

**Massachusetts Workers Compensation
Advisory Council**

**Analysis of September
2003 Workers
Compensation Rating and
Inspection Bureau of
Massachusetts Rate Filing**

May 2003

Tillinghast - Towers Perrin

May 27, 2003

Mr. Andrew Burto
Executive Director
Massachusetts Workers Compensation
Advisory Council
600 Washington Street
Boston, MA 02111


Dear Andrew:

Enclosed, please find our analysis of the September 2003 Workers Compensation Rating and Inspection Bureau of Massachusetts rate filing. It has been a pleasure to work on this analysis for the Advisory Council.

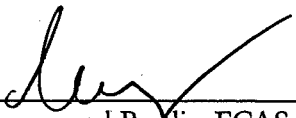
Please call to discuss any questions you may have after reviewing the report.

Sincerely,

TILLINGHAST - TOWERS PERRIN

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PURPOSE AND SCOPE

The Massachusetts Workers Compensation Advisory Council (the Council) engaged Tillinghast – Towers Perrin (Tillinghast) to evaluate sections of the September 2003 Workers Compensation Rating and Inspection Bureau of Massachusetts (WCRIBM) rate filing. The purpose of our review is to provide the Council with an objective analysis of key components of the WCRIBM rate filing. In addition, we were asked to review selected pieces of the independent filings prepared by the Attorney General (AG) and the State Rating Bureau (SRB).

This document presents a summary of our findings.

DISTRIBUTION AND USE

We have prepared this report for the Council to assist it in evaluating the impact of the rate filings. We understand that copies of our report will also be provided to the Commissioner of Insurance. In addition, we understand that under the Freedom of Information Act, this report may become public information available on request to anyone. In such an instance, we request that a list of recipients be provided to Tillinghast periodically. Permission is hereby granted for this distribution on the condition that the entire report is distributed rather than any excerpt. Third parties should recognize that the furnishing of this report is not a substitute for their own due diligence and should place no reliance on this report or the data contained herein that would result in the creation of any duty or liability by Tillinghast to the third party.

Any reference to Tillinghast in relation to this report in any reports, accounts, or other published documents or any verbal reference issued by the Council is not authorized without our prior written consent.

All sections have been prepared so that our actuarial assumptions and judgments are documented. Judgments about the conclusions drawn in this report should be made only after considering the report in its entirety. We remain available to answer any questions that may arise regarding this report. We assume that the user of this report will seek such explanation on any matter in question.

Our conclusions and recommendations are predicated on a number of assumptions as to future conditions and events. Those assumptions, which are documented in subsequent sections of this report, must be understood in order to place our conclusions in their appropriate context. In addition, our work is subject to inherent limitations, which are also discussed in the report.

RELIANCES AND LIMITATIONS

In this review we relied without verification or audit, upon information supplied by the WCRIBM and the Council. We did, however, review the information provided to us for reasonableness.

We have used what we consider to be reasonable actuarial methods and assumptions in our analysis. We have not anticipated any extraordinary changes to the legal, social or economic environment that might affect the frequency or severity of claims. Due to the nature and degree of uncertainties that attach to commercial insurance coverages, no assurance can be given that actual losses will emerge according to any projections contained herein.

We have reviewed previous WCRIBM filings for the Council. The current analysis includes discussion of issues raised in previous reviews. In particular, the Advisory Council should review our prior analyses for further background on the issues raised in this review.

FINDINGS

The following sections provide background on the key issues concerning our analysis and summarize our findings.

1. *Background*

The WCRIBM filing is for rates and rating values to be effective September 1, 2003. An overall rate increase of 8.6% is proposed, based principally on loss experience for policy year 2000 and accident year 2001.

The WCRIBM filing is a comprehensive document that includes substantial analysis of issues relating to the determination of the rate level indication. While we have identified a number of issues relating to the filing, we should also note that the WCRIBM filing is significantly more thorough and comprehensive than industry workers compensation filings we typically see in other states. Analysis of Massachusetts's workers compensation experience is complicated by the system/market changes that have occurred in recent years. The WCRIBM continues to revise its analysis to respond to changing market conditions.

Similar to the September 2001 filing, the September 2003 filing excludes the experience of Eastern Casualty Insurance Company, which had been the largest workers compensation writer in the Commonwealth. This company, which had over a 10% market share, resigned from the WCRIBM in 2001 and ceased writing new business in 2002.

2. *Reconciliation with Prior Filing*

The previous filing indicated an increase of 7.7% in voluntary rates as of September 1, 2001. A 1% increase was approved July 1, 2001. There was no rate change filed or approved subsequent to that date. Based on the prior filing, we would have expected a rate change of approximately 6.3%. The current indication is 2.2% greater, reflecting the impact of revised trend and profit assumptions in the WCRIBM rate filing.

3. *Summary of Analysis*

The table below shows a summary of our indications relative to the WCRIBM indications; for comparison purposes the indications based on the SRB and AG filings are -9.9% and -21.4% respectively.

