.3%	1.2%	1.5%	0.9%	0.7%
2010	5.3%			0.2%	0.4%	4.7%			2.0%	2.1%
2011	5.2%			2.7%	2.5%	5.2%			2.0%	2.2%

NB: greyed cells indicate missing data points in the published indices

The four wage indices shown above are:

LNMM: Average earnings index (AEI) whole economy average earnings

LNMQ: Average earnings index (AEI) whole economy seasonally adjusted

KAB9: Average Weekly Earnings (AWE) total pay whole economy seasonally adjusted

KA5Q: Average Weekly Earnings (AWE) total pay whole economy including bonuses

These are the indices the standard London market reinsurance contracts use to calculate indexation. The index used depends on the policy inception date and the settlement date. As AEI ends in 2010 we use AWE to continue from then on and/or replace it. KAB9 is used to extend LNMQ and KA5Q is used to extend LNMM.

We created a composite wage inflation index, referred to below as "wages", which combines the AEI and AWE indices, since neither covers the entire period. Given the key period is the years with SOC 2000 code 6115, we have used AWE in the main, substituting AEI for the periods prior to 2000. As ASHE is only reported once a year with no known seasonal adjustment, we have used KA5Q and LNMM – the two indices which are not seasonally adjusted.

Summarised by the same periods used for ASHE, the average inflation has been:

| | Percentage Change | | | | Difference to 80th percentile | | | |
| | April to April | | Nov to Nov | | April to April | | Nov to Nov | |
	RPI	Wages	RPI	Wages	RPI	Wages	RPI	Wages
644 + 6115	3.0%	3.7%	2.9%	3.6%	-0.4%	0.3%	-0.5%	0.2%
Including 2002	2.9%	3.7%	2.9%	3.5%	-0.9%	-0.1%	-0.9%	-0.3%
6115 Only	3.3%	3.1%	3.3%	3.2%	0.0%	-0.1%	0.0%	-0.1%
6115 Exc 2003	3.3%	3.2%	3.4%	3.1%	0.6%	0.5%	0.7%	0.4%
6115 2004 => 2009	2.6%	3.8%	2.9%	3.5%	-1.0%	0.2%	-0.8%	-0.2%

Comparing the inflation observed to a sample of the ASHE percentiles, we can see them charted against each other as follows:
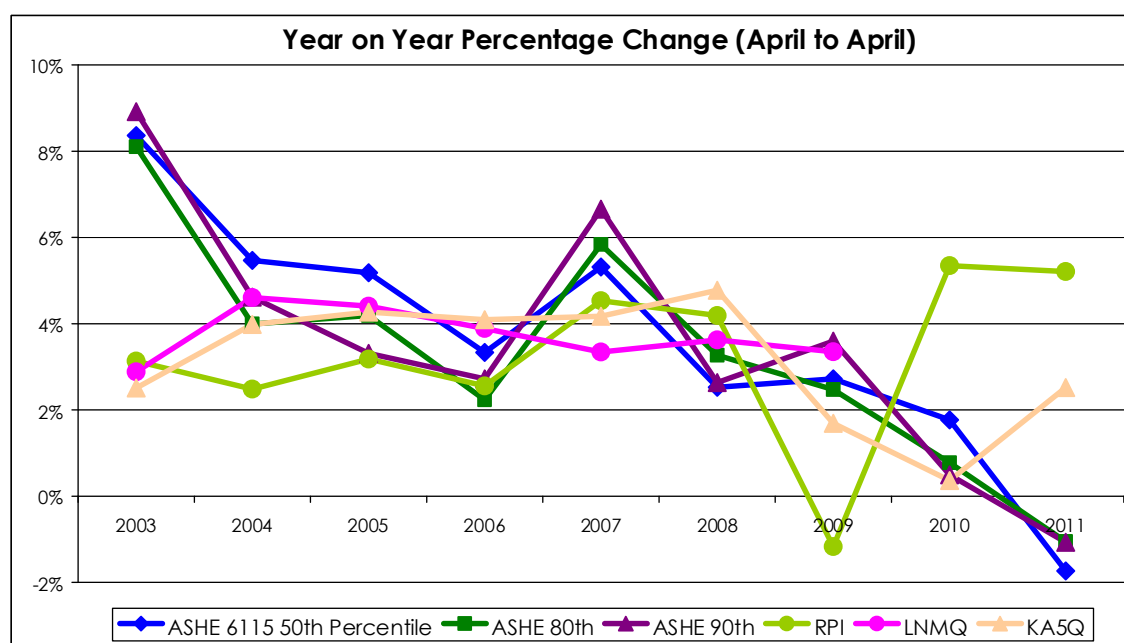
Generally RPI inflation is at a lower level than the other indices, with the last two years being the exception to this. The two wage inflation indices are not dissimilar to the ASHE inflation with the exception of 2002/2003 and to a lesser extent 2011.

