The Actuarial Profession
making financial sense of the future

Time Horizon Solved!

Stefan Claus & Roger Jackson

27 September 2006
Hilton Vienna Hotel, Am Stadtpark

Time Horizon Solved!

Agenda:

- Context
- Time Horizon
- Questionnaire
- Model
- Conclusions

Context

- What are we considering?
  - Risk-Based Capital assessment
  - Impact of Time Horizon
  - Underwriting risk only
- What are we **not** considering?
  - Calculation of individual risks
  - Aggregation of risks

Context

- Capital Assessment
  - Risk Profile (e.g. retained earnings distribution)
  - Risk Measure (e.g. VaR)
  - Risk Tolerance Level (e.g. 99.5%)
- Risk Profile considerations
  - What risks are we trying to capture? [going-concern, run-off]
  - Basis for quantification (e.g. regulatory, cashflow)

Time Horizon

- No common definition of Time Horizon,
- but, various elements to consider, including:
  - Risk Identification issues
    - ***New Business Period [short/medium/long term risks?]***
    - ***Allowance for run-off costs***
  - Risk Quantification issues
    - ***Projection Period***
    - ***Recognition of run-off costs***

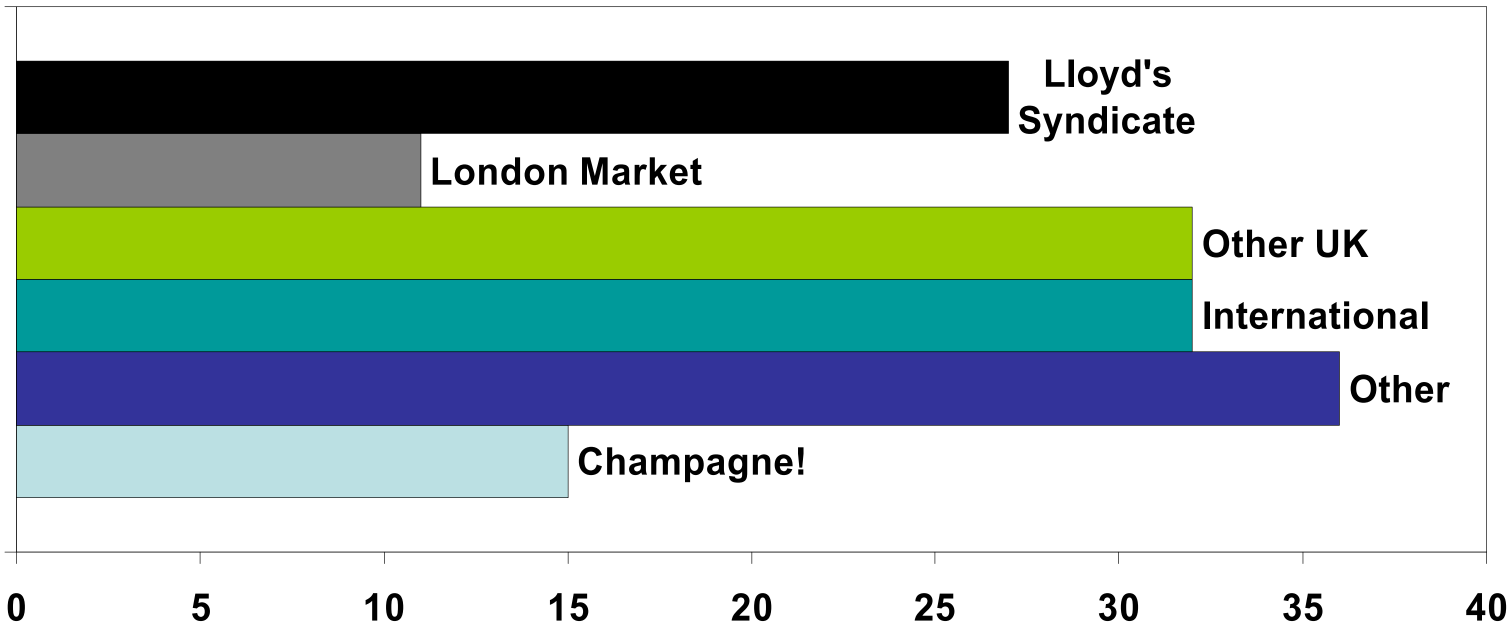
Time Horizon

- and dependent on purpose of capital assessment:
  - Business planning / strategy
  - Rating agency assessment
  - Regulatory assessment
  - Due diligence
  - Other (e.g. Pricing, RI assessment, Asset allocation)

Questionnaire
Aims

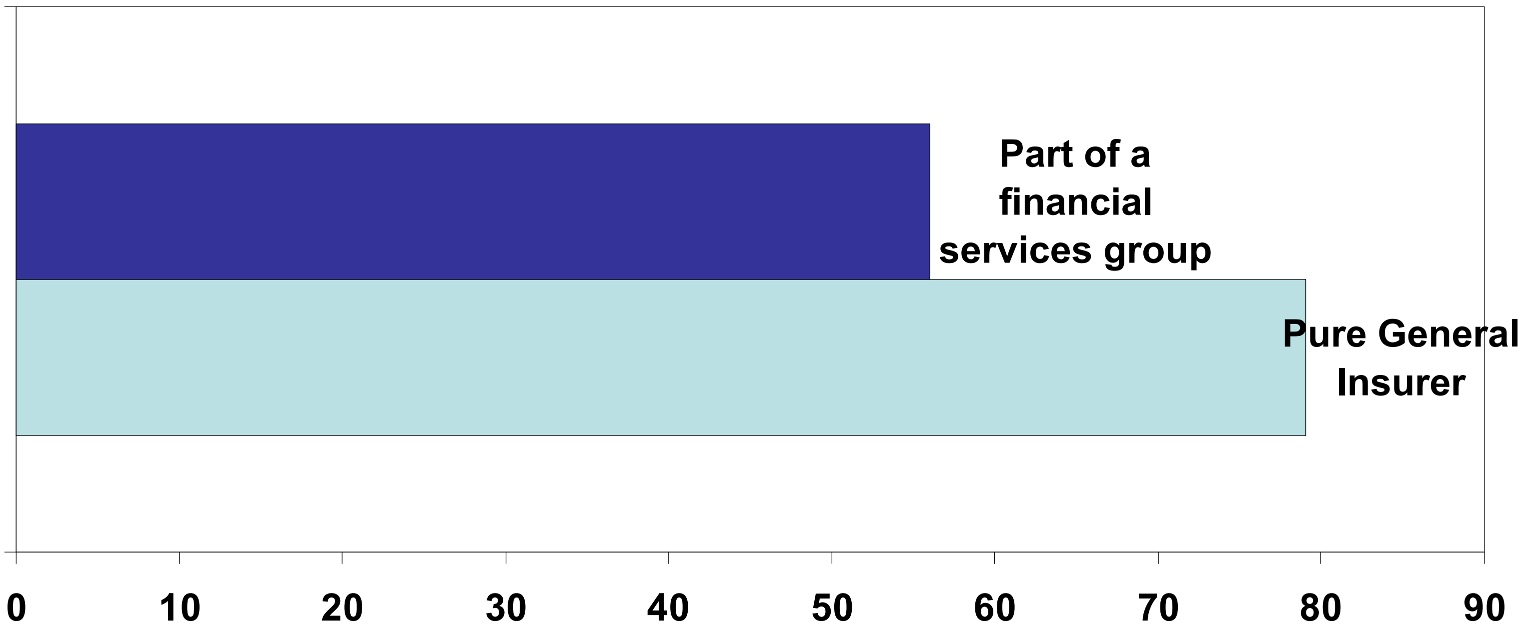
- Understanding
- Agreement / Divergence
- Inputs for model