Rate Level Component	Rate Indication	Incremental Effect	Cumulative Effect
WCRIB Rate Indication	+8.6%		
Loss Development		0 to -2%	+8.6% to +6.6%
Premium Adjustment		-1%	+7.6% to +5.6%
General Expense Trend		0 to -2%	+7.6% to +3.6%
Loss Adjustment Expense		-3%	+4.6% to +0.6%
Loss Trend		0% to -5%	+4.6% to -4.4%
Underwriting Profit		0% to -5%	+4.6% to -9.4%
Rate Indication	+4.6% to -9.4%		

In total, our indications are lower than the WCRIBM indications. For the two key components (loss trend and underwriting profit), the incremental effects shown above encompass a wide range because we did not perform an independent analysis of the data provided. Our review of the various filings suggested that these elements of the WCRIBM filing may be conservative; however, a more exhaustive

analysis of the underlying data could have produced a different result given the number of components underlying each of these areas. Also note that the above results are shown as independent effects; in practice there is interaction among these components (e.g., a change in loss adjustment expense could impact loss trend).

The following sections discuss the most significant issues associated with the filing (Sections 4 through 9). We then follow-up with a discussion of the key issues raised in the filings prepared by the AG and the SRB, along with our comments on their points.

4. Profit Provision

The underwriting profit provision increased from -6.6% to -1.7%. This represents the most significant factor in the overall rate increase. The increase in the underwriting profit provision decreased the permissible loss ratio and caused a roughly 6% overall increase in the rate indication.

There was a major change in the methodology used in evaluating the profit provision. In the 2001 filing the Myers-Cohn model was employed while the current filing uses an Internal Rate of Return model (IRR). The Myers-Cohn model has been employed in Massachusetts since the 1970's in both the workers compensation and personal auto rate filings. The Myers-Cohn model concentrates on the underwriting perspective, comparing premium and loss cash flows between insurance companies and policyholders. It calculates a "fair value premium", i.e. a premium that equals the present value of losses and expenses plus the present value of taxes on underwriting and investment income. The discount rate used in the present value calculations is a risk adjusted rate that considers the risk of insurance companies relative to market risk (as measured by the Beta). For the Myers-Cohn

model, surplus levels are only used for determining Federal Income Taxes on investment income from surplus funds.

The IRR model, on the other hand, concentrates on equity flows between equity holders and the insurance company. It calculates the rate of return for which the present value of future equity flows is zero and then compares this rate of return to the opportunity cost of capital. The opportunity cost of capital is the rate of return that investors require for investments of similar risk. The IRR model uses similar assumptions with respect to underwriting flows, as does the Myer-Cohn model. However, the surplus assumption (as measured by the premium to surplus ratio) is very important in the IRR model because it controls the level of capital required in the insurance entity.

The WCRIBM cites several advantages to the IRR model:

- ✓ It is more widely used in workers compensation ratemaking than the Myers-Cohn model, which is only used in Massachusetts.
- ✓ It is potentially easier to apply and interpret.
- ✓ It eliminates the need to calculate a beta of liabilities, which measures the relative volatility of an insurer's security portfolio compared to market returns. It is not easy to measure the beta of an insurer's security portfolio since available information is available only sporadically. More importantly, beta varies widely from insurer to insurer and from line to line and over differing time frames.

We have not reviewed the IRR model, since this type of review is beyond our scope. We note the following, however, with respect to the implications of the change in the profit model.

- ✓ Since the IRR model is designed to consider investors' targeted rates of return (i.e. a rate of return larger or equal to the opportunity cost of capital), the underwriting profit provision calculated from the IRR model, all other things being equal, should generally be higher than the underwriting profit provision from the Myers-Cohn model.
- ✓ Given the impact of the model change, the WCRIBM should develop a Myers-Cohn projection using the current assumptions underlying the IRR model. While we believe a significant increase in the underwriting profit provision relates to the changes in investment yields in the last few years, we can not determine that impact without reviewing the Myers-Cohn model.

We also note that the WCRIBM believes their model may understate the profit provision (i.e., understate the rate increase) for two reasons:

- ✓ The IRR model does not reflect the true cost of policyholder dividends. These dividends, if reflected, could reduce income, assuming loss experience is favorable.
- ✓ The investment yield underlying the model is based on average yields of securities over the past year. The WCRIBM states that the decreasing trends in recent interest rates may cause the model to overstate income.

We believe that the WCRIBM's assumptions will not necessarily result in understated indications. Policyholder dividends are generally only paid if loss experience is favorable, so the exclusion of this item may not have a significant impact on rate adequacy. Second, recent investment yields were at the lowest level in many years. This assumed investment yield may not be appropriate for evaluating long-term liabilities, assuming that insurers would invest short term in

the current rate environment and over time would invest more long-term as investment yields increased.

5. *Trend*

The trend methodology used in the current filing has changed significantly from the one used in the 2001 rate filing. The current filing relies on separate linear regressions for frequency, indemnity severity, medical severity and payroll trend, while the prior filing derived trend based on fitted loss ratios.

The results of the regressions were supplemented with external economic data and trend factors were selected for each component, based on the external data and the fitted results.

The fitted and selected trends are shown below.

Trend Component	Fitted to	Fitted Trend	Selected Trend	Number of Points Fitted
Frequency	Unemployment rate, MAGSP	-1.50%	-2.25%	21
Indemnity Severity	Average Wage	3.40%	3.00%	5
Medical Severity	Time	12.40%	10.50%	5
Payroll	Wages & Salaries	2.20%	2.20%	5
Net Trend	—	2.50%	0.90%	—

The net trend from the prior filing was -0.15%. The effect on the rate indication by the change in the net loss trend is an increase of roughly 5%.

Medical inflation is the main driver of the positive net trend. The positive indemnity trend is almost offset by the payroll trend of 2.2% since the effect of indemnity in the combined severity trend is around 2.0%, ($2.0\% = 3.0\% \times 67.0\%$ where 67%

represents the indemnity portion of the total losses). The large medical inflation trend more than offsets the negative frequency trend. We note the following with respect to the trend model.