The correlations observed are:

Correlations

	April to April						November to November					
	All Years		6115 Only		6115 ex 2003		All Years		6115 Only		6115 ex 2003	
	RPI	Wages	RPI	Wages	RPI	Wages	RPI	Wages	RPI	Wages	RPI	Wages
10th	-40%	32%	-25%	62%	-26%	71%	-42%	57%	-23%	71%	-19%	72%
25th	-40%	34%	-27%	23%	-33%	47%	-53%	58%	-33%	53%	-27%	66%
50th	-39%	25%	-25%	29%	-29%	51%	-51%	55%	-38%	56%	-33%	67%
60th	-33%	20%	-16%	24%	-19%	47%	-43%	48%	-31%	54%	-25%	68%
70th	-33%	22%	-14%	35%	-17%	62%	-42%	42%	-36%	52%	-31%	65%
75th	-33%	23%	-19%	37%	-22%	64%	-41%	39%	-41%	50%	-38%	61%
80th	-33%	18%	-17%	35%	-21%	62%	-35%	36%	-37%	52%	-32%	65%
90th	-34%	21%	-28%	27%	-36%	52%	-37%	36%	-40%	46%	-36%	58%
RPI	100%	-2%	100%	4%	100%	4%	100%	4%	100%	34%	100%	36%
Wages		86%		78%		77%		87%		92%		92%

The above table shows the correlations by different year-on-year points and across the different sets of time periods ASHE can be grouped into. We have also shown the impact if 2003 is excluded, on the basis that there are known changes in legislation and regulation that would have a disproportionate impact on carers' wage inflation. However, with the recession periods there is an interest in whether other indices continue to be correlated across these years – so they were kept in. This also means we have 8 data points for 6115 rather than 6.

We consistently see negative correlation between RPI and ASHE, but this is very much driven by the last two years of inflation. Excluding 2010 and 2011 has different impacts for different correlation periods. For the total period it leaves weak correlations – negative for lower percentiles and positive for the higher ASHE percentiles. For the 6115-only period without 2010 and 2011, the correlation is between 30% to 50% for the whole period, or 18% to 80% excluding 2003. However, for the 6115 this is only seven data points of comparison (or six if 2003 is excluded).

With wage inflation the correlation varies. It is always positive, but occasionally very weak. It is generally stronger for the lower percentiles than the higher ones, and stronger for November year ends compared to April ones.

For the 6115-only period, if 2003 is excluded then the correlations are reasonably strong for both the April and November year ends. In the key 80th percentile – the most common one used for PPOs – the correlation is 62% and 65% respectively by year ends. This drops if 2003 is included. However, given 2003 differed due to reasons that were predictable, and can be predicted in the future (when changes to legislation/regulation are taking place with expected impacts) it seems reasonable to exclude this from the correlations.

Fixed, long-term assumption

If it is decided to adopt a single long term ASHE assumption then the lack of historical data for ASHE SOC code 6115 is an issue. In the absence of a long history to ASHE, an assumption based on the historical long-term general wage inflation or RPI can be used. A gap may then be considered to allow for the differences observed in ASHE and the price or general population's wage inflation.

For wages, the inflation from January 1990 to December 2011 using our wages composite index is 4.04%. This is however sensitive to the months used, due to the seasonal nature of the curve. Calculating the inflation to February 2012 instead changes the long term inflation to 4.27%. If the wage composite index is created from seasonally adjusted indices the result from January 1990 to December 2011 is 4.07% and to February 2012 it is 4.03%.

Over the same period to December 2011 RPI had 3.19% inflation.

When looking forward, it may be deemed appropriate to assume a gap between ASHE and wage inflation. However, it does implicitly have some assumptions about how the cost of care will change compared to the total population.

