CAPTIVES 101

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March 28, 2006

CAPTIVES 101

- Domiciles Redux

- The Actuary's Role

- Captive Metrics

- Ratemaking Issues

- Ratemaking Examples

Domiciles - Redux

- Domicile differences include
  - Capital requirements
  - Regulatory oversight
  - Cost
  - Infrastructure

The Actuary's Role

- Captive Formation

- Ongoing Management

- Compliance

The Actuary's Role – Captive Formation

- Develop feasibility study
    - Estimate losses for the projected exposures
    - Create pro forma models

- Work with potential owner and advisory team to refine the submission

- Respond to regulatory questions

The Actuary's Role – Ongoing Management

- Develop reserve estimates and funding

- Create allocation models

- Evaluate potential new coverages/members

- Analyze reinsurance structures

- Attend Board meetings

The Actuary's Role - Compliance

- Develop liability estimates as required by the domicile

- Provide actuarial statement of opinion
  - Actuary may need prior approval
  - Timing varies by domicile and/or captive structure

- Coordinate with external auditors

Captive Metrics

- Surplus adequacy is the critical standard
    - Needs to consider the type of risk and the type of captive
    - Surplus can "reside" in the surplus account or the loss reserve account

- Loss reserve adequacy is key: for captives, they typically represent 90% or more of the liabilities

- Premiums need to at least cover expenses and the present value of losses; many captives price with a risk margin

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Captive Metrics

- There are long-term advantages to prudent pricing
  - Flexibility with respect to program structure
  - Increasing the ability to add new members to a group captive or provide additional coverage
  - Respond to unusual adverse situation
  - Solvency requirements
- Some key financial ratios are:
  - The premium to surplus ratio, which reflects a company's exposure to pricing errors; a range of "normal" leverage ratios for captives is shown below

PREMIUM-TO-SURPLUS RATIOS

Long-tail casualty business (below $10 million annual premium)	1:1 – 4:1
Short-tail casualty business (e.g., claims made)	2:1 - 5:1
Property-type coverages — non-CAT	2:1 - 5:1
Property-type coverages — CAT	Less than 1:1
Low-frequency, high-severity casualty (e.g., excess of loss)	2:1 – 5:1
High-frequency, low-severity losses (e.g., primary)	Up to 5:1

Source: Tillinghast TRACS

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Captive Metrics

■ The reserves-to-surplus ratio, which measures a company's exposure to reserve errors. A range of reserve-to-surplus ratios is shown below.

LOSS RESERVES-TO-SURPLUS RATIO

Long-tail casualty business	3:1
Short-tail business	5:1
Mixed (not predominantly one of the above)	4:1

Source: Tillinghast TRACS

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Captive Metrics

■ Risk retention to surplus ratio – A number of domiciles use the "10% rule" (i.e., a company may not expose more than 10% of its surplus to any single risk or loss)

RISK RETENTION-TO-SURPLUS RATIO

Captive Type and Exposure	Retention-to-Surplus Ratio	Implied Surplus Requirement Based on $500,000 Retention
Single-owner, non-casualty, non-catastrophe	200%	$250,000
Single-owner, low-frequency casualty	Up to 100%	$500,000
Group captive, small sophisticated membership, low-frequency casualty	Up to 50%	$1,000,000
Group captive, small membership of midsized insureds	Up to 25%	$2,000,000
Small captive, broad membership of small insureds	Up to 10%	$500,000