- ✓ The current methodology represents a significant improvement over the previous one. In the prior rate filing the net loss ratio trend was based on a single regression of loss ratio over time. The impact of underwriting cycles on the workers compensation market makes it difficult to use these types of historical data to model future cost levels. The current methodology analyzes the individual trend components against relevant economic indicators.

- ✓ Frequency is modeled in two separate regression models. One uses unemployment rates as an independent variable, while the other one uses Massachusetts gross state product (GSP). In both cases, the data is fitted over a twenty-one year interval. The unemployment fit implies a negative relationship between frequency and the independent variable (i.e., frequency is projected to decrease as unemployment increases). The WCRIBM also cites a number of studies, which support the inverse relationship between claim frequency and unemployment. Among the reasons cited are:
 - During recessions the most inexperienced workers are laid off first and these workers are generally more prone to serious accidents.

 - Changes in work intensity can directly affect the number of injuries, and during a recession, a reduction in work intensity could result in a decreased number of injuries.

 - As unemployment increases workers are afraid to file for workers compensation claims, thereby reducing frequency.

The WCRIBM cites several sources for these explanations, including an analysis prepared for the British Health and Safety Executive.

- ✓ The fitted model produces a -1.5% frequency trend. The WCRIBM selects a lower trend (-2.25%) to reflect that the available data does not fully consider favorable trends in workplace safety.
- ✓ We believe that the selected frequency trends may be optimistic. We note that linear regressions are affected by the historical periods employed in the analysis. If we perform the regressions using different time periods the results could vary materially. For example if we compare frequency to unemployment rates for 1997 to 2000 the model would produce a positive relation between the two variables, a result contrary to the WCRIBM conclusion.

Potential explanations for an increase in claim frequency associated with an increase in unemployment include:

- Many employers use voluntary staff reductions, which often are more attractive to experienced workers, during economic downturns. Thus, the remaining staff is less experienced and potentially more accident prone.
- It can be difficult to keep maintenance and safety budgets at necessary levels in a recession, thus, contributing to a decrease in workplace safety.
- In an environment where there is concern about potential lay-offs, an employee may be less apt to give an employer the benefit of the doubt if the employee would have the opportunity to file or reactivate a workers compensation claim.

- ✓ One factor that makes it difficult to fit frequency and another independent variable relates to the lag between the events. To the extent that lags change over time, a good historical data fit may not be predictive of future claim frequencies.
- ✓ Indemnity severity is modeled against average wages. Average wages are closely related to indemnity payments, and higher average wages generally result in higher indemnity payments to injured workers, all other conditions being equal. The regression, which produces an R^2 of roughly 98%, results in a fitted trend of 3.4%. The WCRIBM selects a slightly lower trend (3.0%) for use in the rate indication.
- ✓ Medical severity is fitted over a five-year time horizon. The large recent increases in medical losses significantly impact the fitted trends. The WCRIBM selected a medical trend of 10.5%, which is slightly lower than the fitted trend of 12.4%. There are two limitations in the WCRIBM's approach.
 - As economic conditions change over time, trends observed in the past may change substantially in the future. For example medical inflation dropped from around 12% in the early 1980's to around 3.5% in the late 1990's. This trend reversed in the last few years, which is consistent with external data.
 - The WCRIBM did not rely on external data for this variable, which is the most significant trend component. A review of recent hospital CPI data would imply an annual trend of between 5% and 6%.
- ✓ All the variables utilized in the calculation of the frequency and severity trends are closely inter-related. A drop in frequency during a recession could affect severity, too, since the claims which are most probably not reported are the minor ones. As a result, a decreased frequency could cause a corresponding increase in severity. The WCRIBM makes judgmental adjustments in the selected trends to reflect these inter-relationships.

While the WCRIBM's net trend is not unreasonable, we believe the individual components could be evaluated differently.

6. Law Amendments

The methodology of calculating the effect of law amendments has changed significantly from the previous rate analysis. The prior filing used a simulation model to evaluate benefits before and after law amendments. The current methodology developed in collaboration with the National Council on Compensation Insurance (NCCI) uses a more traditional actuarial approach to calculate benefits paid to the average claimant before and after law amendments. Benefits are evaluated by injury type and medical effects are estimated separately. For each type of benefit the average age of injured workers is used in conjunction with the average weekly benefit to calculate the cost of coverage. Average benefits are calculated in various wage intervals. The effect of the law amendments is incorporated in the average weekly benefits, subject to minimums and maximums.

This methodology is a traditional actuarial calculation. Since mortality tables and the distribution of wages do not change significantly over time we believe that the methodology used is reasonable. We note, though, that the projected State Average Weekly Wage (SAWW) changes underlying the WCRIBM's analysis are low compared to recent historical SAWW changes. This may cause the WCRIBM to understate loss levels for the projection period.

7. Loss/Premium Development

The WCRIBM filing uses historical reported (paid plus case) and paid losses by year at various evaluation points and develops those losses to an estimated ultimate value through the use of loss development factors.

There are a few key observations with respect to the development factor analysis.

- ✓ The WCRIBM changed its methodology for developing losses to an ultimate basis for this filing. In the previous rate filing, the losses for the largest carriers were developed separately from the rest of the industry, while in the current rate filing losses are developed on an aggregate basis for all carriers combined. The rationale for doing this is to increase the credibility of the data used and to eliminate potential distortions caused by unusually large claims. There are some negatives to this approach, however. If there are shifts in carrier market share over time, and loss development varies significantly by carrier, the indications calculated on an aggregate basis could be misestimated. There are also other ways to address an unusually large claim (limiting it or removing it from the data).