The following chart shows the percentage ASHE 6115 is of total population wages from the 2011 ASHE results. It also shows how this would change over 40 years (the average life expectancy of a PPO) if 4% inflation is adopted for wage inflation and a gap of 0.5% to ASHE (either positive or negative).
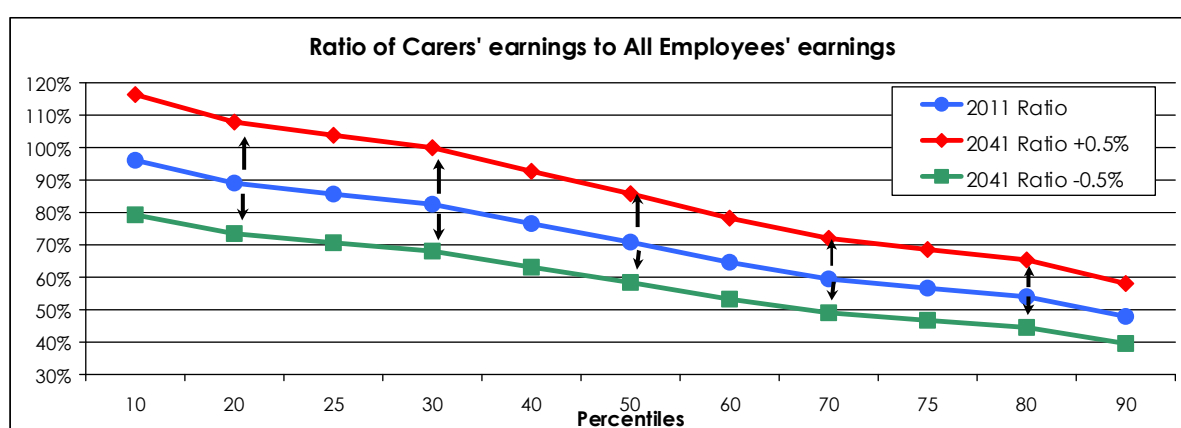
It can be seen that adopting a 0.5% gap effectively results in a significant shift in the level of pay carers receive compared to the wider population. This may be appropriate – we know over the long term some occupations will be winners and some losers. However, it is important that any company adopting a gap between wage inflation and ASHE understands this impact and is happy with the implied assumptions required for it to occur.

This issue occurs also if a projection by period is adopted as well.

Selecting RPI and a gap only avoids this issue if the gap is the same as would normally be adopted by the company as that between RPI and wage inflation.

Projecting ASHE forward by period

If a forward projection of ASHE is required that varies by period – usually so that it is synchronised with the discount rate – the options are more limited. The main two sources of projected positions are:
   – Investment returns (often estimated via bonds, GILTs or interest rate swaps)
   – Price inflation (usually expressed via RPI implicit on indexed linked GILTs)

Both reflect the expected economic conditions projected by the market. There is currently no market forward projection of general population wage inflation, let alone for specific occupations.

With price inflation the issue is that to date, RPI and ASHE has generally been negatively correlated. Therefore linking ASHE to RPI may not be appropriate – especially for any short term matching. Of

course, it may be argued that excluding 2010 and 2011 they are positively correlated – but you are removing 22% of the data points. It should be noted the correlation between the combined Wages and RPI is below 30%. This would support the idea that wages and prices are not particularly correlated. This was tested on both a quarterly basis and annual basis, each with and without a one year lag.

Linking wage inflation to the yield curve will have the result that in the current environment it will likely create a very depressed view of wage inflation across the short-term. This is only an issue if this is unrealistic. Unfortunately AEI inflation data only goes back to 1991 so it does not capture previous recessions. However, there is at least one modern example of a country going through a long period of depressed investment returns.

Lessons from Japan

Japan's three month treasury bills dropped to less than 1% return in 1995 and have stayed beneath 1% ever since. Across the same period wage inflation experienced almost zero inflation. Indeed, from 2000 there has been in aggregate negative inflation. This is similar to the last three years in the UK where wage inflation has been depressed in 2009 to 2011.
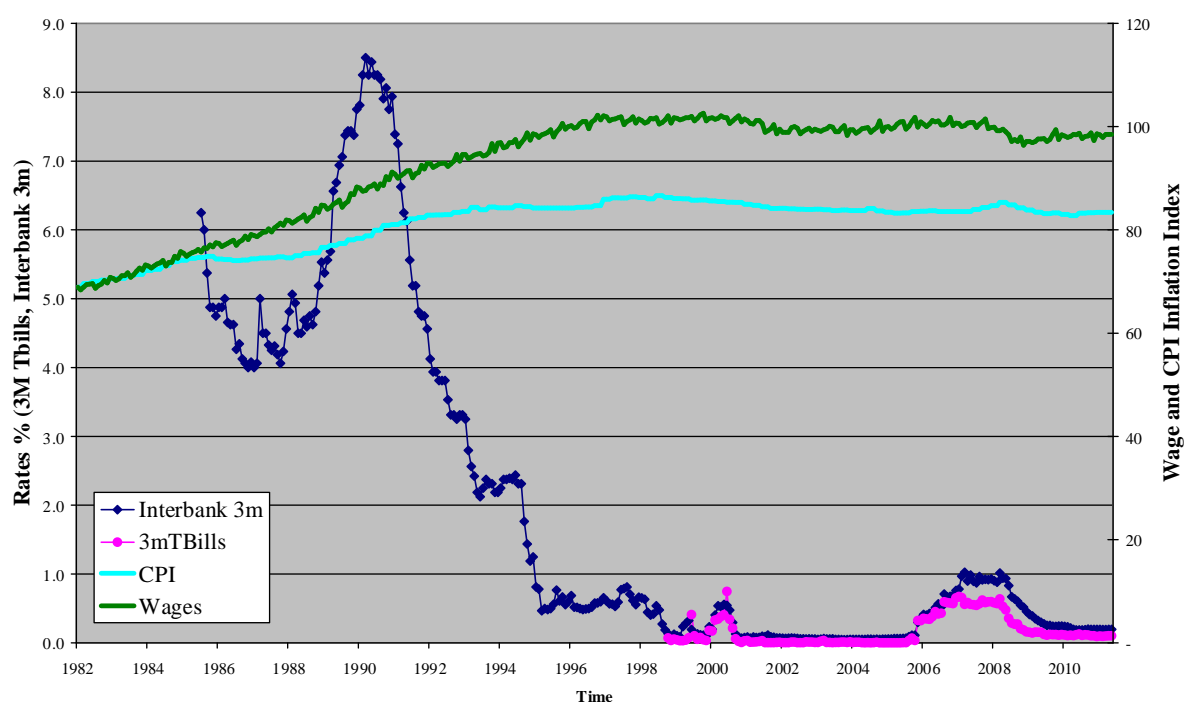
Japan is not exactly like for like with the current situation in the UK. Across the same period price inflation was also depressed, while in the UK price inflation was extremely high in 2010 and 2011. But it is evidence that assuming depressed wage inflation alongside depressed investment returns may not be unreasonable.

