HOMEOWNERS PREMIUM TREND

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Abstract

This paper reviews the Homeowners insurance process, concentrating on the forces that influence changes in loss exposures, Coverage A limits of liability, and insurance-to-value levels of individual exposures at renewal and books of business in the aggregate. These forces, or "influences," are categorized and discussed in terms of their implications on ratemaking methodology, particularly on premium trend. The primary purpose of this paper is to outline an alternative to the traditional premium trend method. The traditional and alternative methods, which assume static book of business, are compared to a "dynamic" approach which explicitly reflects the changes in a Homeowners book.

The paper assumes some familiarity with existing CAS literature on Homeowners ratemaking. In addition to outlining an alternative premium trend method, the paper can serve as an educational tool.

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HOMEOWNERS PREMIUM TREND

INTRODUCTION

The term "premium trend" in Homeowners ratemaking refers to the adjustment of premium to reflect changes in Coverage A limits, or Coverage A amounts of insurance (AOI), over time (i.e., from the experience period to the projection period of an indication). This adjustment has a significant impact on the projected experience loss ratios and, therefore, on the final indication. The actuary must understand the assumptions and foundations underlying the premium trend method employed in the indication.

Closely related to the premium trend adjustment is the issue of insurance to value (ITV). In Head's study ITV was said to exist perfectly "if property is insured to the exact extent (dollar amount or percentage value) assumed in the premium rate calculation. Underinsurance is coverage less than that assumed, and overinsurance is coverage beyond that assumed." [2, p. 15] On a practical level ITV for Homeowners (owners forms) is defined as the ratio of the Coverage A limit to the true replacement cost of the dwelling. A more thorough definition would consider the limits and loss exposures of all the Homeowners coverages. However, the preceding Coverage A-based

definition is commonly used due to its simplicity and practicality.

Within the Homeowners insurance process, the ITV adequacy of a particular risk or portfolio of risks is complicated by the fact that the insured and agent usually have some degree of choice in determining the AOI. Agent's or insured's choice is but one of several forces acting to influence the AOI distribution and the aggregate ITV level of a book of Homeowners business. Since many of these forces, or influences, affect both premiums and losses concurrently, the premium trend method cannot be determined in isolation, but must be determined in a manner consistent with the loss trend method.

The actuary may not have access to reliable estimates of the exact ITV level underlying the several years of history forming the basis of the indication. The first ratemaking principle is that "A rate is an estimate of the expected value of future costs." [1] With respect to premium trend, the actuary's first challenge is to recognize the forces influencing the AOI distribution and the ITV level. The actuary then must reflect those influences in the indication in a manner that preserves the predictive relevance of the historical experience and determines a proper rate level for a certain future exposure period.

The following discussions and exhibits concentrate on owners forms. The concepts and techniques could be applied to tenants forms (HO-4 and HO-6) as well.

THE HOMEOWNERS PROCESS AND INFLUENCES ON EXPOSURE AND AOI

The key coverage provided by the most frequently used Homeowners owners form contracts (HO-2 and HO-3) is "Coverage A-Dwelling." The Coverage A limit of liability should be adequate to cover the costs of dwelling reconstruction in the event of a total loss, including replacement of fixtures that are considered part of the realty for that structure, but excluding the cost of land. [6] The Coverage A limit (or AOI) is truly a critical number, since it is the primary determinant of premium, and it usually forms the basis of the other Section I coverage limits.

For new business most insurers require that some explicit estimate of dwelling replacement cost be documented, usually based on square footage of the house or itemization of the room units and house features. The extent to which the "replacement cost estimator" is actually used in determining the AOI varies widely by insurer, section of the country, and phase of the underwriting cycle.

On renewal policies insurers typically employ an automatic AOI increase to maintain the adequacy of coverage in response to inflation in construction costs. These increases (or "rollups") are usually based on a commercially available construction cost index that varies by state or three-digit zip code area, such as those published by Boeckh or Marshall & Swift. Insurers' procedures vary as to what extent the insured or agent can reject the rollup and still maintain the same type of coverage. This is particularly relevant when the policy contains a "guaranteed replacement cost" (or GRC) provision or endorsement. This type of coverage guarantees full replacement of the dwelling even if the replacement cost exceeds the AOI. Many insurers require that the AOI equal 100% of the estimated dwelling replacement cost ("100% ITV"), or some specified lower percentage thereof, to initially acquire GRC. Again, procedures vary as to whether GRC is removed when rollups are rejected and ITV falls below the required level at renewal. Therefore, it is important that insurers monitor their rate of rollup acceptance or rejection on an ongoing basis. If this information is available, the actuary can use it to assess the improvement or deterioration in aggregate ITV for the renewal portion of the book.

An insurer may conduct a periodic, indepth review of the ITV level of its Homeowners book, either by state, field office,

underwriter, or on a countrywide basis. This review is commonly initiated in response to a deterioration in the non-catastrophe loss ratio. Reunderwriting of an inforce book may be required to remedy inadequate ITV. Underinsured risks are usually encouraged or required to increase their AOI upon renewal based on re-evaluation of their replacement costs by agents or underwriters. Such a reunderwriting may result in a portion of the book being cancelled or non-renewed, causing a sudden shift in the ITV level.

A similar change in the portfolio of risks could occur when the agency plant changes. New agents can bring with them Homeowners books that differ from an insurer's current portfolio in AOI distribution or levels of ITV. Similar effects could result from cancellation of agents, change in field office management, or change in company underwriting guidelines.

Newly constructed and newly purchased homes are typically assumed to be insured more adequately than either older homes or a renewal book of existing homes. This assumption is based in part on mortgagees' requirements of proof that the AOI cover at least the loan principal at closing. However, this assumption may not be true for every insurer. The relative ITV levels of new business versus renewal business will certainly

vary from insurer to insurer and depend heavily on the measures employed to maintain adequate ITV on the renewal book as outlined above.

