AN EXAMPLE OF PROVIDING INFORMATION ON THE RESIDUAL MARKET BURDEN

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An Example of Providing Information on the Residual Market Burden

In 1991, the most recent year for which we have data, the residual market accounted for a quarter of total premium, and the burden of supporting it was 18 cents on every premium dollar. In other words, in a typical state, insurers were assessed 18 cents for every dollar of premium they received from the voluntary market in that state.

Obviously, there is an increased need for an insurer to monitor the foreseeable financial burden of Residual Market Assessments.

Two objectives are to be accomplished in our illustration:

1. Develop formulas to estimate residual market burdens, including all the variables related to the Residual Market's financial results. The basic variables include expense components in writing an assigned risk policy, losses, and assessable premiums.

2. Provide a flexible and sensible burden analysis in a timely manner to member insurers.

The Workers' Compensation Rating and Inspection Bureau of Massachusetts has distributed the residual market burden estimates to our member insurers since mid-1990. We believe that this general format might be of interest to a wider audience.

The general methodology for calculating the residual market overburden follows the methodology in "Workers' Compensation Involuntary Markets - A Company Perspective," by William J. Miller.[1]

Assigned Risk Overburden

$$= \frac{\text{Pool Operating Losses}}{\text{Voluntary Assessable Premiums}}$$

$$= \frac{\text{Pool Net Operating Loss}}{\text{Pool Premium}} \times \frac{\text{Residual Market Share}}{1 - \text{Residual Market Share} - \text{Takeout Credit Share}}$$

[1]CAS Ratemaking Seminar - 1990

Attached are two charts which demonstrate the burden for the residual market an insurer would incur for writing voluntary Workers' Compensation premium in Massachusetts.

The first chart, Exhibit 1a, deals with nominal losses; i.e., it ignores the time value of money. For example, the 20.2% burden shown in Exhibit 1a (Column 4, Row 4) represents 20.2 cents of residual market assessment for every dollar of premium written in the voluntary market (adjusted for take-out credits). A Company's total assessment equals 20.2% multiplied by its voluntary written premium subsequent to adjustment for take-out credits.

The second chart, Exhibit 1b, takes into account the time value of money. The results displayed in the two charts are substantially different. The second chart better reflects both economic reality and the way Workers' Compensation is priced. A negative profit loading in Massachusetts Workers' Compensation rates reflects the investment income on cashflows.

The analysis uses several inputs. Each chart is also based on the overall rate level inadequacy on the vertical axis and the residual market share located on the horizontal axis. When this chart is sent to insurers, the Bureau includes its current estimate of the residual market share.

The inputs in Exhibit 2 are usually stable from year to year, but the market share and rate level inadequacy will depend on the workers' compensation market conditions and underwriting cycle. By putting these two factors on the X and Y axes with a range of inputs, it will allow us to show the impact on burden of these two factors. By supplying the information in the form of a chart, individuals can easily incorporate their own estimates of these two key inputs.

We have only illustrated an example applicable to the Massachusetts Workers' Compensation market. One should carefully study the inputs in the burden formula to tailor them to the particular application. For example, in a state with competitive rating, a different method would have to be devised to estimate the residual market loss ratio than is used here.

A key element in the burden is the Residual Market Loss Ratio. One of the inputs in estimating the residual market loss ratio is the loss ratio differential. An undeveloped two-year average differential in loss ratio is the basis of our estimate,[2] which assumes a similar reporting and development pattern in both markets. This is definitely not a sophisticated method, but it provides a simple reasonable estimate for this calculation.[3]

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[2]Adjusted for changes in the Pool, e.g., removal of premium discounts and introduction of the All Risk Adjustment Program.

[3]A more detailed study in this area might adjust for shifts in market share, differing development patterns, etc.

As with any actuarial analysis, all inputs to the calculation should be carefully reviewed on a regular basis. Continuous adjustments and changes may be required because of the introduction of new programs and changes in circumstances in the assigned risk market. This example was meant to illustrate the type of calculation that might be appropriate. For use in a particular place and time, modifications will have to be made.