Comparing ASHE to other investment indices

AEI information goes back to 1990 and AWE to 2000. We were able to source one year swap rate information going back to 1997 and two year swap information going back to Q4 1990. The two are correlated at the 99% level, and so although we might have preferred to use the one year swap rate, we have used the two year swap rate as it has a longer history.

Calculating the correlation between the Wages index and the two year swap rate using quarterly year on year inflation figures (Q1 1991 to Q3 2011) the correlation figure is 79%. So over the last twenty years wage inflation and short term investment returns have been extremely correlated.

The average gap has been:

				Swap Rate	Index Rate	Difference
1yr Swap Rate	vs.	Wages	Q1 1991 => Q3 2011	4.7%	3.8%	0.9%
1yr Swap Rate	vs.	AWE	Q1 2001 => Q3 2011	3.9%	3.4%	0.5%
2yr Swap Rate	vs.	Wages	Q1 1991 => Q3 2011	4.8%	3.8%	1.0%
2yr Swap Rate	vs.	AWE	Q1 2001 => Q3 2011	4.1%	3.4%	0.7%

Depending on the direct relationship selected, a gap of between 0.5% and 1.0% could be adopted between the yield curve and wage inflation in the short term.

However, given the currently extremely low investment returns it is possible a gap of 0% could be adopted, which would be similar to the experience seen in Japan.

Some key possibilities

So what does this analysis all indicate? Different actuaries will take a different view, but some of the potential issues to consider are:

Operational:

- There is a risk that ASHE 6115 may not be continued by the ONS. Given the issues over already having only nine data points, this would create a lot of issues in analysing the long term inflation. Of course, there is a risk that any alternative sub-code linked to may not continue beyond a 10 year horizon.

- There is the issue that ASHE can be deemed by the ONS as "provisional" for up to a year after publication.

- The change to SOC 2010 and splitting of SOC 2000 code 6115 into two categories might mean at some stage pressure to switch to one or both of these for some heads of damage PPOs are linked to. Especially if one performs better than 6115. This is not an issue that will be identifiable for several years, but is a risk.

Assumption Setting:

- Treating 2003 as an outlier and using only ASHE 6115, the ASHE inflation may be no higher than wage inflation. It may even be lower.

- ASHE 6115 has only nine data points, and is different to its closest predecessor series 644. Of the nine points, three may be outliers. Putting too much reliance on historical ASHE data may not be appropriate.

- There are significant implicit assumptions to choosing any gap between the ASHE inflation and general wage inflation.

- Based on the limited ASHE data and the high level analysis of RPI against wage inflation, there does not appear to be any strong correlation between the ASHE and RPI.

- High level analysis has indicated that wage inflation and the investment return (using historical swaps as a proxy) have been correlated. So a link to the discount rate adopted may be appropriate for projecting ASHE in the short term.

It should be noted that for the analysis of the historical indices inflations and correlations the analysis was at a high level, only being performed back to approximately 1990. Others in the market may well have performed more detailed analysis of the relationship between price inflation, wage inflation and investment returns.