Source: Tillinghast TRACS

Ratemaking Issues – Cash Flows

The following chart shows simplified captive cash flows.
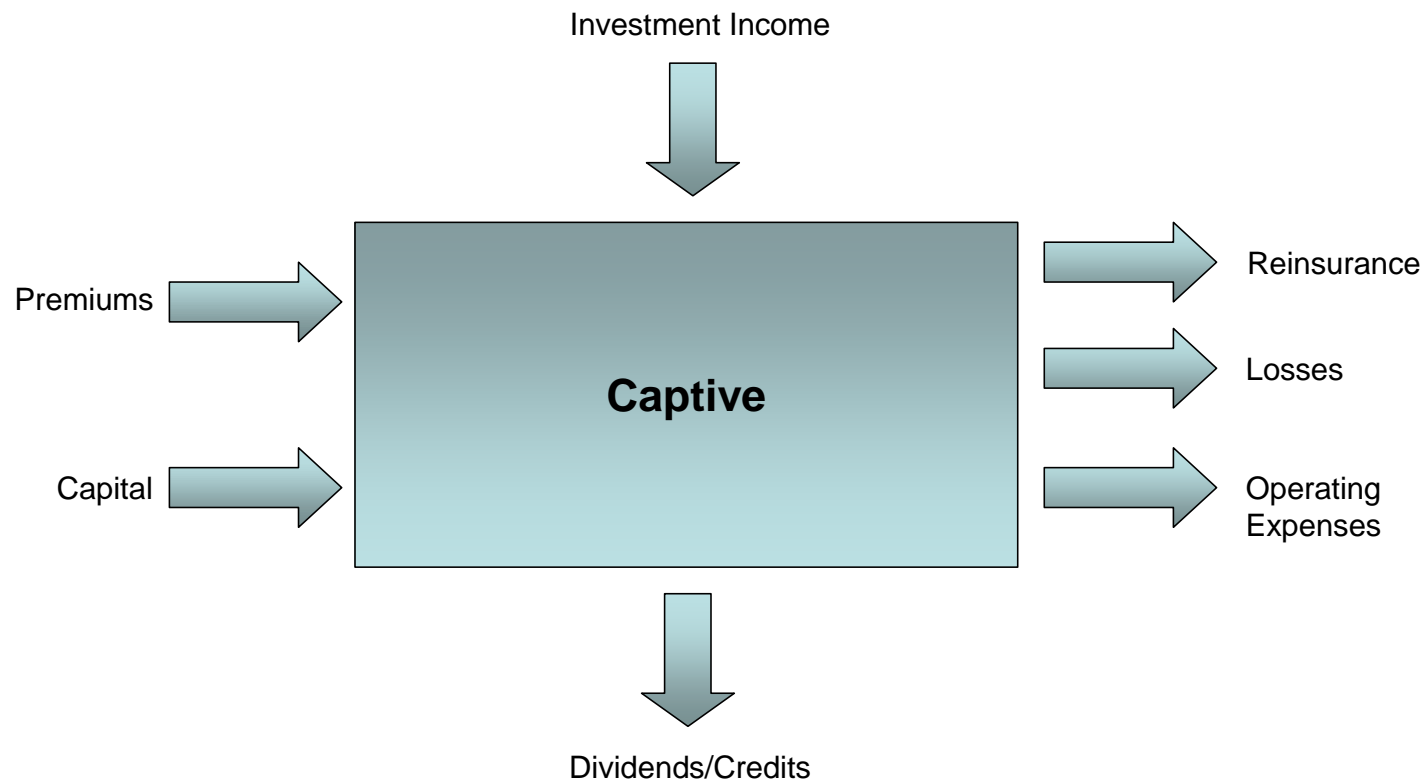
Ratemaking Issues – Data

- Exposures without losses

- No closed claims data

- Combined coverage information

- Incomplete/inconsistent exposures

- Missing claim counts

- Partial loss data

Ratemaking Issues – Industry Statistics

- Loss development data

- Size of loss curves

- Trend

- Loss costs

- Statutory changes

Example One – Adding A Coverage to a Captive

- An indemnification policy for a self-insured workers compensation program where the self-insurer retains the first $500,000 of any occurrence. The company has an existing captive and adding this coverage would allow more diversification in the captive.

- Analysis Approach
  - Calculate losses limited to $100,000
  - Develop a limited pure premium
  - Compare large loss experience to industry
  - Incorporate risk margins, expenses and discounting

- Risk margins may be mandated or elective
  - Closed no pays and/or medical only claims can dampen variability
  - Often data doesn't reflect "unlimited" severity

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Example One – Adding A Coverage to a Captive

Example One   Exhibit 1
Projection of 2006 Pure Premium - Limited to $100K   Sheet 2