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Enclosure

F O R M U L A

Assigned Risk Overburden

$$= \frac{\text{Pool Net Operating Loss}}{\text{Pool Premium}} \times \frac{\text{Residual Market Share}}{\text{(1-Residual Market Share-Take Out Credit Share)}}$$

$$= [1 - \text{Pool Loss Ratio} - \text{Pool Expense Ratio}] \times \frac{\text{Residual Market Share}}{1 - \text{Residual Market Share} - \text{Take Out Credit Share}}$$

$$ARO = [(1-L \times D-E) \times \frac{M}{[(1-M)-T]\ A} \times F]$$

$$L = \frac{(1+I) \times DR}{M \times DR + (1-M)}$$

ARO	=	The Assigned Risk Overburden
I	=	The Rate Level Inadequacy (Total Market)
M	=	The Residual Market Share (as a portion of Total Market Premiums)
D	=	The Loss Discounting Factor which reflects the timing of the cash flow
ELR	=	The Expected Loss Ratio (Total Market)
E	=	The Pool Expense Ratio; servicing carrier allowances plus producers' fee plus administrative expense
L	=	Projected Involuntary Market Loss Ratio
DR	=	Differential between the Involuntary Loss Ratio and the Voluntary Loss Ratio
F	=	Factor to adjust Calendar Year written premium to Policy year premium
T	=	Eligible Take-Out credits as a percentage of Total Market Premium
A	=	Factor to anticipate the effect of insolvencies of Pool members

Massachusetts Workers' Compensation
1993 Projected Residual Market Burden
Nominal Losses

Exhibit-1a

Inadequacy of Loss Provision in the Total Market Rate *	Residual Market Share (as a percentage of Standard Premium)						
	10%	20%	30%	40%	50%	60%	70%
-10%	2.3%	4.5%	6.8%	9.2%	11.9%	15.2%	20.2%
-5%	2.9%	5.9%	9.2%	12.9%	17.5%	23.8%	34.3%
0%	3.5%	7.3%	11.5%	16.5%	23.0%	32.3%	48.4%
5%	4.1%	8.7%	13.9%	20.2%	28.5%	40.8%	62.6%
10%	4.8%	10.1%	16.2%	23.9%	34.1%	49.3%	76.7%
15%	5.4%	11.4%	18.6%	27.5%	39.6%	57.9%	90.9%
20%	6.0%	12.8%	21.0%	31.2%	45.1%	66.4%	105.0%
25%	6.6%	14.2%	23.3%	34.9%	50.7%	74.9%	119.2%
30%	7.3%	15.6%	25.7%	38.5%	56.2%	83.4%	133.3%
35%	7.9%	17.0%	28.0%	42.2%	61.7%	92.0%	147.5%
40%	8.5%	18.4%	30.4%	45.8%	67.3%	100.5%	161.6%

* A negative "inadequate loss provision" implies an excessive loss provision.

Massachusetts Workers' Compensation

1993 Projected Residual Market Burden

With Loss Discount

Exhibit-1b

Inadequacy of Loss Provision in the Total Market Rate *	Residual Market Share (as a percentage of Standard Premium)						
	10%	20%	30%	40%	50%	60%	70%
-10%	0.8%	1.3%	1.4%	0.8%	-0.8%	-4.4%	-12.4%
-5%	1.4%	2.5%	3.4%	4.0%	4.0%	3.0%	-0.1%
0%	1.9%	3.7%	5.5%	7.2%	8.8%	10.5%	12.2%
5%	2.5%	4.9%	7.5%	10.4%	13.7%	17.9%	24.6%
10%	3.0%	6.1%	9.6%	13.6%	18.5%	25.3%	36.9%
15%	3.5%	7.4%	11.6%	16.7%	23.3%	32.8%	49.2%
20%	4.1%	8.6%	13.7%	19.9%	28.1%	40.2%	61.6%
25%	4.6%	9.8%	15.8%	23.1%	33.0%	47.6%	73.9%
30%	5.2%	11.0%	17.8%	26.3%	37.8%	55.1%	86.2%
35%	5.7%	12.2%	19.9%	29.5%	42.6%	62.5%	98.6%
40%	6.3%	13.4%	21.9%	32.7%	47.4%	69.9%	110.9%

Note: Losses were discounted at 3.29% after-tax risk adjusted rate of return.

* A negative "inadequate loss provision" implies an excessive loss provision.

Massachusetts Workers' Compensation

Exhibit 2

Inputs for the Burden Calculation

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Expected Total Market Loss Ratio	Involuntary and Voluntary Market Loss Ratio Differential	Discount Factor for the Loss Ratio	Residual Market Expense Ratio	Assessment Base	CY to PY Adjustment Factor	Take-Out Credit
0.798	1.260	0.872	0.295	0.995	1.04	0.08

(1) Underlying the rate filing for 7/1/92. (Total Market Loss and Loss Adjustment Expense Ratio of 87.8%, based on an underwriting profit provision of -5.2%, an LAE provision of 10.0%, and other provisions from the 7/1/92 rate filing.) The loss ratio excluding loss adjustment expense (LAE) is used because LAE is included in the servicing carrier allowance.