Questionnaire
Results: Background of respondents



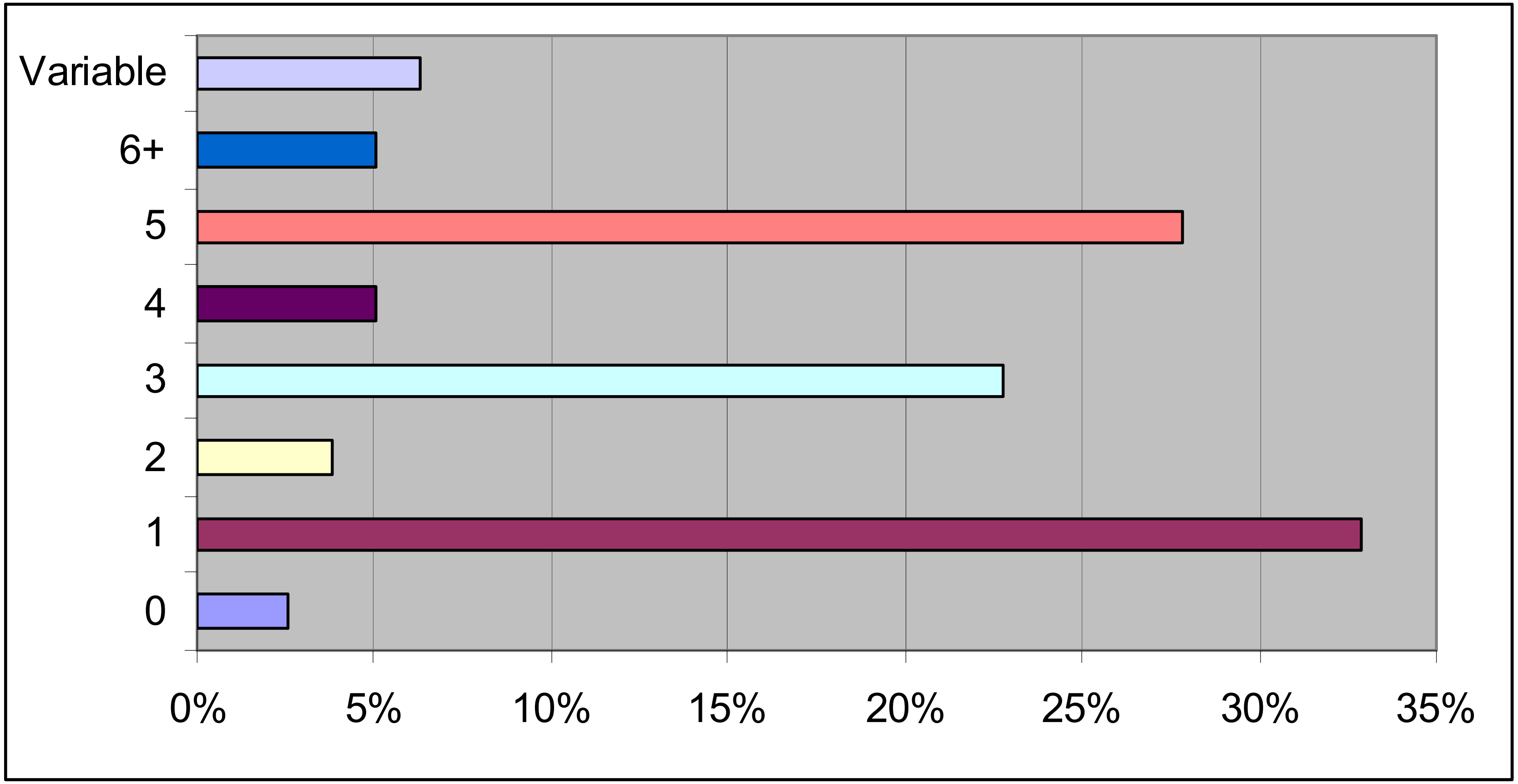
- Total Number of responses: 153

Questionnaire
Results: Background of respondents