Accident Year (1)	Estimated Ultimate Loss (000s) (2)	Trend/ Benefit Factor (3)	Trended Ultimate Loss (000s) (4)	Payroll (00s) (5)	Estimated Pure Premium (6)	Estimated Ultimate Counts (7)	Estimated Frequency (8)	Estimated Severity (9)
2000	$2,790	1.268	$3,536	$1,400,000	$2.53	610	0.436	$5,797
2001	2,880	1.218	3,509	1,425,000	2.46	630	0.442	5,570
2002	3,560	1.171	4,170	1,480,000	2.82	715	0.483	5,831
2003	3,980	1.126	4,481	1,500,000	2.99	760	0.507	5,896
2004	3,830	1.082	4,145	1,525,000	2.72	800	0.525	5,181
Total	$17,040		$19,841	$7,330,000	$2.71	3,515	0.480	$5,645
(10) Selected					$2.90		0.505	$5,800
(11) Adjusted to eliminate med-only claims							0.126	$17,400

Notes:

(2)	From Exhibit 1, Sheet 3.
(3)	Based on industry data.
(4)	(2) x (3).
(5)	From Exhibit 1, Sheet 7.
(6)	(4) / (5).
(7)	From Exhibit 1, Sheet 4.
(8)	(7) x 1000 / (5).
(9)	(4) x 1000 / (7).
(10)	Selected judgmentally.
(11)	(10), adjusted to reflect an assumed med-only percentage of 75% of claims and 25% of losses.

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Example One – Adding A Coverage to a Captive

- "Typical" captive expenses can include
    - Captive management
    - Excess or reinsurance
    - Claims handling
    - Actuarial, audit, legal fees
    - Taxes
    - Investment expenses
    - LOC costs
    - Other, including travel and domicile charges
- In the example the new coverage is assigned a pro-rata amount of expense
- Discounting
    - Approach varies by domicile
    - Investment yield should consider captive asset structure

Example One – Adding A Coverage to a Captive

Example One   Exhibit 1
Projected Expenses (000s)   Sheet 8

Operating Expense	Projected Cost
(1)	(2)
Reinsurance - WC only	$200
Risk Management Services	150
Accounting Services	40
Actuarial	25
Consultants	5
Legal Services	5
Trust and Bank Fees	1
State Assessments	20
Miscellaneous	5
Total	$451
Subtotal excluding reinsurance	$251
Coverage expenses - reinsurance plus 10% of program expenses	$225

Notes:
(1),(2) Provided by Company.

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Example One – Adding A Coverage to a Captive

Example One   Exhibit 1
Projection of 2006 Premium   Sheet 1

1. Estimated Payroll (00s)	$1,681,000		
2. Selected 2006 Pure Premium	2.90		
3. Increased Limits Factor	1.510		
4. Expected 2006 Ultimate Losses (000's)	$7,361		
5. Discount Factor @ 5%	0.8628		
6. Discounted Expected 2006 Ultimate Losses (000's)	$6,351		
7. Risk Margin at			
a) 75% Confidence Level	1.10		
b) 90% Confidence Level	1.30		
c) 95% Confidence Level	1.50		
8. Estimated Expenses (000's)	$225		

9. Estimated Premium (000's) at	Nominal	Discounted
a) Expected Level	$7,586	$6,576
b) 75% Confidence Level	8,322	7,211
c) 90% Confidence Level	9,795	8,482
d) 95% Confidence Level	11,267	9,752

Notes:

(1)	Assumes 5% annual growth from 2004 level.
(2)	From Exhibit 1, Sheet 2.
(3)	From Exhibit 1, Sheet 6.
(4)	(1) x (2) x (3) / 1000.
(5)	From Exhibit 1, Sheet 5.
(6)	(4) x (5).
(7)	Based on simulation of Company experience.
(8)	Provided by Company. See Exhibit 1, Sheet 8.
(9)	(4) or (6) (for discounted) x (7) (for higher confidence levels) + (8).

Follow-up to Example One – Developing A Pro Forma

- Key Elements
  - Losses – expected and higher confidence levels
  - Expenses
  - Cash flows and investment income assumptions
  - Capitalization – Investible assets vs. LOCs

- Develop Scenario Testing
  - Funding at higher confidence levels and emergence at expected (base case)
  - Variations of more adverse scenarios
    — Loss levels
    — Investment results
    — Combination of above
  - Evaluation of Scenarios
    — Financial position
    — Leverage ratios
    — Captive structure

Follow-up to Example One – Captive Management and Regulatory Compliance

- Baseline for monitoring emergence

- Starting point for reserve analyses and second year funding

- Tool to evaluate alternative reinsurance structures

Example Two – Allocating Premiums for a New Group Captive

■ Four physician groups consider establishing a captive to react to increases in premium and retentions