(2) Adjusts for the impact of ARAP and the elimination of premium discounts in the pool. See Exhibit 6.

(3) Discount factor for the loss flow 0.8538 divided by the discount factor for the premium flow 0.9793 This is based on a risk-adjusted after-tax rate of return of 3.29% to the premium and the loss flow from the 7/1/92 filing. Note that 3.29% = 5.00% x (1 - 34.3%), where 5.00% is the pre-tax risk adjusted rate of return and 34.3% is the tax rate on investment income.

(4) The expense ratio including the current Pool payment of 25% of net written premium to servicing carriers (since there are no retrospective plans or premium discounts in the Massachusetts Assigned Risk Pool, this is also 25% of standard premiums), the 3.9% average commission to agents, and 0.6% for the Pool's administration expense. See Exhibits 3 & 4.

(5) The assessment base is the percentage of premium written by the Pool members. The Mass. Assigned Risk Pool assessments apply to all (solvent) carriers. This factor is less than unity in order to anticipate the effect of insolvencies.

(6) Adjusts the assigned risk direct written premium from calendar year to policy year. See Exhibit 5.

(7) Estimated total credit for Calendar Year 1993, assuming credits of 3.4% of total premium (as in 1991) and retentions of 60% and 70% of credits from 1991 and 1992, respectively; see Exhibit 7. The Calendar Year voluntary assessable premium is the voluntary premium reduced by the amount of eligible credits in the Take-Out program.

Massachusetts Workers' Compensation

Exhibit 3

Calculation of Average Commission

Assigned Risks

Premium by Layer	Standard Premium*	Distribution	Commission (%)
First $ 1,000	60,020,575	4.63%	9%
Next $ 4,000	142,717,556	11.00%	5%
Next $ 95,000	569,197,398	43.89%	4%
Over $100,000	525,083,328	40.48%	3%
TOTALS	1,297,018,857	100.00%	3.9%

* Obtained by trending 89/90 composite policy year Schedule Z first report data for the Residual Market to the policy effective period.

Massachusetts Workers' Compensation

Exhibit 4

Administration Expense for the Pool

Policy Year	(1) Administration & Other Expenses	(2) Assigned Risk Written Premium*	(1)/(2) Administration & Other Expense Ratio
86	949,304	194,820,996	0.49%
87	1,472,482	248,620,039	0.59%
88	2,143,472	362,190,846	0.59%
89	3,320,457	505,771,245	0.66%
90	3,585,110	619,504,775	0.58%
Average of 86 - 90			0.58%
Selected			0.6%

* Net of uncollectible.

Source: NCCI, as of 12/31/91.

Massachusetts Workers' Compensation

Exhibit 5

Assigned Risk Written Premium (in Millions)

Policy Year	(1) Policy Year Earned Premium*	(2) Calendar Year Written Premium	(1)/(2) Adjustment Factor
86	195	176	1.108
87	249	231	1.078
88	362	349	1.037
89	506	513	0.986
90	620	615	1.008
Average of 86-90			1.043
Selected			1.04

* Includes EBNR (Earned But Not Reported).

Note: This adjustment factor takes into account that Policy Year results for the Pool are assessed to member companies based on the generally smaller Calendar Year premiums.

Massachusetts Workers' Compensation
Differential Analysis
Adjusted for ARAP and the Removal of Premium Discount in the Pool

		PY 1989	PY 1990
(1)	Assigned Risk Loss Ratio [1]	110.5%	74.9%
(2)	Voluntary Market Loss Ratio [1]	78.7%	55.7%
(3)	Effect of ARAP in Voluntary Risk [2]	0.978	1.000
(4)	Effect of ARAP in Assigned Risk [2]	0.939	1.000
(5)	Removal of Premium Discount from Assigned Risk [3]	0.936	0.936
(6)	Assigned Risk Loss Ratio Adjusted for ARAP and Premium Discount = (1)x(4)x(5)	97.1%	70.1%
(7)	Voluntary Risk Loss Ratio Adjusted for ARAP and Premium Discount = (2)x(3)	77.0%	55.7%
(8)	Differential in Loss Ratio between Assigned Risk and Voluntary Risk = [(6)/(7)]	1.261	1.259
(9)	Two-year average in differential	1.260	

1 From page 2.
2 A 2.4% increase in 93.6% of the Voluntary Market premiums from ARAP.
A 7.4% increase in 87.5% of the Residual Market premiums from ARAP.
As of 1/1/90, ARAP is included in reported Earned Premium.
3 Based on trended first report data (composite policy year 89/90) from Schedule Z, average premium discount in the Pool would be 6.4%.