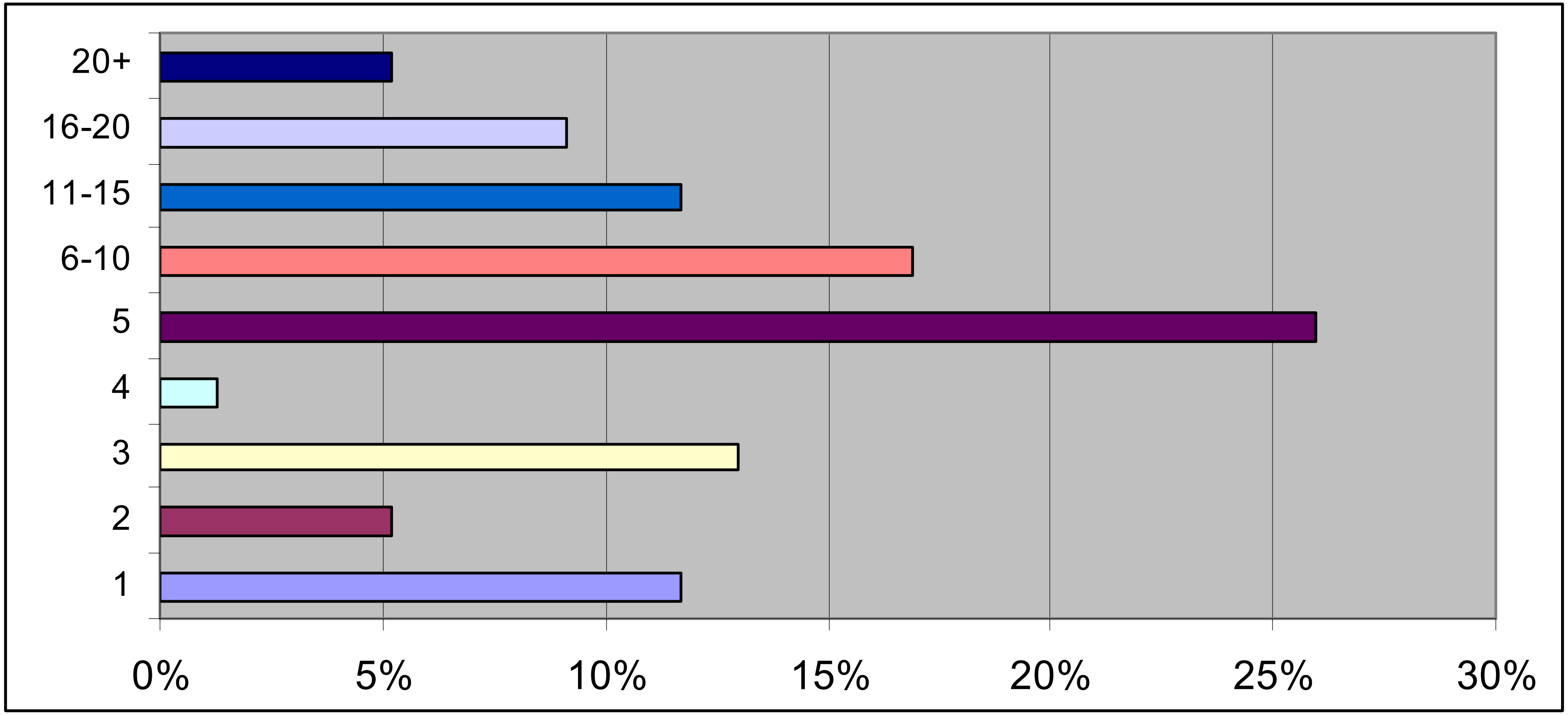


- Total Number of responses: 153

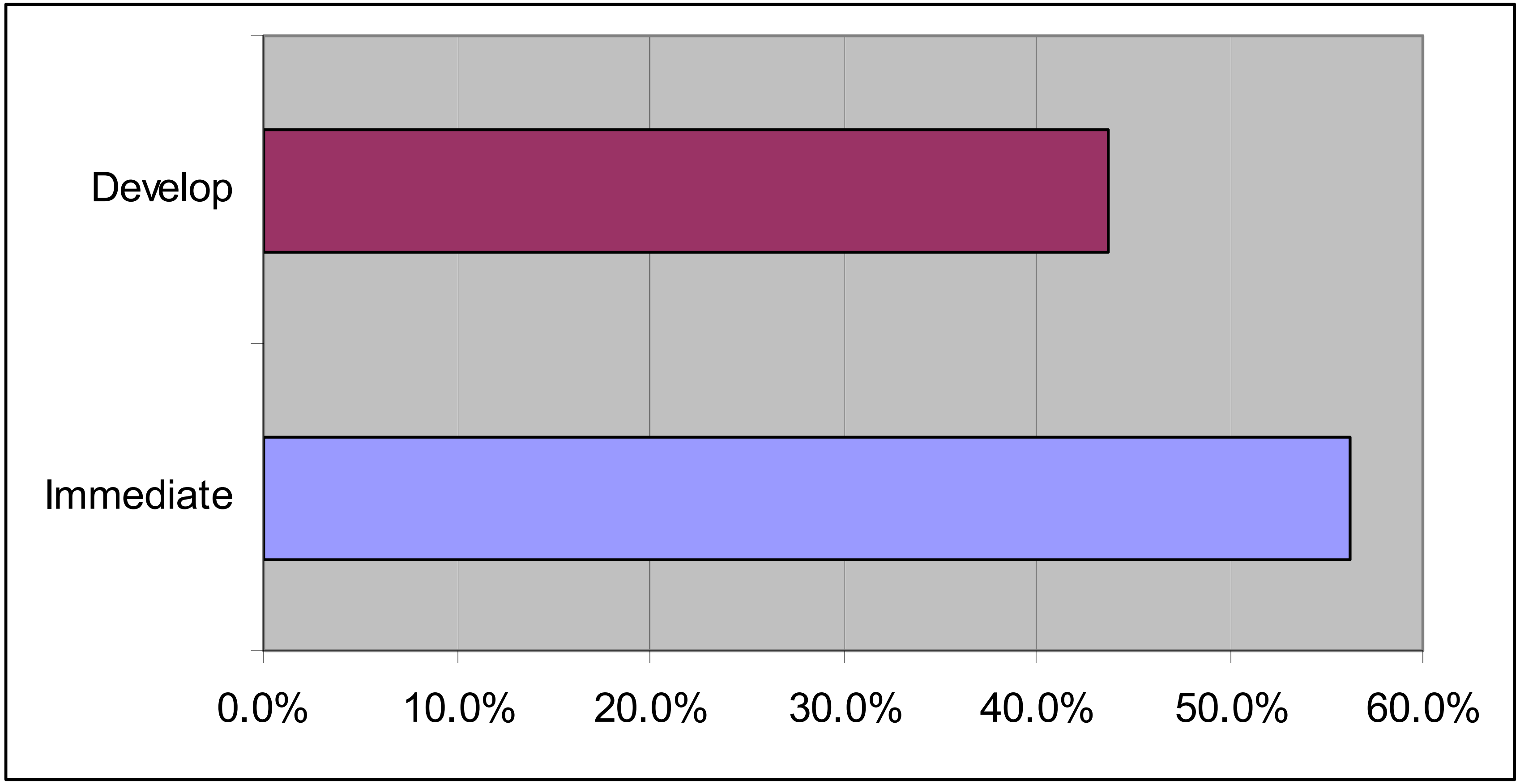
Questionnaire Results: New Business Period