■ Analysis approach

  ■ Data review

  ■ Develop an "experience mod"

  ■ Apply the mod to industry pure premiums

  ■ Adjust for policy form, retention level, discounting, risk margins and expenses

■ Data review

  ■ Exposure information not provided for all years

  ■ Average values of open claims do not track average paids, nor does frequency track loss volume

  ■ Data quality varies

Example Two – Allocating Premiums for a New Group Captive

Example Two
Summary of Basic Data evaluated as of December 31, 2004

Exhibit 2
Sheet 5

Accident Year (1)	Losses (000's) (2)	Losses (000's) (3)	Losses (000's) (4)	Reported Counts (5)	Closed Counts (6)	Physicians FTEs (7)	Average Reported (8)	Average O/S (9)	Average Paid (10)	Reported Frequency (11)
Practice A										
2000	$200	$500	$700	20	8		$35,000	$41,667	$25,000	#N/A
2001	50	60	110	5	4		22,000	60,000	12,500	#N/A
2002	650	700	1,350	10	6	100	135,000	175,000	108,333	0.100
2003	75	450	525	3	2	110	175,000	450,000	37,500	0.027
2004	15	300	315	12	6	105	26,250	50,000	2,500	0.114
Total	$990	$2,010	$3,000	50	26	315	$60,000	$83,750	$38,077	0.159
Practice B										
2000	$0	$100	$100	2	1	75	$50,000	$100,000	$0	0.027
2001	800	1,200	2,000	5	3		400,000	600,000	266,667	#N/A
2002	20	700	720	10	3	60	72,000	100,000	6,667	0.167
2003	400	600	1,000	12	5		83,333	85,714	80,000	#N/A
2004	150	700	850	5	4	75	170,000	700,000	37,500	0.067
Total	$1,370	$3,300	$4,670	34	16	210	$137,353	$183,333	$85,625	0.162
Practice C										
2000	$100	$0	$100	5	1	50	$20,000	$0	$100,000	0.100
2001	75	50	125	7	3	50	17,857	12,500	25,000	0.140
2002	150	850	1,000	8	5	50	125,000	283,333	30,000	0.160
2003	20	300	320	5	4	50	64,000	300,000	5,000	0.100
2004	50	100	150	6	3	50	25,000	33,333	16,667	0.120
Total	$395	$1,300	$1,695	31	16	250	$54,677	$86,667	$24,688	0.124
Practice D										
2000	$700	$300	$1,000	3	2	55	$333,333	$300,000	$350,000	0.055
2001	600	500	1,100	4	2	60	275,000	250,000	300,000	0.067
2002	500	900	1,400	2	1	62	700,000	900,000	500,000	0.032
2003	50	50	100	5	4	65	20,000	50,000	12,500	0.077
2004	25	750	775	5	1	70	155,000	187,500	25,000	0.071
Total	$1,875	$2,500	$4,375	19	10	312	$230,263	$277,778	$187,500	0.061
TOTAL										
2000	$1,000	$900	$1,900	30	12	280	$63,333	$50,000	$83,333	0.107
2001	1,525	1,810	3,335	21	12	285	158,810	201,111	127,083	0.074
2002	1,320	3,150	4,470	30	15	272	149,000	210,000	88,000	0.110
2003	545	1,400	1,945	25	15	300	77,800	140,000	36,333	0.083
2004	240	1,850	2,090	28	14	300	74,643	132,143	17,143	0.093
Total	$4,630	$9,110	$13,740	134	68	1,437	$102,537	$138,030	$68,088	0.093

Notes:

(2) - (7)	Provided by the Broker. Total (7) includes estimates for missing periods. (7) is on a base class equivalent basis.
(8)	(4) x 1000/(5).
(9)	(3) x 1000/[(5) - (6)].
(10)	(2) x 1000/(6).
(11)	(5)/(7).