- ✓ In the current review, individual carrier development would be helpful to better understand the large increases in the loss development factors for the paid plus case loss reserve triangles in the last few calendar years. If claim count data were also available, the impact of any changes in claim settlement and case reserving practices would be determined. The WCRIBM does not make any adjustment for changes in case adequacy in the current filing, since such an adjustment is likely to be meaningless on an industry aggregate basis. Since the WCRIBM uses two year development factor averages, if the carriers already adjusted their case reserves to an appropriate level, the selected loss development factors could overstate ultimate losses. This could also cause the trend indications to be overstated, since the trend analysis relies on the calculated development factors. We note that the current approach increases the dispersion of the paid and paid plus case methods relative to the 2001 rate filing; given the rationale for making the change, we might have expected the methods to move closer together, all else being equal.

- ✓ The tails employed in the rate filing are calculated by comparing loss development for the 1997 through 2001 calendar years for policy/accident years prior to 1981 to the cumulative development of policy/accident year 1981 losses at the end of the corresponding calendar year. We note that there is significant implied development, even during calendar year 2001, for a year as old as 1981. The methodology does not assume though any development for calendar years subsequent to 2001 for the 1981 policy/accident year, which may understate the tails slightly.
- ✓ The WCRIBM continues to adjust reported losses for the escalation of benefits. The combined medical and indemnity escalation factors in the current filing (around 1.017 on an incurred basis and 1.016 on a paid basis for policy year 2000 & accident year 2001) are consistent with the prior filing. We have questioned this methodology in previous reviews, and still question whether the methodology results in an overlap with the other aspects of the loss development methodology. (i.e., inadequate reserves for claims subject to benefit escalation contributes to the loss development observed in the loss development data).
- ✓ For calculating premium development, it would be beneficial to calculate separate premium development patterns between retrospectively-rated (retro) and non-retro business. For the non-retro business most of the development would come from payroll audits one or two years after the inception of the policy. For the retro business, there could be positive premium development five to six years after the inception of the policy subsequent to the retro adjustments. If there is any shift in the premium volume between retro and non-retro business, the estimate of future premium development could be biased if the development is done on an aggregate basis.

8. Expenses

In general, the WCRIBM used a similar approach with respect to expenses as in prior filings (with the exception of the 1999 rate filing). In the 1999 rate filing, the WCRIBM made two specific changes with respect to expenses; other acquisition expenses were treated as fixed expenses and the commission allowance was adjusted to reflect the estimated impact of rate deviations. The WCRIBM reverted to their historic approach in the September 2001 and 2003 filings (i.e., treating other acquisition expenses as variable expenses and not considering the impact of deviations in the commission allowance calculation).

The percentages of Commission and Other Acquisition Expense, Premium Tax ratio and Premium Discount varies between the two most recent filings but the total Variable Expense ratio of 17.1% has not changed significantly from the prior filing. The fixed expense ratio dropped by roughly two percentage points between the two filings. The loss adjustment expense factor dropped from 26.7% to 24.7%, in response to the decreasing trend in the LAE provision for calendar years 1999 through 2001.

9. Classification Rates/Experience Rating

There were no significant changes in the methodology of calculating classification rates, including the calculation of credibility factors, between the two latest rate filings. We note that classification rates do not affect the overall rate level, but the allocation of costs by insured.

The WCRIBM filing includes a proposed 28.9% increase on F-class business (about half of the 53.8% indication). Although this represents a significant increase, these

classes represent less than 1% of the total market. F Class indications are derived in a manner similar to that used for all other rate classifications.

There were a few changes proposed in the calculation of experience rating factors. The WCRIBM is proposing to adopt the current NCCI methodology. The most significant differences relate to medical only losses (the medical only losses used in experience rating would be subject to 30% of their otherwise determined value), and the (W) Weight and (B) Ballast factors. The WCRIBM filing indicated that these changes will cause large insureds with no excess losses to get smaller mods, while those with excess losses will get higher mods, but did not provide any supporting detail. An offset factor was applied so that all the incorporated changes maintained revenue neutrality.

10. *Attorney General's Filing*

The Attorney General (AG) submitted an independent filing with an indicated rate change of -21.4%. This represents a difference of approximately 30 points from the proposed WCRIBM rate change of 8.6%. The two rate components that comprise the majority of the variation in the two rate indications are loss trend and the underwriting profit provision. The following table summarizes the rate level components reviewed by the AG:

Rate Level Component	Rate Indication	Incremental Effect	Cumulative Effect
WCRIB Rate Indication	+8.6%		
Loss Development		-0.8%	+7.8%
Premium Adjustments		-1.9%	+5.9%
General Expense Trend		-2.1%	+3.8%
Loss Adjustment Expense		-3.7%	+0.1%
Loss Trend		-10.4%	-10.3%
Underwriting Profit		-11.1%	-21.4%
AG Rate Indication	-21.4%		

In the following paragraphs we discuss each of these components.

- **Loss Development:** The AG's filing includes an adjustment to the tail calculation in the WCRIBM filing to make the current WCRIBM methodology consistent with prior WCRIBM filings; the purpose of the adjustment is to reflect the differing maturity of claims by calendar year. This adjustment has a small effect on the rate indication, dropping it by **-0.8%**.