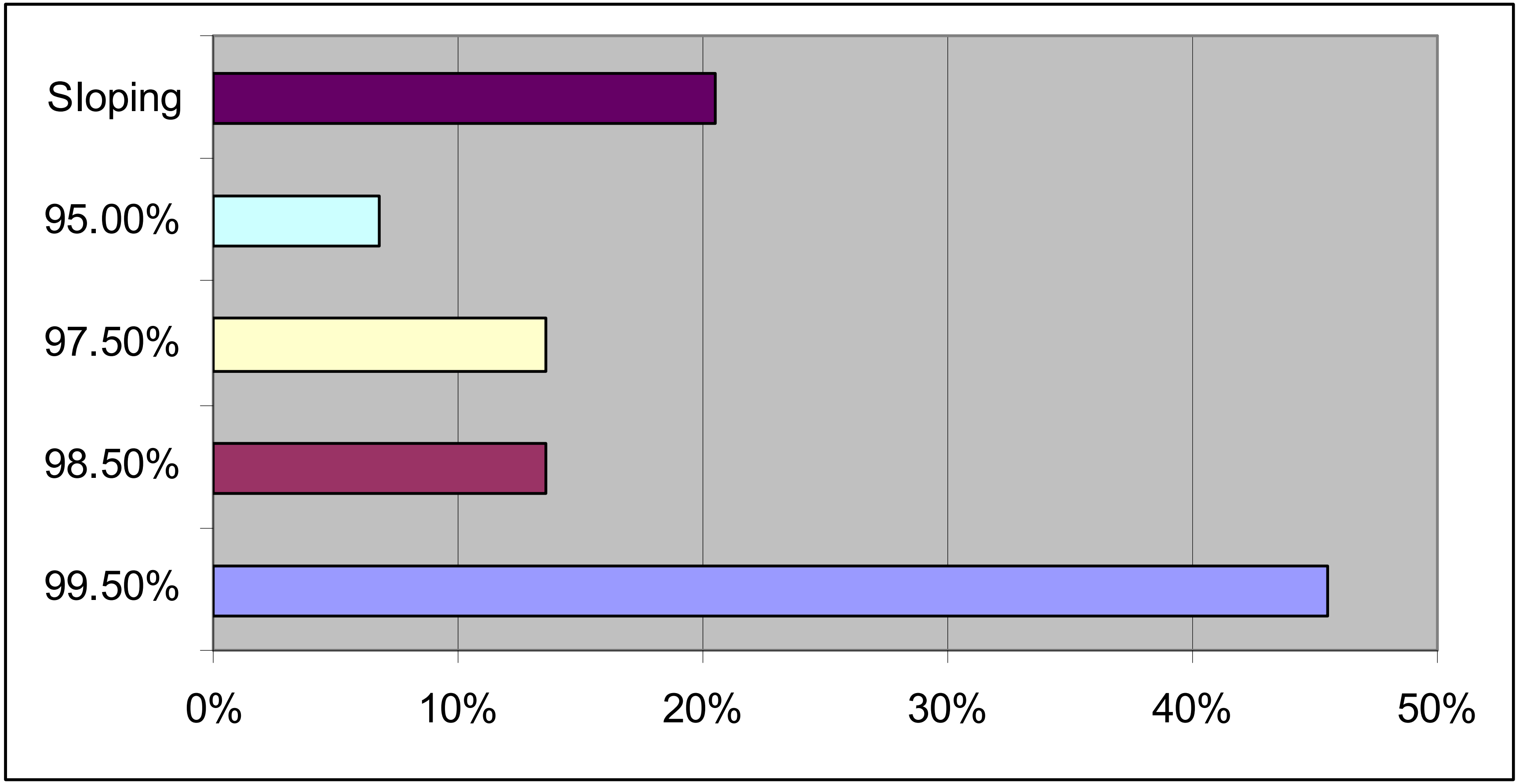
Questionnaire Results: Projection Period



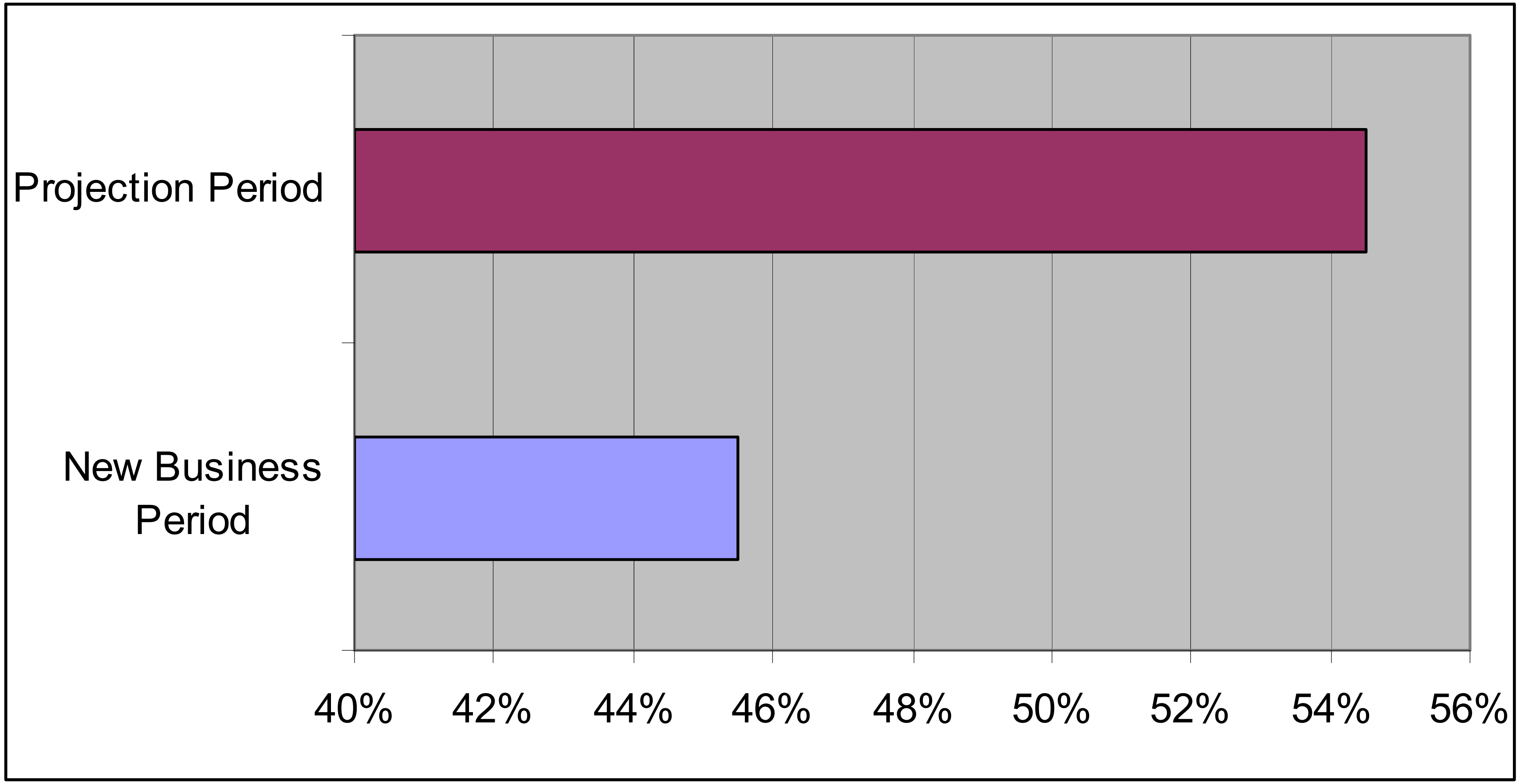
Questionnaire
Results: Reserve recognition



Questionnaire Results: What confidence level do you use at the end of the Projection Period?