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Example Two – Allocating Premiums for a New Group Captive

- Experience Mod Approach
  - Determine at what loss limit data is credible
  - Calculate estimated ultimate losses by multiplying basic limit incurred losses by loss development factors
  - Divide ultimate losses by exposures on base class basis
  - Compare actual loss costs with expected loss costs to determine experience modification factor (experience mod)
  - Weight individual accident year results (using exposures and reporting patterns) to calculate overall experience mod factors
  - Calculate a credibility weighted experience mod, and select experience mod
  - Apply selected experience mod to industry expected loss cost to calculate experience-modified loss cost
  - Multiply experience-modified loss cost and projected exposures to estimate losses for the forecast period
- Allocate results by practice

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Example Two – Allocating Premiums for a New Group Captive

Example Two
Calculation of Basic Limits Loss Costs and Formula Credibility

Exhibit 2
Sheet 3

Accident Year	Basic Limit Losses (000's) (000's)	LDF to Ultimate	Developed Losses (000's)	Base Class Equivalent Exposures	Developed Loss Cost Per Expos. Unit	Basic Limits Industry Expected Loss Cost	Ratio of Actual to Industry Loss Cost	Exposure Weights
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
2000	$1,300	1.163	$1,512	280	$5,399	$18,000	0.300	0.295
2001	2,510	1.250	3,138	285	11,009	19,800	0.556	0.279
2002	870	1.538	1,338	272	4,921	21,780	0.226	0.217
2003	1,545	2.381	3,679	300	12,262	23,958	0.512	0.154
2004	1,665	6.667	11,100	300	37,000	26,354	1.404	0.055
Total	$7,890		$20,766	1,437	$14,451			1.000

(10)	Weighted Average Ratio	0.449
(11)	Credibility	0.350
(12)	Credibility Weighted Average	0.807
(13)	Selected Ratio	0.750
(14)	Industry Loss Cost at 7/05	$30,404
(15)	Experience Modified Loss Cost	$22,803

Notes:

(2)	Exhibit 2, Sheet 5, Column (4) - Exhibit 2, Sheet 4, Sum of Column (7) by year.
(3),(7),(14)	Based on industry data.
(4)	(2) x (3).
(5)	From Exhibit 2, Sheet 5.
(6)	(4) x 1000/(5).
(8)	(6)/(7).
(9)	Based on (3) and (5).
(10)	Weighted average of (8), using weights in (9).
(11)	Based on (3) and (5), and a full credibility standard of 40,000.
(12)	(10) x (11) + [1.0 - (11)].
(13)	Selected judgmentally.
(15)	(13) x (14).

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Example Two – Allocating Premiums for a New Group Captive

Example Two

Allocation of Premium (000's)

Exhibit 2
Sheet 1

1. Projected 2006 Premium, $1,000,000 per occurrence limits - discounted funding, 75% confidence level $7,561

Practice	2006 Exposures	Percentage of Exposures	2000-2004 Reported Counts	Percentage of Counts	2000-2004 Incurred Loss (000's)	Percentage of Inc. Loss	Selected Allocation Percentage	Allocated Premium
(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Practice A	105	35.00%	50	37.31%	$3,000	21.83%	31.38%	$3,559
Practice B	75	25.00%	34	25.37%	4,670	33.99%	28.12%	3,189
Practice C	50	16.67%	31	23.13%	1,695	12.34%	17.38%	1,971
Practice D	70	23.33%	19	14.18%	4,375	31.84%	23.12%	2,622
Total	300		134		$13,740			$11,342

Notes:

(1)	From Exhibit 2, Sheet 2.
(3),(5),(7)	From Exhibit 2, Sheet 5.
(4)	(3)/(3), total.
(6)	(5)/(5), total.
(8)	(7)/(7), total.
(9)	Equal weighting of (4),(6), and (8).
(10)	(1) x (9) x 1.5 (to incorporate an initial capital contribution).

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Example Three – Develop Premium Estimates for Non-Traditional Exposures

- Analyze process to generate an insured event

- Develop frequency and severity (or pure premium) estimates

- Consider timing of cash flows, expenses and risk margins

- Example assumes two ways in which a claim could arise:
  - A vaccinated worker contracted smallpox (direct exposure); or
  - A vaccinated worker infected a co-worker (indirect exposure)

- Estimate claim frequencies for direct and indirect exposures and combine the two. Key variables underlying the claim frequency projection are:
  - Percentage of workers vaccinated
  - Estimated percentage of non-vaccinated workers exposed to vaccinated workers
  - Estimated percentage of workers contracting smallpox

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Example Three – Develop Premium Estimates for Non-Traditional Exposures