Property improvements constitute another important influence upon AOI changes and are often overlooked in the AOI until the insured affiliates with a new insurer. An insured's AOI should be increased in response to significant improvements in the quality of the dwelling materials from remodeling (such as addition of custom woodworkings, upgrades in lighting fixtures, etc.) or construction additions (such as room additions, or partitioning a new bedroom in an open basement). These changes constitute real increases in dwelling replacement cost and increases in loss exposure. AOI increases are commonly overlooked in these cases, resulting in ITV deteriorations for these insureds. An insurer can monitor and control this potential deterioration by a process of periodic replacement cost reassessment upon renewal.

Each of the above issues can be considered for an individual insured or for a portfolio of Homeowners policies in the aggregate. Note that items which influence the level of replacement cost should also influence AOI (either individually or in the aggregate) in like proportion in order to maintain a consistent level of ITV. However, AOI's are not necessarily

increased when changes occur in replacement cost, that is, when changes occur to the underlying level of exposure to loss. The ITV level deteriorates to the extent that the increase in AOI does not keep pace with the increase in replacement cost; this is true for both an individual insured as well as a portfolio of insureds in the aggregate.

An observed change in the AOI distribution of a book of business, albeit significant, does not necessarily imply a change in the ITV level. Groups of insureds could be added or deleted in such a way that the resulting book maintains the same level of ITV.

HOMEOWNERS FREQUENCY TREND

The above issues deal with forces influencing the severity of insured losses and the relationship of the AOI to loss severity. Traditionally, severity trend has been reflected in Homeowners ratemaking, but frequency trend has been omitted. This traditional omission treats year-to-year differences in loss frequency as being exclusively random in nature, as opposed to being systematic and reflecting some underlying pattern. A discussion of Homeowners trend would be incomplete without mention of the possibility of real changes in the

frequency of insured loss due to permanent changes in weather patterns, theft or vandalism, or other similar factors. Real frequency change would impact future incurred loss levels and is therefore a loss trend issue. It is not a premium trend issue since increased frequency of loss generally would not affect the selection of the Coverage A limit for either an individual insured or a book in the aggregate. However, AOI levels might be influenced by increased insurance consciousness following a catastrophe.

Real frequency changes are difficult to isolate in Homeowners data due to the naturally high degree of random frequency variation. Analysis of claim frequency by cause of loss can help in this determination. Note that the typical excess wind procedure inherently assumes that no long-term trend exists in the relationship between wind and non-wind losses. The procedure effectively "smooths" excess wind losses over a long-term period (usually as many years as data are available) as if the expected wind-to-non-wind ratio were uniform over time. However, the impact of catastrophic losses in recent years (1988 through 1993) and the ensuing reaction in the reinsurance markets cause one to question the predictive relevance of the data of past decades. Changes in population density and building density are particularly relevant in this regard.

CATEGORIES OF SEVERITY AND FREQUENCY INFLUENCES

The various influences on changes in replacement cost and/or changes in AOI are categorized below as those which are inflationary in nature, and those which are non-inflationary in nature. The importance of this distinction will become clear as specific premium trend methods are discussed later in this paper. Frequency influences on Homeowners losses are listed as a separate category.

Inflationary Influences

1) Changes in dwelling replacement cost due to inflation in the costs of construction materials and labor.

2) Changes in contents replacement cost or depreciated value due to inflation in the prices of household goods, furniture, and personal property.

3) Inflationary trends in liability and medical losses.

Non-Inflationary Influences

1) Changes in mix of business due to reunderwriting, change in underwriting practices (including Coverage A increase requirements on renewal, replacement cost estimation requirements on new or renewal business, etc.),

or change in agency plant.

2) The effect of new construction or property improvements.

3) Changes in selected Coverage A limit below or above the level of inflation in loss exposure caused by economic conditions or sudden shifts in the demand for housing.

Frequency Influences

1) Systematic (non-random, non-catastrophic) changes in the frequency of non-weather-related insured loss. This would include changes in the frequency of theft, fire, liability claims, vandalism, or other insured perils.

2) Permanent and systematic (non-random) changes in weather patterns which would increase or decrease the incidence or intensity of weather-related insured losses (tornados, hurricanes, windstorms, freezings) on a long-term basis.

3) Changes in the density and geographic distribution of population and buildings which would increase or decrease claim frequency from large-scale occurrences, particularly tornados, windstorms, and hurricanes.

IMPLICATIONS ON RATEMAKING AND THE TRADITIONAL METHOD

From a ratemaking perspective, the extent to which these influences affect the underlying dwelling (and contents) replacement cost is a loss trend issue; the extent to which they affect changes in AOI is a premium trend issue. Methodologically as well as judgmentally, the actuary must always consider loss trending and premium trending as they relate to each other, not in isolation. Any specific loss trend method explicitly or implicitly accounts for each of the various influences in a certain manner and proportion. The corresponding premium trend method must account for the same influences in like manner and like proportion in order to preserve the relevance of the historical loss ratio data for prospective ratemaking. This is not to say that the actuary can choose to flatly ignore certain trend considerations, but that the treatment of such on the numerator and denominator of the loss ratio should be consistent, or "in synch." The projected loss ratio, and therefore the indication, will be inaccurate to the extent the premium and loss trend methods are "out of synch" with one another.

Methods discussed in the following sections are referred to as either "static" or "dynamic." Static methods simulate the effect of a fixed book as it renews from the experience period

to the projection period. By contrast, dynamic methods explicitly recognize and project the effect of changes in the book of business.

Static Methods and the Traditional Method (Static Method I)

The traditional Homeowners premium/loss trend method (as presented by Walters [4] and Homan [3]) is referred to as "Static Method I." Losses are trended using an external index based on economic data reflecting only inflationary influences. [3, pp. 729-731 and Exhibits 6 and 7] Losses are not trended or adjusted for non-inflationary or frequency influences.

An example of the Static Method I premium trend procedure is shown on Exhibits 1 and 2. On Exhibit 1 an Average Earned Relativity (item B) is calculated for each experience period. Average Earned Relativities can be obtained from exposure extension systems commonly used to obtain premium at present rates, or can be computed from historical exposure distributions as in this example. Earned Exposures (columns 5 through 9) are segregated into the AOI ranges represented in columns 1 and 2. An AOI Relativity (column 4) corresponding to the Midpoint (column 3) of each AOI range is derived by direct lookup, interpolation, or extrapolation (for higher values) from the current AOI relativity curve. The Average Earned Relativity (item B) for each year is simply a weighted average

of each range's Relativity (column 4) with the Earned Exposures for that year (columns 5 through 9).