Questionnaire Results: Is your confidence level a function of the:



Model
Aim

- Potential impact on capital assessments from:
  - Different views of time horizon
  - Different risk tolerances

Model Assumptions

- Risk Profile
  - Underwriting risk only / No investment income
  - Going Concern
  - Calculation basis: cashflow
  - 6 worst simulations (cashflows of losses)
  - Cashflows assume Perfect Foresight
  - Recognition assumption 60%, 80%, 90%, 100%
  - New business assumed to increase capital (may not always be the case)
- Risk Measure
  - Value at Risk

Model
Example Assumptions (1 yr new business)

	Total	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
1	1,902	132	185	238	264	291	264	211	158	132	26
2	1,615	112	157	202	224	247	224	179	135	112	22
3	1,447	100	141	181	201	221	201	161	121	100	20
4	1,327	92	129	166	184	203	184	147	111	92	18
5	1,234	86	120	154	171	189	171	137	103	86	17
6	1,158	80	113	145	161	177	161	129	96	80	16

Recognition To Ultimate

1	**2**	**3**	**4**	**5**
60%	80%	90%	100%	100%

Expected Ultimate

1	1,141	1,521	1,712	1,902	1,902	1,902	1,902	1,902	1,902	1,902
2	969	1,292	1,453	1,615	1,615	1,615	1,615	1,615	1,615	1,615
3	868	1,157	1,302	1,447	1,447	1,447	1,447	1,447	1,447	1,447
4	796	1,062	1,194	1,327	1,327	1,327	1,327	1,327	1,327	1,327
5	740	987	1,111	1,234	1,234	1,234	1,234	1,234	1,234	1,234
6	695	926	1,042	1,158	1,158	1,158	1,158	1,158	1,158	1,158

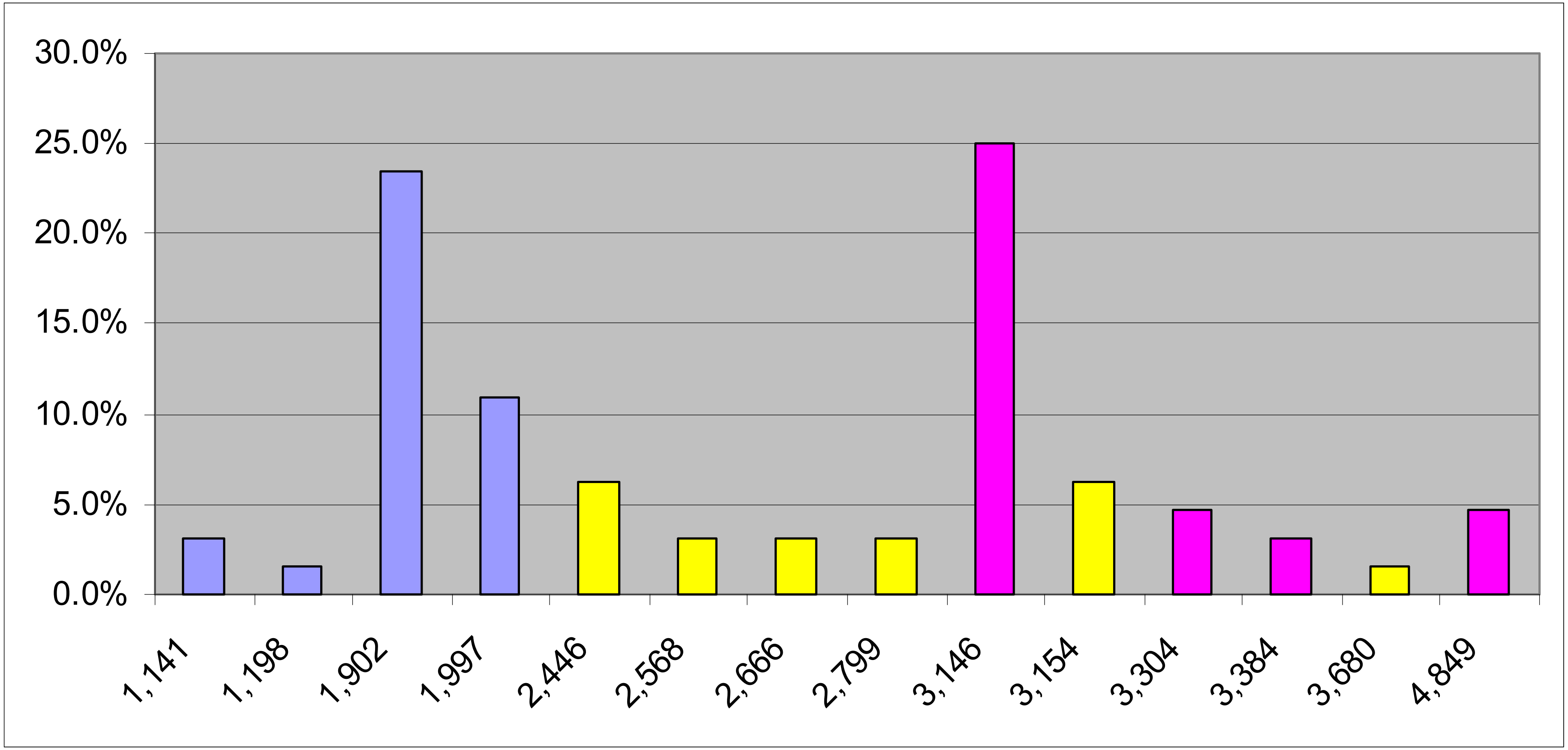
Model Variables

- Risk Profile (Time Horizon)
  - New Business Period: 1 year, 3 years, 5 years
  - Recognition: Immediate, Develop over time
  - Projection Period: 1 year, 3 years, Complete Run-off
  - Calculation basis: Going concern, run-off
- Risk Tolerances
  - 99.5%, 98.5%, 97.5%, Sloping (100% - t*0.5%)
- 144 combinations!
  (but significant number discarded)

Variability of model results to input assumptions

- Capital amount varied from 1,141 to 4,849
- Variables for these extremes were:
  - 1,141: (1 NB, 1PP, CI 99.5%, Recognition over time)
  - 4,849: (5 NB, 5PP, CI 99.5%, Recognition immediately)
- NB: Different assumptions, different results!