Example Three	Exhibit 3
Projection of Claim Frequency	Sheet 3

1. Estimated Employees	
a. Estimated Payroll (00's)	$4,000,000
b. Average Salary	50,000
c. Estimated Headcount	8,000
A. Direct Exposure (for vaccinated workers)	
2. Estimated % of Workers Vaccinated	1.50%
3. Estimated Number of Vaccinated Workers	120
4. Estimated Percentage of Vaccinated Workers Contracting Smallpox	2.00%
5. Estimated Number of Vaccinated Workers Contracting Smallpox	2
B. Indirect Exposure (non-vaccinated workers exposed by vaccinated workers)	
6. Estimated Percentage of Non-vaccinated Workers exposed to Vaccinated Workers	5.00%
7. Estimated Percentage of Non-vaccinated Workers Contracting Smallpox	1.00%
8. Interaction Effect	1.20
9. Estimated Number of Non-Vaccinated Workers Contracting Smallpox	5
10. Total Projected Claims	7

Notes:

(1a),(1b),(2)	Provided by the healthcare system.
(1c)	(1a) x (1b).
(3)	(1c) x (2).
(4),(6),(7)	Based on industry information and input from healthcare system.
(5)	(3) x (4).
(8)	Estimated based on healthcare system input.
(9)	(1c) x [1.0 - (2)] x (6) x (7) x (8).
(10)	(5) + (9).

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Example Three – Develop Premium Estimates for Non-Traditional Exposures

- Assume one of three outcomes
    - Outcome A - fatal claim
    - Outcome B - permanent total claim
    - Outcome C - temporary total claim

- Assign percentage probabilities to each outcome and develop estimated severities for each scenario

- Calculate an overall estimated severity as the weighted average of the estimated cost of the three outcomes

- Combine the frequency and severity assumptions to calculate expected losses

- Adjust expected losses to reflect discounting, risk margins and operating expenses.

Example Three – Develop Premium Estimates for Non-Traditional Exposures

Example Three	Exhibit 3	
Calculation of Severity	Sheet 2	

		Probability
A. Outcome A - Fatal Claim		5%
1. Estimated Lost Wages	$1,333	
2. Estimated Medical Costs	500,000	
3. Estimated Survivor Benefits	1,032,307	
4. Total	$1,533,640	
B. Outcome B - Permanent Total Claim		10%
1. Estimated Lost Wages	$416,212	
2. Estimated Medical Costs	100,000	
3. Estimated Future Medical Costs	141,471	
4. Total	$657,683	
C. Outcome C - Eight Week Injury		85%
1. Estimated Lost Wages	$5,333	
2. Estimated Medical Costs	15,000	
3. Total	20,333	
D. Combined Severity (weighted average of A-C)	$159,734	

Notes:

All 3 outcomes assume injured worker currently earns 1,000 per week, a 2/3 replacement rate,
  7.5% annual future medical inflation and 4% annual COLA adjustment.
Outcome A: Assumes 2 weeks of wage loss prior to death and 20 years of survivor benefits.
Outcome B: Assumes 10 years of lost wages, annual medical costs of 10,000 in current dollars.
Outcome C: Assumes 8 weeks lost wages.
Combined severity based on probability weighting of severity by outcome.
Probability of each outcome based on industry data and healthcare system input.

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Example Three – Develop Premium Estimates for Non-Traditional Exposures

Example Three   Exhibit 3
Calculation of Indicated Funding   Sheet 1

1. Estimated Projected Claims   7

2. Estimated Average Severity $159,734

3. Estimated Ultimate Losses $1,118,100

4. Risk Margin at
   a. 75% Confidence Level   1.350
   b. 90% Confidence Level   1.700
   c. 95% Confidence Level   2.250

5. Discount Factor @ 5%   0.866

6. Expenses $20,000

7. Indicated Funding at	Nominal	Discounted
a. Expected Level	$1,138,100	$988,318
b. 75% Confidence Level	1,529,435	1,327,230
c. 90% Confidence Level	1,920,770	1,666,141
d. 95% Confidence Level	2,535,725	2,198,716

Notes:
(1) From Exhibit 3, Sheet 3.
(2) From Exhibit 3, Sheet 2.
(3) (1) x (2).
(4) Based on simulation of healthcare system experience.
(5) From Exhibit 3, Sheet 4.
(6) Provided by the healthcare system.
(7) (3) x (4) (for higher confidence levels) x (5) (for discounted results) + (6).