Note: In Massachusetts, ARAP was introduced 1/1/90 and premium discounts were eliminated in the Pool 1/1/91.

Massachusetts Workers' Compensation
Differential Analysis
Premiums and Losses as of 12/31/91 (in $ Millions)

POLICY YEAR 1989

	(1) Total Market*	(2) Assigned Risks**	(3) = (1) - (2) Voluntary Market	(4) = (2) / (3) Differential
(1) Net Earned Premium	1229.2	505.8	723.4	
(2) Reported Losses = Paid + Case Reserves	1128.1	558.7	569.4	
(3) Loss Ratio	91.8%	110.5%	78.7%	140.4%

POLICY YEAR 1990

	(1) Total Market*	(2) Assigned Risks**	(3) = (1) - (2) Voluntary Market	(4) = (2) / (3) Differential
(1) Net Earned Premium (including ARAP)	1355.6	619.5	736.1	
(2) Reported Losses = Paid + Case Reserves	874.3	464.0	410.3	
(3) Loss Ratio	64.5%	74.9%	55.7%	134.5%

Average ln differential for PY 89-90 prior to the adjustment for ARAP and the removal of premium discount in the Pool: 1.375

* From Financial Aggregate Data (Total Market).
** From NCCI, Massachusetts Combined Data in National Pool.

Massachusetts Workers' Compensation

Exhibit 7

Adjustment for Take-Out Credit Program

Data for Calendar Year 1991

(1) Take-Out Credits ($ million)	(2) Direct Written Premium ($ million)	(1)/(2) Take-Out Percentage
49.2	1,431.0	3.4%

Source: NCCI Massachusetts Premium Analysis

Data for First 8 Months

Year	New Take-Out Credits ($ million)	Average Premium Size ($ thousand)
1991	38.3	42.7
1992	32.6	69.4

Source: WCRB approximate data (to be used only for purposes of this comparison).

Estimated Impact of Take-Out Credit Program

Year	(1) New Take-Out Credits*	(2) Rate of Retention to 1993 **	(1)x(2) Credit in 1993
1991	3.4%	60%	2.0%
1992	3.4% **	70%	2.4%
1993	3.4% **		3.4%
Total Credits in 1993, as percentage of Total Market Premium			7.8%
Selected Value			8%

* As percentage of total premium.

** WCRB estimates.

Note: Take-Out Credits are available for up to three years. The Massachusetts Take-Out program became effective in 1991.

1993 Residual Market Overburden Sample Calculation
With Loss Discount

A. Residual Market Loss Ratio:

(1)	Expected Total Market Loss Ratio including LAE	0.878
(2)	Loss Adjustment Expense Ratio (as a percentage of losses)	10.0%
(3) = (1)/[1 + (2)]	Expected Total Market Loss Ratio excluding LAE	0.798
(4)	Inadequacy of Loss provision in the Total Market Rate (Chosen for Example)	30%
(5) = [(3) X (1 + (4)]	Expected Total Market Loss Ratio excluding LAE (loaded in inadequacy of loss provision in the Total Market Rate)	1.037
(6)	Differential in Loss Ratio between Voluntary and Involuntary Market	126.0%
(7)	Residual Market Share (Chosen for Example)	60%
(8) = (5)/{[(1-(7))/(6)] + (7)}	Residual Market Loss Ratio	1.130
(9)	Loss Ratio Discount Factor	0.872
(10) = (8) X (9)	Residual Market Loss Ratio with Loss Discount	0.985

B. Pool Net Operating Losses:

(11)	Servicing Carrier Allowance	25%
(12)	Selected Producers' Fee	3.9%
(13)	Administration & Other Expense Ratio	0.6%
(14) = (11) + (12) + (13)	Pool's Expense Ratio	29.5%
(15) = [(10) + (14)-1]	Pool Net Operating Losses	28.0%

C. Residual Market Burden:

(16)	Pool Assessment Base	0.995
(17)	Adjustment Factor, Calendar Year vs. Policy Year	1.04
(18)	Adjustment for Take-Out Credit	8%
(19) = (15) X (17)/(16) X (7)/[1 - (7) - (18)]	Residual Market Overburden	54.9%

Note: The burden calculated in this example differs slightly from that shown in Chart 1b due to rounding.