Results from the Questionnaires



Conclusions
Time Horizon considerations

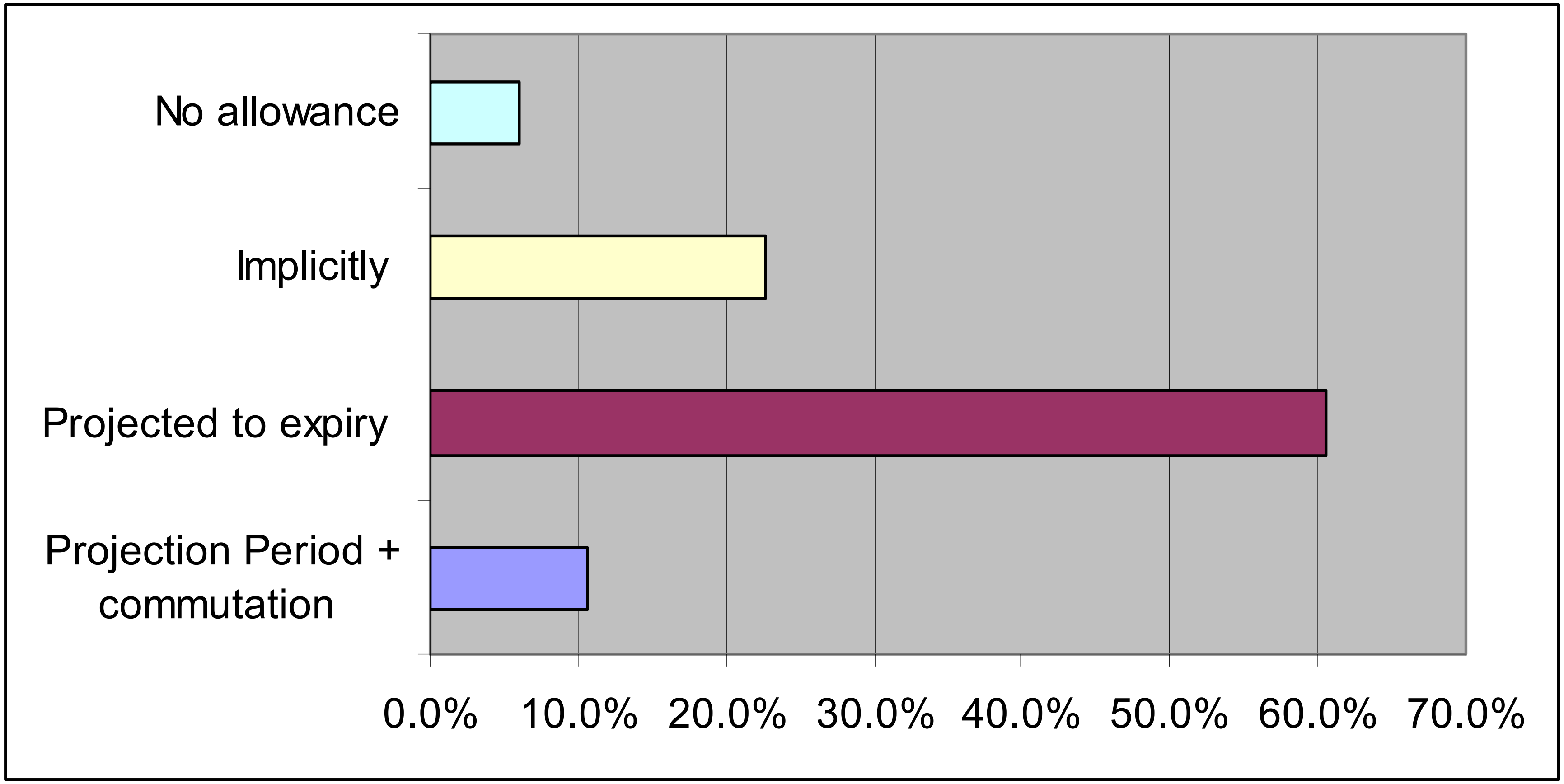
- Affects risk profile in numerous ways
  - New Business Period
  - Projection Period
  - Claim Recognition
- Purpose of capital assessment
- Impact on capital assessment can be dramatic

Conclusions
Time Horizon solved?

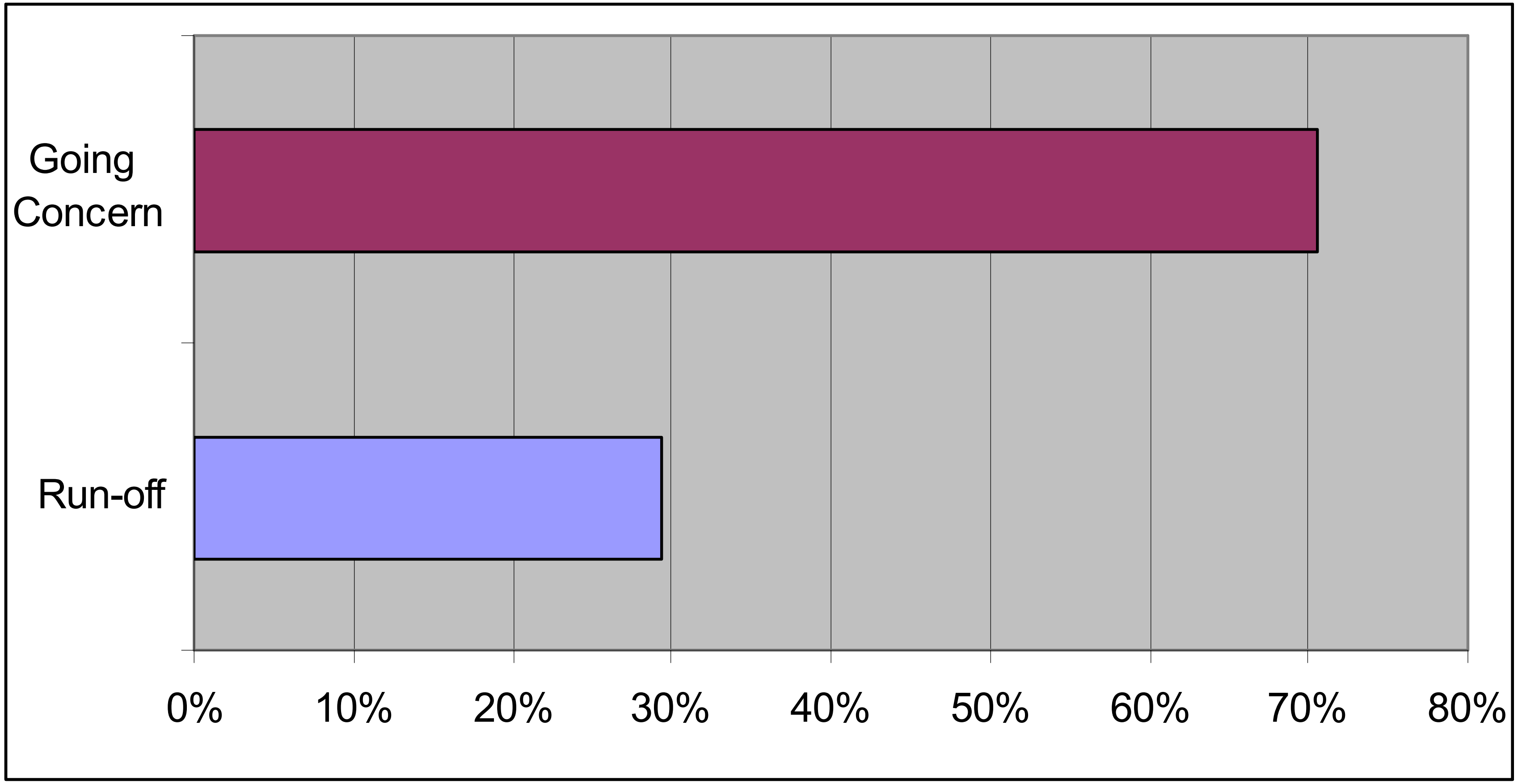
- Solvency 2!