Tillinghast comments: The adjustment factor used by the AG is not unreasonable. However, the tail calculation includes potential biases in the other direction, which are not considered by the AG.

- **Premium adjustments:** The WCRIBM adjusts premium to reflect the impact of experience rating, using an off balance factor of **-1%**. The AG's selected off-balance factor is based on the 1999/2000 composite policy year from Schedule Z, while the WCRIBM factor is based on a ten-year historical period, with a tempering adjustment. Incorporating the AG's proposed change decreases the WCRIBM rate indication by **-1.9%**.

Tillinghast comments: The Schedule Z data shows an upward trend in the off-balance factors, suggesting that the AG's factor may be biased downward. The WCRIBM factor may be overstated, though, since there has been significant variation in the impact of experience rating over the ten-year period.

- **General expense trends:** For this component, the AG proposes a salary trend of **3.5%** compared to a corresponding trend of **6.3%** from the WCRIBM. The AG's filing considers countrywide data in deriving this trend, because they believe there are issues with respect to the Massachusetts specific data.

Incorporating a 3.5% salary trend would drop the WCRIBM rate indication by -2.1%.

- **Tillinghast comments:** It may be more appropriate to use Massachusetts data in this calculation because Massachusetts' wages are generally higher than countrywide data would suggest. Issues around the compilation of the Bureau of Labor Statistics data (which is used in the calculation) should be addressed and adjustments made so that the year to year comparisons are appropriate.
- **Loss adjustment expense:** The AG's filing excluded data from all companies that had anomalous results (a ratio that was either negative or above 100%) from the calculation of the Loss Adjustment Expense (LAE) ratio. The AG's filing selected an LAE factor of 20% which is about 20% less than the 24.7% factor selected by the WCRIBM. This decreases the overall rate indications by -3.7%.
- **Tillinghast comments:** The adjustment contained in the AG's filing is not unreasonable. However, it would be more consistent to apply this type of adjustment to all components of the rate filing, as it is possible that these types of data anomalies exist in other rating components too. Neither filing addresses the more significant issues in terms of what is driving the reduction in LAE; for example is an upward trend in losses depressing the LAE ratio (since it is measured against losses) or are there carrier actions that are impacting the LAE dollars spent (e.g. a reduction in cost containment efforts, which could have a negative impact on long-term loss trends).
- **Loss Trend:** The AG's filing includes a lengthy review of trend, with a particular emphasis on the frequency component. The AG's filing cites the following concerns relative to frequency:

- ✓ The AG's filing considers the WCRIBM frequency model to be unstable since different trends can be calculated using different historical time periods as a base. The model statistics that measure the "goodness" of the model fit are also affected by the time period considered.
- ✓ The AG's filing states that the WCRIBM frequency model does not fit history. The AG questions the quality of the Massachusetts frequency data, and is concerned that variables that affect frequency, like cost containment, are back derived from the model rather than used as an explicit input. The AG's filing also raises a concern that the WCRIBM's projections of future frequency are dependent on projections of future unemployment and Gross Standard Product (GSP), two economic variables which have been difficult to estimate historically.
- ✓ The WCRIBM filing assumes that during a recession frequency will decrease; however from 1996 to 2001 the AG's filing notes that frequency dropped by -38.5% despite the economic expansion experienced in MA during that period.
- ✓ The severity component of the WCRIBM's model is also questioned in the AG's filing. The AG believes that the selected indemnity and medical trends of 3.0% and 10.5%, respectively, are too high when compared to the selected payroll trend of 2.2%.

The AG's filing includes calculations of trends by component but the selected annual net loss trend of -2.5% is based on a fit of historical loss ratios adjusted for the effect of benefit level changes, cost containment and premium level changes. Based on the proposed net loss trend from the AG filing the rate indication would decrease by -10.4%.

Tillinghast comments: All of the issues raised by the AG in regards to the frequency model are reasonable; however we note that most of these issues are quite common for regression models. In our discussion of the WCRIBM frequency model, we cite similar concerns with respect to the underlying assumptions and the issues of historical fit. Tillinghast believes that the payroll trend selected by the WCRIBM is low. Medical inflation, which is not driven by payroll trend, has fluctuated widely in the past; however both internal and external data suggest that it has increased significantly in the recent past. While there are issues with respect to the calculation of trend by component, the alternative method proposed by the AG is not necessarily an improvement over the WCRIBM method.

- **Underwriting profit provision:** The AG's rate filing includes significant discussion on the calculation of the Underwriting Profit Provision (UPP); its analysis reduces the indications by -11.1%. There are two testimonies provided by the AG, one by Mr. Richard Cohn and one by Mr. Allan Schwartz.

The stated goal of Mr. Cohn's testimony is to compare the Myers-Cohn (MC) model to the IRR model from a regulatory perspective and to recommend the most appropriate model for the rate filing. Mr. Cohn also supplies parameters for the MC model and addresses issues such as cost of capital (COC) and investment rate of return. Mr. Cohn's testimony does not provide a recommendation for an appropriate level of the UPP. In more detail:

- ✓ Mr. Cohn believes that the MC model reflects both the policyholders and shareholders point of view. He adds that in a heavily regulated environment like Massachusetts, it is inappropriate to use a model like the IRR that, from his perspective, ignores the policyholders. He states that the IRR model does not really calculate COC (one of its stated advantages from the WCRIBM perspective) but

that the COC is calculated using CAPM theory. Mr. Cohn also adds that the same financial theory, namely CAPM, is used to calculate the beta of liabilities, one of the “most contentious” inputs in the MC model. The MC model has an implied COC built in its parameters according to Mr. Cohn. Another weakness of the IRR model according to this testimony is that the COC employed in the IRR model is independent of the amount of surplus allocated while the UPP is sensitive to the assumed surplus allocation. This testimony recommends the MC model for the rate filing since it is a model that has been used historically and as a result the main issues arising from the model have been thoroughly reviewed.