A Current Amount Factor (CAF) for each historical experience period is calculated on Exhibit 2, columns 1 through 4. These CAF's are used to adjust each year's premium to the "current" point, i.e., the midpoint of the latest (current) experience period. The Relativity to Latest Year (column 3) is simply the ratio of the current year's Average Earned Relativity (column 2) to that of the particular experience year.

The Relativity to Latest Year (column 3) reflects changes internal to the Homeowners insurance process. Left alone, the actual, historical change in Average Earned Relativity reflects both inflationary and non-inflationary influences. The premium and loss trend methods would be "out of synch" unless further adjustment occurs to assure that the two trend methods reflect the same influences. Therefore, the Relativities to Latest Year are tempered 25% in the derivation of the Current Amount Factors (column 4) to eliminate non-inflationary influences. The Current Amount Factor equals unity plus 75% of the difference between column 3 and unity. Note that a 75% tempering factor is used here simply for the purpose of example. A different tempering factor would be more appropriate in this case. This will be discussed in the next

section of this paper.

As shown on Exhibit 2, a linear regression of the Average Earned Relativities is used to compute the Premium Projection Factor. Tempering is also employed at this stage. The Premium Projection Factor trends the premium from the midpoint of the current experience period to one year beyond the proposed effective date.

After application of the tempering factor, this premium/loss trend method reflects only inflationary influences and thereby simulates the changes occurring to a static book of business having no changes in the underlying level of real loss exposure, and only inflationary changes in AOI.

One might observe that a book is not static if as much as one policy is added or deleted from the book from one calendar year to the next. So it would appear that this approach is based on circumstances too ideal to be useful in a trend model. However, it is easier to see the model's usefulness if one observes that five separate loss ratio projections are being generated from the five separate experience years. Within the larger context of the Homeowners indication, the degree to which the singular Homeowners book is static from year to year is of secondary importance. For each individual experience

year, the trend model adjusts the premiums and losses as if the book renews in a static fashion from that experience year to the projection period. It is in this sense that the assumption of a static book, or perhaps five static books, can be better understood. Each year's portfolio of exposures, appropriately trended, serves as a separate sample of the policies to be priced in the projection period.

Changes in real loss exposure appear to be ignored in such a static approach. By omitting an explicit adjustment for changes in the book of business, it would appear that the predictive relevance of the trended historical data is compromised. However, static methods do not ignore the effect of these influences. Static models assume that non-inflationary influences (such as changes to the insured portfolio), in the aggregate, have offsetting effects on premium and loss between the experience period and the projection period. This treatment can be contrasted with the Dynamic Method discussed later.

The Tempering Factor

The judgmental tempering factor, used to factor out the effect of non-inflationary influences on premium, is a distinguishing feature of Static Method I. The example used in Exhibits 1 and 2 employs the same tempering factor chosen in Homan [3]: 75%

throughout the experience and projection periods. The actuary could select the tempering factor based on an estimate of the relative proportions of inflationary versus non-inflationary influences to the total change in Average Earned Relativity. A tempering factor closer to unity (such as 80%) would reflect a relatively lower proportion of change from non-inflationary influences, and a factor farther from unity (such as 70%) would reflect a relatively greater proportion of change from non-inflationary influences. Factors from 75% to 85% have been used traditionally.

The exposure distributions and significant growth in total number of exposures on Exhibit 1 suggest that changes in the book are responsible for a large proportion of the change in Average Earned Relativity. Therefore, a tempering factor lower than the traditional 75% would be more appropriate in this case. Traditionally the exact magnitude of the tempering factor has been largely a matter of judgment. As we will see, "Static Method II" can provide information relevant to this issue.

As shown on Exhibit 2 in the computation of the Current Amount Factors (column 4) and the Premium Projection Factor (item M), the application of the tempering factor assumes that the effect of non-inflationary influences is a constant proportion of the

change in average Coverage A relativities over the trend period (or over a sizeable portion of the trend period), and that this proportion is the same for each experience year. By contrast, Walters chose a tempering factor of 85% for the Current Amount Factors and 75% for the Premium Projection Factor. [4, Appendix D, Sheet 3] Different tempering factors for the experience and projection periods can be used to reflect the variation in the proportional impact of non-inflationary influences (and corresponding changes in ITV level) on the total premium trend, or simply to control the "spread" between the premium trend and loss trend.

It is interesting to reflect on the flow of the calculations in Static Method I from a directional perspective. The loss trend process starts with the experience losses, unaffected by either inflationary or non-inflationary influences. It then augments these losses for inflationary influences. The premium trend process also starts with untrended premium (at current rates), but moves to a point (before tempering) reflecting the full effect of both inflationary and non-inflationary influences. The tempering process takes the premium backwards to a point corresponding to the trended losses.

The tempering factor approach was devised originally in a bureau environment. A bureau's portfolio of risks is

relatively unchanged by insureds' movements among insurers, or by an individual insurer's underwriting or marketing actions. However, as discussed previously, these influences can cause sudden and dramatic shifts in an individual insurer's book, AOI distribution, or ITV level. The following section proposes a modification to the traditional method that customizes the premium trend to the changes in AOI distributions for a particular company and state.

STATIC METHOD II

Static Method II uses the same loss trend procedure as Static Method I, i.e., losses are trended using an external economic index reflecting only inflationary influences. The premium trend procedure is displayed on Exhibits 3, 4 and 5.

The first step is adjustment of the historical AOI distributions for inflationary influences. Exhibit 3 displays the calculation of a "Construction Cost Inflation Factor", or CCIF, for this purpose. In this example, the CCIF is based on the countrywide Boeckh Residential Index (BRI). This is the same BRI which typically comprises 55% of the Current Cost Factor used to trend losses. [3, p. 730] Other indices could be used. The index used for renewal rollups would be preferred

since it directly impacts the Coverage A values for that company and state. The CCIF is calculated on Exhibit 3 for each experience period as the ratio of the average BRI of the current experience period to the average BRI of the historical experience period.