Further Questionnaire Results

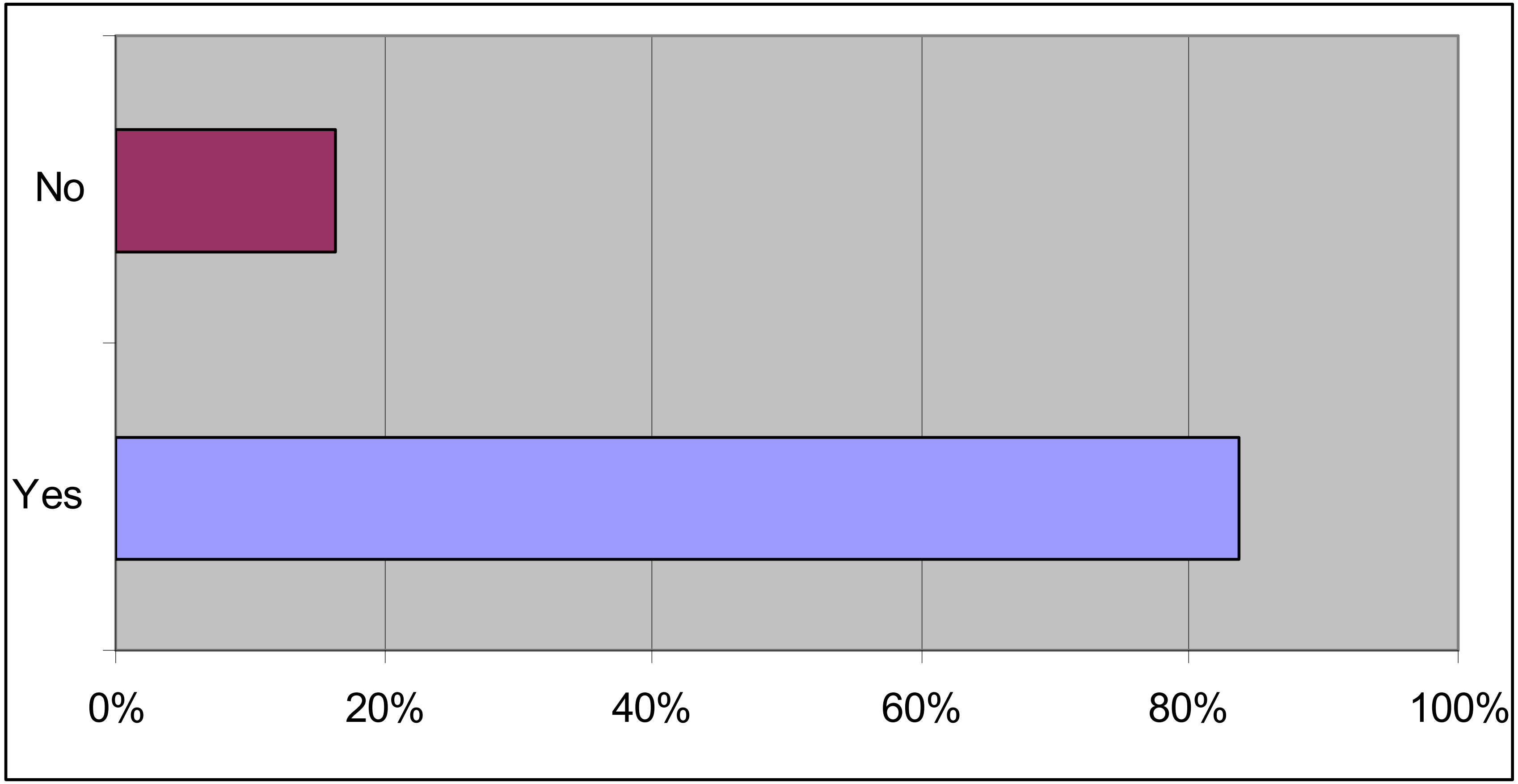
Questionnaire Results: Allowance for claim run-off?