- ✓ He also notes that the WCRIBM model uses leverage ratios, i.e. premium to surplus ratios and raises a concern that the leverage ratios employed “are very high especially in light of the fact that the insurers can always employ the shareholders to cover any timing differential between premium inflows and loss payments”.
- ✓ Mr. Cohn also believes that policyholder dividends should not be included in the IRR model because they represent voluntary contributions of insurance companies that should not result in higher pricing levels.
- ✓ The last points raised by Mr. Cohn are related to the cost of capital. According to Mr. Cohn the opportunity cost of capital of 10.3% employed by the IRR model is too high for two reasons. First, the 10.3% represents only the cost of equity and he states that roughly 15% of insurance financing comes from debt. Since debt cost is lower than equity cost the weighted average COC between equity and debt should be lower than the 10.3% figure that is based solely on equity cost. He also comments that the COC calculated from the WCRIBM model assumes a growth rate of dividends that is “too high” as compared with the growth in GDP.

Tillinghast comments - Using a model because it has always been used and its issues have been resolved is not necessarily a reason to continue using a model prospectively. While M-C models from a policyholder's perspective and IRR models from a shareholder's perspective, there are many assumptions common to both models, reflecting that the two perspectives are not always independent. We note that there are number of issues with these pricing models because they are dependent on a variety of assumptions with respect to each input. A range of reasonable estimates around any of the inputs could be considerably different than the range of results suggested by the various experts. For example:

- The COC is based on an analysis of a sample of large stock insurance companies. These may not be representative of the Massachusetts writers, particularly as respects the mutual companies.
- The leverage ratios are based on industry averages for companies writing commercial casualty insurance. These ratios are not necessarily representative of companies writing workers compensation in Massachusetts.
- The allocation of surplus by line can be calculated in a variety of ways, producing a range of results.
- Taxation is considered on a stand-alone base; a company's actual tax position is dependent on the interaction of a number of factors. Note that this is a constraint of any model of a complex process.

The second testimony of the AG filing regarding the UPP is provided by Mr. Schwartz. He calculates UPP from both the MC and the IRR models based on parameters provided by Mr. Cohn's testimony. The MC model indicates an UPP of -13.8% by employing a beta factor of +0.03. This UPP would drop the overall rate indication by

roughly 13%. The IRR model with new inputs produces an UPP of -11.4% compared to the -1.7% UPP recommended by the WCRIBM. The overall effect on the rates is -11.1%.

Mr. Schwartz comments that the premium to surplus ratio employed in the WCRIBM IRR model is too high because it considers premium from both the current and past years.

He also uses the latest available IRS discount factors and adjusts the commission patterns because the WCRIBM did not convert the commission flows from a single policy year to a policy year basis where policies are assumed to be written homogeneously through the year.

Mr. Schwartz mentions other reasons that could potential leverage the indication of the UPP even though he does not use them in his IRR model. One is the discounting of WC loss reserves which is permitted by statutory accounting in certain situations. He believes that the reserve discount factor for workers compensation is in the area of 15% to 20%, though he does not cite any sources for this information.

Mr. Schwartz's testimony includes a discussion of the riskiness of workers compensation and his assessment of various factors affecting this. The issue of riskiness was raised in the WCRIBM filing as well. Neither filing uses risk explicitly in their sections of parameters for the UPP provisions.

Mr. Schwartz and the WCRIBM disagree on the perceived "riskiness" of the workers compensation line. The WCRIBM suggests that workers compensation is more risky than the average line due to its long tailed nature, unlimited liability, medical inflation exposure, occupational disease and benefit inflation. To compensate for this riskiness, they argue that the UPP should be higher to compensate for that risk. Mr. Schwartz

believes that workers compensation is not a riskier than average line. He states that the liability in workers compensation is not unlimited since indemnity benefits are typically capped in terms of weekly benefits. He also states that other lines like medical professional liability and other liability have even longer payout patterns and that the benefits for workers compensation are in large part annuity type benefits, which makes them less risky. He believes that occupational disease and medical inflation are not unique to the workers compensation line and that benefit utilization has produced reduced benefits during the 90's.

Mr. Schwartz also lists a few reasons why policyholder dividends should not be included in the IRR model as a cost. They include the fact that these dividends are at the discretion of insurance companies and are sometimes used as an attempt to increase market share. Mr. Schwartz believes the consumers should not pay these costs. He also notes the Insurance Commissioner has no control over which company pays dividends and the inclusion of the dividends as a cost would weaken the Commissioner's ability to determine if rates are adequate. Mr. Schwartz mentions that historically when rates were excessive the underwriting cycle was exacerbated. He believes that the inclusion of dividends in the rate indication could potential cause unfairly discriminatory rates in the case of policyholders that either do not receive any dividends or receive lower than average dividends.