For each historical experience year on Exhibit 4, Sheet 1, each AOI interval's Historical Amount (column 3) is multiplied by that year's CCIF (item A) to determine the Current Amount (columns 5 and 8). Note that the Historical Amounts (column 3) and corresponding Historical Relativities (column 4) are identical to the Static Method I Midpoint Amounts and Relativities displayed on Exhibit 1, columns 3 and 4, respectively. The adjective "historical" is introduced in Static Method II to distinguish the unadjusted data from the data adjusted to current level by the CCIF.

For each experience period, the Relativities at Current Amount in columns 6 and 9 are determined for each Current Amount in columns 5 and 8, respectively, in the same manner as described for the Static Method I Relativities, i.e., by direct lookup, interpolation or extrapolation from the current curve. The Average Relativity at Current Amount (item F) is the weighted average of the Relativities at Current Amount (columns 6 and 9) for each experience period based on the exposure distribution

of that experience period (columns 7 and 10).

The Average Historical Relativity (item E) for each experience period is the weighted average of the Historical Relativities (column 4) based on the exposure distribution for that period (columns 7 and 10). Note that the Average Historical Relativity is the same as the Average Earned Relativity from Static Method I (Exhibit I, item B).

Finally, the Current Amount Factor (item G) is the ratio of the Average Relativity at Current Amount (item F) to the Average Historical Relativity (item E). In contrast to Static Method I, tempering is not employed in the computation of the CAF. This difference between the two methods will be discussed in the following section. The final computation of the CAF is reproduced in columns 1 through 4 of Exhibit 5 for comparison to Exhibit 2.

The Premium Projection Factor is based on a linear regression of the Reciprocal of the CAF (Exhibit 5, column 5 and following). Basing the Premium Projection Factor on the Reciprocal of the CAF may seem confusing at first, but the reasoning becomes clear as one reflects upon what the CAF represents in this method. For an individual experience year, the Static Method II CAF is the amount by which that year's

premium increased due to the effect of construction cost inflation on the AOI distribution from that year to the current period. Each historical experience year's Reciprocal of the CAF (column 7) is the ratio of the historical experience year's inflation-related premium level to that of the current year. When all years' CAF's are taken together, the current year's premium level forms a common reference point. A regression on the reciprocals provides an estimate of the effect of inflationary influences for premium projection. Again, tempering is not employed in the Premium Projection Factor computation.

An alternative projection method might be to project the CCIF to one year beyond the proposed effective date, propose a future AOI distribution, and compute a future Average Earned Relativity. This alternative process would be similar to the technique used in the Dynamic Method outlined later in this paper.

An Illustrative Example

Consider the manner in which the 12/89 experience period is adjusted in both static methods. (Note that the example used in Exhibits 1 through 5 was taken from actual company data.) Exhibit 4, Sheet 1 demonstrates that, if all 12/89 earned exposures renewed to the 12/93 (i.e., current) period with

inflationary AOI increases as reflected by the BRI, the Average AOI would increase from $78,000 to $88,300 (items C and D), and the Average Relativity would increase from 1.237 to 1.352 (items E and F), or by a factor of 1.093 (i.e., item G, the Static Method II CAF). This increase of 9.3%, which is equivalent to an average annualized increase of 2.2%, can be compared to the 13.2% (3.1% annualized) increase in the CCIF (and BRI) over the same period (item A).

The 12/89 experience loss ratio (at current rates) divided by the 1.093 CAF and multiplied by a standard Current Cost Factor (based on an inflationary index) is an estimate of the loss ratio that would have been produced by the same business if there were no material change in ITV level. Exposure distributions and total exposure counts are radically different from 12/89 to 12/93, indicating a significant change in the book. However, this 12/89 sample, adjusted by Static Method II to the current period, is an appropriate estimate of the current loss ratio, assuming that the policy amount relativity curve is actuarially balanced (i.e., has uniformly adequate relativities for all AOI's). If there is no material change in ITV and the relativity curve is balanced, the changes due to non-inflationary influences have offsetting impacts on premiums and losses, and the 12/89 loss ratio (as adjusted) maintains its predictive relevance.

In contrast, the Static Method I CAF for 12/89 indicates a 33.1% premium increase (7.4% annualized) after application of the traditional 75% tempering factor (see Exhibit 2, column 4). Insureds would likely resist 7.4% annual increases in Coverage A limits in such a low inflation environment. Given the knowledge that non-inflationary influences, such as a significant change in the book, account for such a large portion of the change in AOI, the actuary using Static Method I would be inclined either to use a tempering factor lower than the traditional 75%, or to augment the traditional Current Cost Factor with a supplemental loss trend. With either of these changes the premium and loss trend adjustments are closer to being "in synch."

Static Methods Compared

In contrast to Static Method I, the flow of the Static Method II premium trend procedure is similar to the loss trend procedure. The trended premiums never arrive at a point reflecting non-inflationary influences, so there is no need to eliminate non-inflationary influences to correspond to the loss trend. The premium trend process adjusts the AOI distribution for each historical experience period only for the inflationary factor impacting the losses. Losses from all Homeowners coverages are influenced by construction cost inflation (on Coverages A and B, as modeled by the BRI) or inflation in the

costs of personal property, housing and medical care (Coverages C through E, as modeled by the Modified Consumer Price Index, or MCPI). AOI increases for a static book are based on estimates of construction cost inflation (the CCIF). The loss trend process and premium trend process flow "in synch."

Note that both the numerator and denominator of the Static Method II CAF are based on the exposure distribution of the historical experience period. In contrast, the numerator and denominator of the Static Method I CAF are based on the exposure distributions of the current period and the historical period, respectively. By basing the CAF on the historical distribution alone, non-inflationary changes in the AOI distribution are not distorting the premium trend in relation to the loss trend. The need for a judgmental tempering factor is eliminated because both premium and loss trend adjustments reflect only inflationary influences.

However, Static Method II is subject to the same qualification as the traditional static method with respect to non-inflationary influences: the assumption that their effects on premiums and losses offset one another between the experience period and the projection period. The predictive relevance of the adjusted historical experience is compromised to the extent this assumption is not valid, unless some form of

supplemental trend is employed. This can be a disadvantage of static methods. However, note that the ability to vary the tempering factor in Static Method I provides an opportunity to control the spread between the premium and loss trend, and thereby recognize such phenomena as shifts in ITV level, excessive increases in the demand for housing, etc.