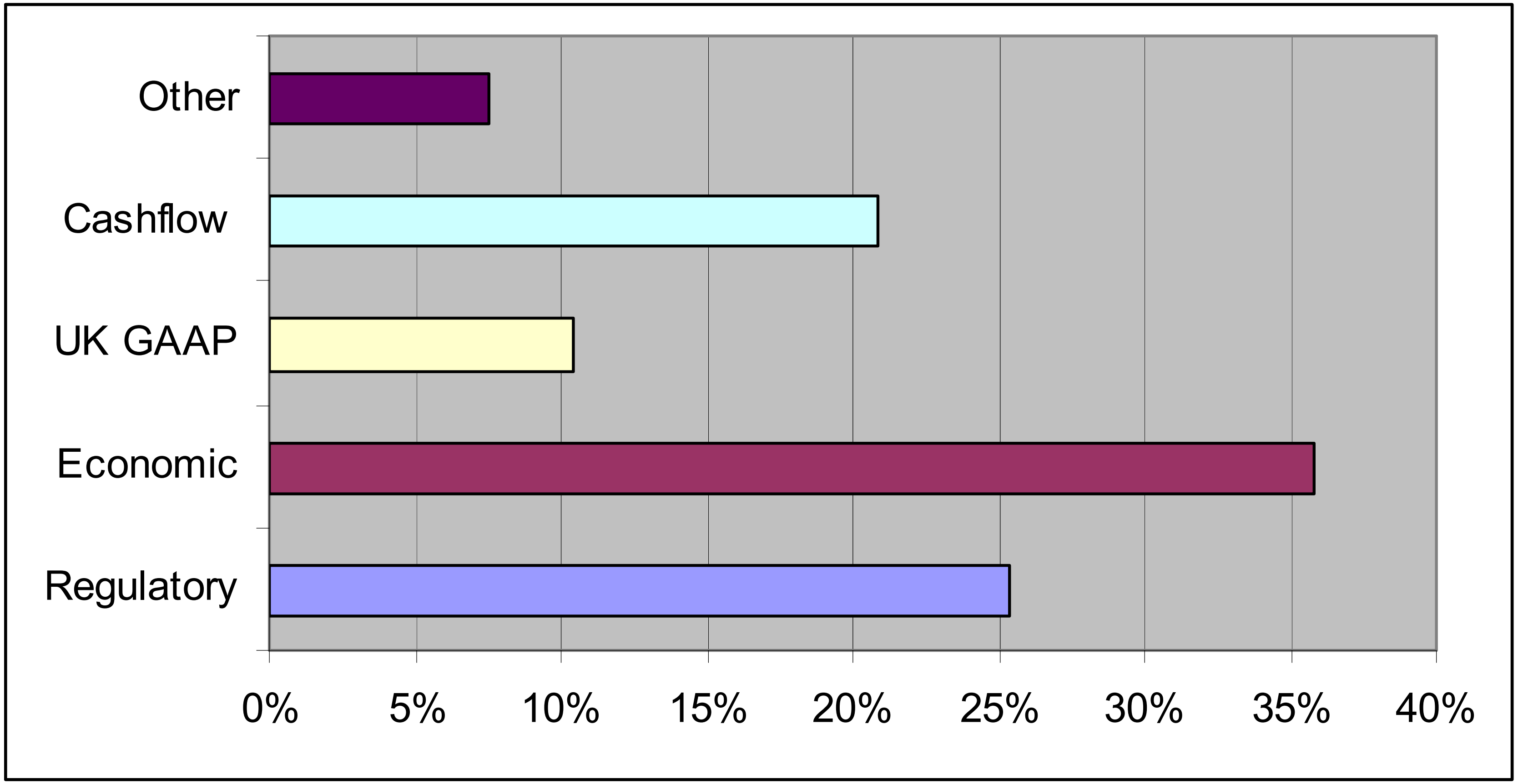
Questionnaire Results: Going concern or run-off?



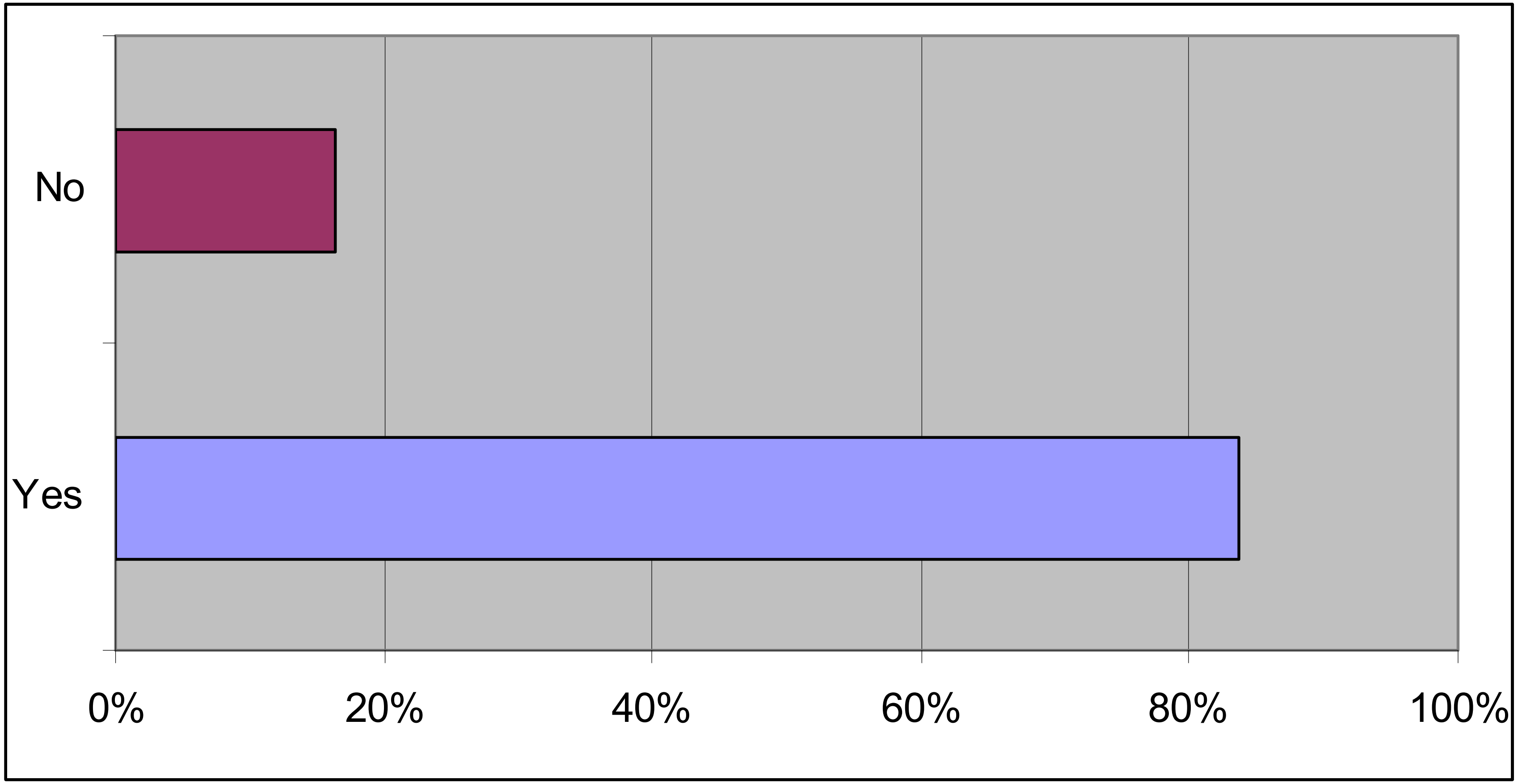
Questionnaire
Results: Allowance for unexpired risks?



Questionnaire Results: Calculation Basis



Questionnaire Results: Solvency assessed at the end of each Projection Period?



Questionnaire Results: Which Projection Period produced the highest result?

- "Depends" was a common answer!
  - 1 year if risks considered to ultimate straight away
  - Longer period if no management actions allowed for
  - Depends on profitability of new business assumed
- Overall feedback was limited
  - Roughly 2/3rds stated that applying more than 1 projection period produced a higher result

Questionnaire
Results: Any other comments

- In practice a variety of approaches are used
- Allowance for the underwriting cycle?

- We spelt conundrum incorrectly!