Tillinghast comments - There are some adjustments cited by Mr. Schwartz that do not appear to be unreasonable, although we have not reviewed the detail of the calculations (e.g. properly reflecting the timing of the commission payments, policy holder dividend exclusion). There are also some inconsistencies in his arguments (e.g. the issue of discounting). His comments with respect to the riskiness of the workers compensation line are not entirely accurate; for example the payout pattern associated with workers compensation is longer than for professional liability given the potential for life time payments but the timing of the payments is different (there are more "up front" payments with workers compensation). Some of the benefits are capped statutorily but a significant

portion of the benefit (medical) is not capped and is payable over a claimant's lifetime. Given the impact of medical inflation, it would not be reasonable to consider these benefits as "limited". Also while other lines can be impacted by occupational claims, the impact on workers compensation is different given the nature of the coverage (occurrence based with unlimited medical benefits). Mr. Schwartz states that other lines have a higher proportion of benefits composed of medical costs, but does not cite specific statistics. He also points out that the total cost of an occurrence is limited in terms of the dollars that will be paid out; while it is true that the cost of an occurrence can be eventually defined with some certainty, it is not limited in the sense of an actual dollar amount as reinsurance is not considered in the filing process (take for example a single occurrence with 10 severely injured workers requiring major life time medical; this type of claim could ultimately cost in excess of \$30 million. That level of exposure may not be considered limited). He also cites a few reasons why the line may be less risky than average:

- The ability of the industry to publish uniform price tables; however, he does not comment on the impact of deviations on this factor.
- The large database available. In other components of his filing, he criticizes the industry data.
- The availability of experience rating and retrospective rating - these apply to other coverages as well.
- The use of administrative processes to settle claims; this tends to underestimate the impact of attorney involvement.

One of the factors that make it difficult to evaluate the level of risk is that neither party (the WCRIBM or the AG) sets a definition of risk - for example, is it variation in the loss ratio, or is it the level of the combined loss ratio.

- **Retro Rating and Experience Rating Plan Factors:** The AG's filing proposes new retro rating factors that give full credibility weight to Massachusetts data. The filing states that without this change the WCRIBM proposal would result in excessive premiums being charged to retro insureds. The AG's filing also states that the WCRIBM filing does not provide sufficient detail to evaluate the impact of the proposed changes in the experience rating plan.

Tillinghast comments: With respect to retro rating, the adjustments proposed do not effect the overall rate level but do effect the rate level charged individual insureds. Retro factors that are higher do not necessarily imply excessive premiums because of the multiple factors that drive the ultimate retro premium. With respect to experience rating, the WCRIBM filing could be supplemented with more detail on the impact of the proposed changes on an individual insured basis.

- **F-Class Rate Change:** The AG's filing recommends a change in the methodology of determining F-class rates. Since the F-class experience is limited, the AG proposes a rate indication that would give weight to both the rate level change indicated by the historical data and the rate level change indicated by adjusting the current rates for trend.

Tillinghast comments: We agree that the F-class experience is limited but employing a method that gives weight to the current rate would delay the achievement of an adequate and not excessive rate, especially if the current rate is significantly inadequate or excessive. Also, as noted previously, the effect of this change on the overall rate indication is minimal.

11. State Rating Bureau Filing

The State Rate Bureau (SRB) produced an independent filing that suggests an indicated rate change of -9.9%. The SRB analysis raises similar issues as the AG's filing. The following table provides a reconciliation of the WCRIBM and SRB rate level indications:

Rate Level Component	Rate Indication	Incremental Effect	Cumulative Effect
WCRIB Rate Indication	+8.6%		
Loss Development		-6.3%	+2.3%
Loss Trend		-2.7%	-0.4%
Loss Adjustment Expense		-3.9%	-4.3%
Underwriting Profit		-5.6%	-9.9%
SRB Rate Indication	-9.9%		

Detail of the rate components analyzed by the SRB are as follows.

- **Loss Development:** There are three components of loss development reviewed by the SRB.
 - ✓ The tail factors in the SRB filing are adjusted similarly to those in the AG's filing. In addition the SRB filing adjusts the tail factors to increase the perceived consistency of the paid and reported tails. The overall effect on the rate indication is a decrease of -2.5%.
 - ✓ The loss development in the SRB filing is adjusted by excluding losses from a carrier that experienced very large medical case reserves. The overall effect on the rate indication is -0.5%.
 - ✓ The SRB filing tries to quantify the evidence of case reserve strengthening shown in the loss data. The SRB filing compares paid losses per closed claim to average case

reserves per open claim. The implied trend in the latter is much higher than that of the former. The SRB assumes that because the trend of paid on closed is mostly due to inflation, the additional trend included in the average case reserve per open claim must be due to reserve strengthening. The SRB judgmentally adjusts the selected loss development for this apparent case reserve strengthening, reducing the overall rate indication by -3.3%.

Tillinghast comments: With respect to the tail factors, the first adjustment made by the SRB is similar to that made by the AG (see above). The adjustment made to reconcile the incurred and paid tails is somewhat judgmental; to evaluate potential biases in this approach it would be helpful for the SRB to further analyze the drivers underlying the differences in the two data sets. With respect to excluding the results from a carrier with unusually large medical reserves, we note that this creates a potential downward bias because there may be carriers within the data analyzed that have unusually small medical reserves that are not excluded. As noted in our discussion of LAE in the AG's filing, it is not unreasonable to exclude unusual data from a filing. However, the exclusions should be incorporated on a systematic and comprehensive basis. Although there is evidence of reserve strengthening on a macro level (e.g. the difference in the ultimate losses implied by the paid and incurred methods), the SRB's statistics do not necessarily support this conclusion. The SRB filing looks at paid on closed and average case per reserve open claim on an industry wide basis. This comparison can be distorted by changes in market shares, since carriers define claims differently and have different procedures with respect to establishing reserves and closing claims. A more accurate way to develop this analysis would be to perform the analysis on a carrier by carrier basis, which would require supplemental information from the WCRIBM. Also, the comparison between paid on closed and average case reserve on open can be distorted for workers compensation due to the impact of partial payments.