If more detailed information is available, either static method could be enhanced by (a) use of state or regional inflationary indices, including the index used for renewal rollups, (b) explicit reflection of changes in the percentage of rollup acceptance on the renewal book, or (c) judgmental adjustment for sudden changes in ITV resulting from reunderwriting or changes in the agency plant.

A DYNAMIC METHOD

As stated above, the apparent omission of reflecting non-inflationary influences can be a disadvantage of static methods. Weinman [5] has proposed an alternative premium and loss trend method which estimates the <u>total</u> change in exposure from all causes, rather than quantifying only the effect of inflationary influences. As such, this Dynamic Method does <u>not</u> attempt to model changes to a static book, but explicitly

incorporates the changes that occur due to all trend influences in the aggregate. Loss trend adjustments in this model are based on the actual frequency and severity trends in Homeowners losses (excluding wind and hail losses), since actual losses, to the extent credible, are the best reflection of the effect of non-inflationary influences on the book of business. The premium trend is based on a judgmental estimate of the projected exposure distribution, including consideration of changes in the book and rollup trends. As such, the premium and loss trends are "in synch." Exhibits 6 through 10 illustrate the steps of this Dynamic Method. The example used in the preceding discussion of static methods is used in Exhibits 6 through 10 so the models can be compared.

Actual Homeowners losses for the book in question, to the extent credible, provide valuable information on the effect of all trend influences in the aggregate. On Exhibit 6 pure premium trend is estimated from loss severities and frequencies excluding wind losses. The Annual Rates of Change derived from exponential regressions of the data (item A) would suggest an annual pure premium trend of 3% (i.e., the product of 1.061 and .971). If 3% were selected as the annual pure premium trend, trended losses would be calculated by multiplying each year's experience losses by 1.03 to the appropriate power.

However, in this particular example note the poor R-Squared statistics (item B) and large variation in year-to-year changes (columns 3 and 5). Whereas a larger, more stable book might lend itself very well to this Dynamic Method, this particular case is not well suited for derivation of internal loss trend due to the apparent erratic nature of the losses, even after elimination of wind claims.

In casualty lines, such as automobile liability, one could opt to use regressions of bureau or industry data (with appropriate consideration of liability limits) when an individual company's data are too unstable. However, Homeowners loss severities are greatly impacted by the particular portfolio of risks insured and changes in that portfolio. For this reason, the actuary must use a considerable degree of caution when considering outside data to model a particular book's total (inflationary plus non-inflationary) trend.

Large fire or liability losses, particularly on smaller books, can distort internal Homeowners loss trends. Depending on the sophistication of the database, another difficulty might arise in adjusting for changing deductible distributions and the corresponding claim elimination. Static methods deal with the issue of non-inflationary influences using the general assumptions discussed previously. Likewise, the selection of

an aggregate loss trend factor from internal data involves degrees of assumption and uncertainty. A Dynamic Model projection process, however, gives the actuary an opportunity to explicitly reflect knowledge of real changes to that individual state's book.

The first step in the Dynamic Method's premium trend is the selection of an Annual Growth Rate (Exhibit 7, item A). Changes in Average Coverage A Amounts (columns 2 and 3) and the actual factor used to rollup renewals (column 4) are used in this estimate. The 5% factor chosen in this example represents the actuary's estimate of the annual change in Coverage A limits during the projection period (i.e., from the midpoint of the latest experience period to one year beyond the proposed effective date).

On Exhibit 8, the Annual Growth Factor is raised to the appropriate power (items A through F) and applied to the Midpoint AOI Amounts (column 3) to calculate Projected Midpoint Amounts (column 6). Projected Earned Relativities (column 8) corresponding to each Projected Midpoint Amount (column 6) are derived from the AOI relativity curve by lookup, interpolation or extrapolation. Weinman suggests using the proposed relativity curve for this purpose since it more accurately reflects future AOI changes. [5, pp. 785-786]

The Adjusted Distribution (column 7) is based on the latest experience period's Exposure Distribution (column 5) and any judgmental modifications reflecting changes anticipated during the projection period. The Projected Average Earned Relativity (item H) is a weighted average of the Projected Earned Relativities (column 8) using the Adjusted Distribution (column 7).

Finally, the Dynamic Method's Premium Trend Factors are computed on Exhibit 9 (column 3) as ratios of the Projected Average Relativity to each year's actual Average Earned Relativity (column 2). Note that this trend factor, like the loss trend, reflects changes from all trend influences. Since the model's intention is to reflect changes from all causes (i.e., all trend influences), tempering is neither appropriate nor desired.

CONCLUSION

The Statement of Principles [1] states the following regarding "Data":

> "Historical premium, exposure, loss and expense experience is usually the starting point of ratemaking. This experience is relevant if it provides a basis for developing a reasonable indication of the future. Other relevant data may supplement historical experience. These other data may be external to the company or to the insurance industry and may indicate the general direction of trends in insurance claim costs, claim frequencies, expenses and premiums." (emphasis added)

The art of ratemaking involves using and adjusting historical data in a manner that preserves and enhances predictive relevance to the greatest possible extent. The issue of data relevance should not be viewed in an "all or none" fashion. To paraphrase the above quotation, historical experience, together with the adjustments deemed appropriate by the actuary, is relevant to the extent that it develops a reasonable indication of the future. (Note that the above paragraph is only an excerpt from the Statement of Principles. The entire Statement should be read for a complete understanding of issues

pertaining to the relevance of "adjustments" to historical data.)

Trend is one of the most important and influential adjustments underlying the final rate indication. The issues of trend and ITV go hand in hand in Homeowners ratemaking. The actuary may choose to use a static or dynamic method based on the sophistication of the loss database, knowledge of the book being priced, and information available regarding changes in the book. Currently dynamic approaches are more commonly employed in larger companies, and static approaches are more commonly used for smaller books or in cases of unreliable internal loss information.

The actuary must decide on the methodology that optimizes the predictive relevance of the historical premium and loss experience. If quality loss data are available, and if loss distributions are stable enough over time to allow reliable estimates of internal trends, a dynamic approach could be chosen to incorporate the effect of all trend influences in the indication. On the other hand, if quality loss information is not available, or if the loss experience is too unstable, the general assumptions and external trend data of a static approach may better serve the actuary's purpose.

REFERENCES

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[2] Head, G.L., Insurance to Value, Richard D. Irwin, Inc., 1971, Chapter 2, "Survey of Insurance to Value," pp. 9-34.

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[4] Walters, M.A., "Homeowners Insurance Ratemaking," PCAS LXI, 1974, pp. 15-57.

[5] Weinman, S.J., "Homeowners Ratemaking," Pricing Issues, Casualty Actuarial Discussion Paper Program, 1990, Vol. II, pp. 781-808.

[6] Wood, G.L., Lilly, C.C., Malecki, D.S., Graves, E.E., and Rosenbloom, J.S., Personal Risk Management and Insurance (Fourth Edition), American Institute for Property and Liability Underwriters, 1989, Vol. I, Chapter 4, "Homeowners Insurance," pp. 189-269.

NOTICE

Static Method I
Calculation of Average Earned Relativities
Homeowners Forms 1-3,5,8
Sample State

Exhibit 1

(1) (2) Amount of Insurance	(3) Midpoint Amount	(4) Relativity	(5) 12/1989	(6) 12/1990	(7) 12/1991	(8) 12/1992	(9) 12/1993
			Earned Exposures				
20 - 29,999	25.0	0.860	66	33	13	10	4
30 - 39,999	35.0	0.872	454	242	148	73	22
40 - 49,999	45.0	0.904	1,032	675	468	267	65
50 - 59,999	55.0	0.965	1,273	1,039	818	691	717
60 - 69,999	65.0	1.040	1,199	1,257	1,267	1,273	1,224
70 - 79,999	75.0	1.130	1,009	1,071	1,266	1,466	1,553
80 - 89,999	85.0	1.240	787	931	1,116	1,480	1,859
90 - 99,999	95.0	1.370	545	748	1,032	1,499	1,994
100 -124,999	112.0	1.632	710	1,096	1,672	2,735	3,642
125 -149,999	137.0	2.032	313	508	841	1,550	2,112
150 -174,999	162.0	2.388	153	253	470	900	1,308
175 -199,999	187.0	2.738	78	146	254	510	724
200 -299,999	250.0	3.500	109	186	348	677	984
300 -499,999	400.0	4.800	22	59	116	236	321
500 -749,999	625.0	6.150	1	6	19	36	55
750 -999,999	875.0	7.650	0	0	2	6	8
1,000+	1,250.0	9.900	0	0	0	1	1
(A) Total Exposures			7,751	8,250	9,850	13,410	16,593
(B) Average Earned Relativity			1.237	1.375	1.529	1.699	1.782

Static Method I — Exhibit 2
Current Amount Factors and Premium Projection Factor
Homeowners Forms 1-3,5,8
Sample State

Calculation of Current Amount Factors:

(1) Twelve Months Ending	(2) Average Earned Relativity	(3) Relativity To Latest Year	(4) Current Amount Factor (Column 3 tempered 25%)
12/1989	1.237	1.441	1.331
12/1990	1.375	1.296	1.222
12/1991	1.529	1.165	1.124
12/1992	1.699	1.049	1.037
12/1993	1.782	1.000	1.000

Calculation of Premium Projection Factor:

(5) Twelve Months Ending	(6) X	(7) Avg. Earned Relativity (Y = Col. 2)	(8) X*X	(9) X*Y
12/1989	-2	1.237	4	-2.474
12/1990	-1	1.375	1	-1.375
12/1991	0	1.529	0	0.000
12/1992	1	1.699	1	1.699
12/1993	2	1.782	4	3.564
(A) Sum	0	7.622	10	1.414

(B) Linear Regression: Y' = B*X + A = 0.141*X + 1.524	
(C) N = Number of Points = 5	
(D) A = Mean of Fitted Line = Sum(Y)/N = 7.622/5 =	1.524
(E) B = Avg. Annual Increment = Sum(X*Y) / Sum(X*X) = 1.414 / 10 =	0.141
(F) Midpoint of Current Experience Period	01-Jul-93
(G) X Value =	2.0
(H) Fitted Value = 0.141 * 2.0 + 1.524 =	1.806
(I) Proposed Effective Date	01-Jul-94
(J) One Year Beyond Proposed Effective Date	01-Jul-95
(K) X Value =	4.0
(L) Fitted Value = 0.141 * 4.0 + 1.524 =	2.088
(M) Premium Projection Factor = (2.088 / 1.806 - 1) * 0.75 + 1 =	1.117

Premium Projection Factor is a linear projection of the change in Average Earned Relativity from the midpoint of the current experience period to one year beyond the proposed effective date, tempered 25%.

Exhibit 3

Static Method II
Calculation of Construction Cost Inflation Factor
Homeowners Forms 1-3,5.8
Sample State

(1) Twelve Months Ending	(2) Average Annual BRI	(3) Construc-tion Cost Inflation Factor
12/1989	406.4	1.132
12/1990	419.5	1.096
12/1991	431.4	1.066
12/1992	445.4	1.033
12/1993	459.9	1.000

The Construction Cost Inflation Factor is the ratio of the latest year's Average Annual Boeckh Residential Index (BRI) to the BRI for that year.

(Note: 1993 Average Annual BRI was estimated at the time of publication.)