- **Loss trend:** The SRB raises similar issues as were discussed in the AG's filing. Their filing notes that the regressions employed in the WCRIBM filing are unstable and do not fit the economic data very well. They also point out that the future frequency is based on uncertain projections of future unemployment and GSP. In addition to the AG's comments regarding frequency, the SRB filing notes that frequency models that exclude economic variables fit better when compared to models that include economic variables. The SRB suggests that projecting future net loss trends is a difficult exercise and, given the overall uncertainty in the data, suggests an overall trend of 0.0%. The proposed zero net loss trend when compared to the suggested 0.9% trend from the WCRIBM causes a drop in the rate indication of **-2.7%**.

Tillinghast comments - We agree with the SRB that there is a great degree of uncertainty in projecting future net loss trends and that reviewing trend by component is reasonable. Given the magnitude of the implied medical severity trend, the selected trend of 0.0% may be slightly optimistic.

- **Loss adjustment expense:** The SRB filing recommends an LAE ratio of 19.6%, which is very close to the 20% LAE ratio recommended by the AG. The SRB bases its selected LAE ratio in part, on a comparison of the expense data provided by the WCRIBM to Massachusetts calendar year loss and ALAE data from the Statutory page 14 and the Insurance Expense Exhibit. A second reason for the SRB's recommendation for a lower LAE ratio is based on the belief that companies have begun investing less money in their cost containment efforts, decreasing the LAE ratio in the process. The effect of the revised 19.6% LAE ratio on the overall rate indication is a drop of **-3.9%**.
- **Tillinghast comments:** As discussed above, it is not unreasonable to adjust the underlying data to correct for anomalous data points. We note, though, that the SRB rate filing did not provide statistical support for its assumptions with respect to cost containment.

- **Underwriting Profit Provision:** The SRB filing agrees with the use of the IRR model, because it believes that the IRR model is very well suited to insurance and is widely accepted. However, the SRB proposes an UPP based on the IRR model of -6.55%. The difference from the 1.7% UPP recommended by the WCRIBM is based on the adjustments of various inputs to the model. The adjustments are as follows:
 - ✓ The SRB also notes the issue concerning the commission payout patterns mentioned in the AG's filing. By not adjusting premium commission flows for the fact that the model is on a policy year basis rather than a single policy basis, the commission payout pattern is accelerated. The SRB selects a slower commission payout pattern, resulting in a decrease in the UPP of -2.08%.
 - ✓ The SRB uses the adjusted loss payout patterns from its own loss development analysis. Since these patterns are faster than the WCRIBM payout patterns, the indicated UPP increases by +1.14%.
 - ✓ The SRB notes that the IRS discount factors employed by the WCRIBM are consistent with a 6.0% interest rate while the currently proscribed IRS rate is 5.71%. Using the lower discount rate would increase the discounted losses for taxation purposes, increase after-tax income and drop the UPP indication by -0.54%.
 - ✓ The SRB excludes policyholder dividends for the same reasons mentioned in the AG filing. The higher implied income produces a drop in the indicated UPP of -2.35%.
 - ✓ The SRB states that the surplus provision for the WCRIBM IRR model suggests a very high allocation of surplus in the earlier portion of the policy year, which is inconsistent with the net cash flows during that period. They also state that the only economic reason to maintain "large amounts of surplus" is if the investment

earnings in workers compensation are higher than in alternative investment opportunities. The SRB employs a 2.01 constant reserve to surplus ratio rather than a fixed premium to surplus ratio; the overall effect on the UPP is a decrease of -1.66%.

- ✓ The SRB, in a similar manner to the AG's filing, suggests a lower opportunity COC by using both equity and debt as capital sources. Under this assumption, the proposed COC drops to 9.86% from the 10.32% equity cost in the WCRIBM filing, decreasing the indicated UPP by -1.06%.

On a combined basis using the SRB assumptions decreases the UPP to -6.55% from the -1.7% provision in the WCRIBM filing. The effect on the overall rate indication is roughly -5.6%.

Tillinghast comments: Some of the adjustments in the SRB filing are not unreasonable (e.g. the recognition of the timing of commission payments, the exclusion of policy holder dividends) and the SRB model attempts to maintain internal consistency (e.g. adjusting the loss payout pattern derived in the SRB loss development analysis). Some of the other adjustments, however, while implying an increased precision (e.g. the adjustment of the tax discount rate, the assumed COC, the assumed reserve leverage ratio) could be estimated differently than the SRB's analysis indicates.

F-Class rates: The SRB notes that there is much variability in the historical loss experience of the F-Class. The 97/98 composite policy year loss ratio is 214.3% while the 99/00 loss ratio is 9.2%. The SRB also notes that the premium of certain class codes that experienced large losses in the past dropped significantly during the historical period. By excluding these class codes from the analysis the SRB calculates an F-class rate indication of +11.1% compared to the 53.8% indicated by the WCRIBM.

Tillinghast comments: The variability in the historical loss experience of the F-Class is expected since the exposure for this class is low. Also, as noted above, the effect on the overall rate indication is minimal.