Static Method II
Calculation of Current Amount Factors
Homeowners Forms 1-3,5,8
Sample State

Exhibit 4
Sheet 1

				12 / 1989			12 / 1990		
(A) Construction Cost Inflation Factor:				1.132			1.096		
(1)	(2) Amount of Insurance	(3) Historical Amount	(4) Historical Relat.	(5) Current Amount	(6) Rel. at Current Amount	(7) Earned Expos.	(8) Current Amount	(9) Rel. at Current Amount	(10) Earned Expos.
20	29,999	25.0	0.860	28.3	0.863	66	27.4	0.862	33
30	39,999	35.0	0.872	39.6	0.878	454	38.4	0.877	242
40	49,999	45.0	0.904	50.9	0.935	1,032	49.3	0.926	675
50	59,999	55.0	0.965	62.3	1.018	1,273	60.3	1.002	1,039
60	69,999	65.0	1.040	73.6	1.116	1,199	71.2	1.092	1,257
70	79,999	75.0	1.130	84.9	1.239	1,009	82.2	1.206	1,071
80	89,999	85.0	1.240	96.2	1.387	787	93.2	1.345	931
90	99,999	95.0	1.370	107.5	1.560	545	104.1	1.506	748
100	124,999	112.0	1.632	126.8	1.869	710	122.8	1.805	1,096
125	149,999	137.0	2.032	155.1	2.291	313	150.2	2.223	508
150	174,999	162.0	2.388	183.4	2.688	153	177.6	2.606	253
175	199,999	187.0	2.738	211.7	3.040	78	205.0	2.960	146
200	299,999	250.0	3.500	283.0	3.830	109	274.0	3.740	186
300	499,999	400.0	4.800	452.8	5.117	22	438.4	5.030	59
500	749,999	625.0	6.150	707.5	6.645	1	685.0	6.510	6
750	999,999	875.0	7.650	990.5	8.343	0	959.0	8.154	0
1,000+		1,250.0	9.900	1,415.0	10.890	0	1,370.0	10.620	0
(B) Total Exposures						7,751			8,250
(C) Average Historical Amount of Insurance						78.0			90.1
(D) Average Current Amount of Insurance						88.3			98.8
(E) Average Historical Relativity						1.237			1.375
(F) Average Relativity at Current Amount						1.352			1.476
(G) Current Amount Factor						1.093			1.073

Notes: Average Historical Amount (C) and Average Current Amount (D) are displayed for information only. They have no impact on the computation of the Current Amount Factor.

Static Method II
Calculation of Current Amount Factors
Homeowners Forms 1-3.5.8
Sample State

Exhibit 4
Sheet 2

				12 / 1991			12 / 1992		
(A) Construction Cost Inflation Factor:				1.066			1.033		
(1)	(2) Amount of Insurance	(3) Historical Amount	(4) Historical Relat.	(5) Current Amount	(6) Rel. at Current Amount	(7) Earned Expos.	(8) Current Amount	(9) Rel. at Current Amount	(10) Earned Expos.
	20 - 29,999	25.0	0.860	26.7	0.861	13	25.8	0.861	10
	30 - 39,999	35.0	0.872	37.3	0.875	148	36.2	0.874	73
	40 - 49,999	45.0	0.904	48.0	0.919	468	46.5	0.912	267
	50 - 59,999	55.0	0.965	58.6	0.990	818	56.8	0.978	691
	60 - 69,999	65.0	1.040	69.3	1.074	1,267	67.1	1.057	1,273
	70 - 79,999	75.0	1.130	80.0	1.180	1,266	77.5	1.155	1,466
	80 - 89,999	85.0	1.240	90.6	1.308	1,116	87.8	1.274	1,480
	90 - 99,999	95.0	1.370	101.3	1.461	1,032	98.1	1.413	1,499
	100 -124,999	112.0	1.632	119.4	1.750	1,672	115.7	1.691	2,735
	125 -149,999	137.0	2.032	146.0	2.164	841	141.5	2.101	1,550
	150 -174,999	162.0	2.388	172.7	2.538	470	167.3	2.462	900
	175 -199,999	187.0	2.738	199.3	2.892	254	193.2	2.818	510
	200 -299,999	250.0	3.500	266.5	3.665	348	258.3	3.583	677
	300 -499,999	400.0	4.800	426.4	4.958	116	413.2	4.879	236
	500 -749,999	625.0	6.150	666.3	6.398	19	645.6	6.274	36
	750 -999,999	875.0	7.650	932.8	7.997	2	903.9	7.823	6
	1,000+	1,250.0	9.900	1,332.5	10.395	0	1,291.3	10.148	1
(B) Total Exposures						9,850			13,410
(C) Average Historical Amount of Insurance						103.0			116.8
(D) Average Current Amount of Insurance						109.8			120.6
(E) Average Historical Relativity						1.529			1.699
(F) Average Relativity at Current Amount						1.611			1.747
(G) Current Amount Factor						1.054			1.028

Static Method II
Calculation of Current Amount Factors
Homeowners Forms 1-3,5,8
Sample State

Exhibit 4
Sheet 3

12 / 1993

(A) Construction Cost Inflation Factor: 1.000

(1) (2) Amount of Insurance	(3) Historical Amount	(4) Historical Relat.	(5) Current Amount	(6) Rel. at Current Amount	(7) Earned Expos.
20 - 29,999	25.0	0.860	25.0	0.860	4
30 - 39,999	35.0	0.872	35.0	0.872	22
40 - 49,999	45.0	0.904	45.0	0.904	65
50 - 59,999	55.0	0.965	55.0	0.965	717
60 - 69,999	65.0	1.040	65.0	1.040	1,224
70 - 79,999	75.0	1.130	75.0	1.130	1,553
80 - 89,999	85.0	1.240	85.0	1.240	1,859
90 - 99,999	95.0	1.370	95.0	1.370	1,994
100 -124,999	112.0	1.632	112.0	1.632	3,642
125 -149,999	137.0	2.032	137.0	2.032	2,112
150 -174,999	162.0	2.388	162.0	2.388	1,308
175 -199,999	187.0	2.738	187.0	2.738	724
200 -299,999	250.0	3.500	250.0	3.500	984
300 -499,999	400.0	4.800	400.0	4.800	321
500 -749,999	625.0	6.150	625.0	6.150	55
750 -999,999	875.0	7.650	875.0	7.650	8
1,000+	1,250.0	9.900	1,250.0	9.900	1

(B) Total Exposures 16,593

(C) Average Historical Amount of Insurance 123.4
(D) Average Current Amount of Insurance 123.4

(E) Average Historical Relativity 1.782
(F) Average Relativity at Current Amount 1.782

(G) Current Amount Factor 1.000

Static Method II
Current Amount Factors and Premium Projection Factor
Homeowners Forms 1-3.5.8
Sample State

Exhibit 5

Calculation of Current Amount Factors:

(1) Twelve Months Ending	(2) Average Historical Relativity	(3) Average Relativity at Current Amount	(4) Current Amount Factor (3) / (2)
12/1989	1.237	1.352	1.093
12/1990	1.375	1.476	1.073
12/1991	1.529	1.611	1.054
12/1992	1.699	1.747	1.028
12/1993	1.782	1.782	1.000

Calculation of Premium Projection Factor:

(5) Twelve Months Ending	(6) X	(7) Reciprocal of Curr. Amt Factor (Y = 1/ Col. 4)	(8) X*X	(9) X*Y
12/1989	-2	0.915	4	-1.830
12/1990	-1	0.932	1	-0.932
12/1991	0	0.949	0	0.000
12/1992	1	0.973	1	0.973
12/1993	2	1.000	4	2.000
(A) Sum	0	4.769	10	0.211

(B) Linear Regression: Y' = B*X + A = 0.021*X + 0.954	
(C) N = Number of Points = 5	
(D) A = Mean of Fitted Line = Sum(Y)/N = 4.769/5 =	0.954
(E) B = Avg. Annual Increment = Sum(X*Y) / Sum(X*X) = 0.211 / 10 =	0.021
(F) Midpoint of Current Experience Period	01-Jul-93
(G) X Value =	2.0
(H) Fitted Value = 0.021 * 2.0 + 0.954 =	0.996
(I) Proposed Effective Date	01-Jul-94
(J) One Year Beyond Proposed Effective Date	01-Jul-95
(K) X Value =	4.0
(L) Fitted Value = 0.021 * 4.0 + 0.954 =	1.038
(M) Premium Projection Factor = 1.038 / 0.996 =	1.042

The Current Amount Factor (CAF) is the amount by which that year's premium increased to the midpoint of the current experience period due to the effect of building replacement cost increases on the AOI distribution.

Premium Projection Factor is a linear projection of the change in the reciprocal of the CAF from the midpoint of the current experience period to one year beyond the proposed effective date, untempered.

Dynamic Method
Calculation of Loss Trend
Homeowners Forms 1-3,5,8
Sample State

Exhibit 6

(1) Twelve Months Ending	(2) Average Severity	(3) Percent Change	(4) Claim Frequency	(5) Percent Change
12/1986	1,880	--	0.0577	--
12/1987	1,821	-3.1%	0.0505	-12.5%
12/1988	1,864	2.3%	0.0676	33.9%
12/1989	2,442	31.0%	0.0454	-32.8%
12/1990	2,748	12.5%	0.0359	-20.9%
12/1991	3,234	17.7%	0.0459	28.0%
12/1992	1,998	-38.2%	0.0499	8.7%
12/1993	2,792	39.8%	0.0500	0.1%
(A) Annual Rate of Change		6.1%		-2.9%
(B) R-Squared		0.428		0.151

Excludes wind and hail losses.

Dynamic Method
Calculation of Growth Factor
Homeowners Forms 1-3,5,8
Sample State

Exhibit 7

(1) Twelve Months Ending	(2) Average Cov. A Amount	(3) Percent Change	(4) Renewal Rollup Factor
12/1989	78,019	--	--
12/1990	90,124	15.5%	3.2%
12/1991	103,036	14.3%	2.8%
12/1992	116,795	13.4%	3.2%
12/1993	123,442	5.7%	3.3%

(A) Selected Annual Growth Rate	5.0%
(B) Annual Growth Factor	1.050

Dynamic Method
Calculation of Average Projected Earned Relativity
Homeowners Forms 1-3,5,8
Sample State

Exhibit 8

(A) Midpoint of Latest Experience Period	01-Jul-93
(B) Proposed Effective Date	01-Jul-94
(C) One Year Beyond Proposed Effective Date	01-Jul-95
(D) Trend Period in Years	2.0
(E) Annual Growth Factor	1.050
(F) Growth Factor Applied to Col (3)	1.103

(1) (2) Amount of Insurance	(3) Midpoint Amount	(4) 12/1993 Earned Exposures	(5) 12/1993 Exposure Distrib.	(6) Projected Midpoint Amount	(7) Adjusted Distrib.	(8) Projected Earned Relativity
20 - 29,999	25.0	4	0.0%	27.6	0.0%	0.862
30 - 39,999	35.0	22	0.1%	38.6	0.0%	0.877
40 - 49,999	45.0	65	0.4%	49.6	0.0%	0.927
50 - 59,999	55.0	717	4.3%	60.7	4.3%	1.006
60 - 69,999	65.0	1,224	7.4%	71.7	7.4%	1.097
70 - 79,999	75.0	1,553	9.4%	82.7	9.4%	1.212
80 - 89,999	85.0	1,859	11.2%	93.8	11.3%	1.353
90 - 99,999	95.0	1,994	12.0%	104.8	12.1%	1.517
100 -124,999	112.0	3,642	21.9%	123.5	22.2%	1.816
125 -149,999	137.0	2,112	12.7%	151.1	12.8%	2.235
150 -174,999	162.0	1,308	7.9%	178.7	7.9%	2.622
175 -199,999	187.0	724	4.4%	206.3	4.4%	2.976
200 -299,999	250.0	984	5.9%	275.8	6.0%	3.758
300 -499,999	400.0	321	1.9%	441.2	1.9%	5.047
500 -749,999	625.0	55	0.3%	689.4	0.3%	6.536
750 -999,999	875.0	8	0.0%	965.1	0.0%	8.191
1,000+	1,250.0	1	0.0%	1,378.8	0.0%	10.673
(G) Totals		16,593	100.0%		100.0%	
(H) Projected Average Earned Relativity						1.943

Exhibit 9

Dynamic Method
Calculation of Premium Trend Factors
Homeowners Forms 1-3,5,8
Sample State

(1) Twelve Months Ending	(2) Average Earned Relativity	(3) Premium Trend Factor
12/1989	1.237	1.571
12/1990	1.375	1.413
12/1991	1.529	1.271
12/1992	1.699	1.144
12/1993	1.782	1.090
Projected	1.943	

The Premium Trend Factor is the ratio of the Average Projected Earned Relativity to the Average Earned Relativity for that year.