DISCUSSION BY JOHN F. O'LEARY, JR.*

While agreeing with the thrust of Mr. Masterson's paper, I have several pertinent questions concerning his comments on the claims market place, the apparent motivation for creating this type index, and calculation of the index.[1]

In an attempt to point out the peculiarities of costs in the insurance industry, the author notes: "Our costs are not determined by supply and demand in dealing with suppliers in a market place." This seems to me to be a considerable overstatement of the case, especially in that later in the paper he sets out to measure cost factors which clearly are determined by supply and demand forces. In fact, any time a price is determined there certainly are underlying demand and supply forces operating in the market. It may be that what Mr. Masterson means is that the frequency of losses may not be determined by supply and demand; but, the dollar costs associated with a loss are determined, nevertheless, by elements of demand and supply in all the sub-markets that are drawn upon in settling that claim. All the costs involved in settling that claim, labor costs, materials costs, legal services, are prices that have been determined in particular markets by supply and demand. Admittedly, the inter-relationships among the many markets that are tapped to settle a given claim may be extremely complex, but denying that supply-demand forces are operating compounds the confusion rather than clarifies the issue.

Aware that there are different costs associated with different lines of business, the author began with an attempt to isolate cost factors relevant to each particular line of business. The crux of the problem, however, is how to measure the effects of inflation on claims costs and take account of inflationary pressures on forecast losses for ratemaking and reserve purposes. Recognizing that inflation is essentially a price phenomenon, one reaches intuitively for price indexes as variables likely to reflect in summary the changes in the economy wrought by inflationary pressures. One certainly would consider including in a list of variables that affect loss some variables (adequately defined) in the nature of price indexes. What the author ap-

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* Mr. O'Leary, who is Research Associate, Operations Research, in the Insurance Company of North America, was a guest reviewer of Mr. Masterson's paper.

[1] Throughout this memorandum reference is made to several indexes. The abbreviations used are: CPI — Consumer Price Index; WPI — Wholesale Price Index; IPI — Implicit Price Index; LPI — Liability-Property Insurance Index; ABILI — Auto Bodily Injury Loss Index.

pears to have done, however, is create an intermediate variable which may or may not serve as a proxy for all the price variables which might be included in an analysis of the impact of inflation on claims costs.

Because the problem (inflation and its effects) is so complicated and difficult to assess, Mr. Masterson has chosen an index number approach. The method, if used properly, has several advantages: it is conceptually and computationally simple, it is a familiar technique, and may provide as accurate a measure as is needed for many purposes. In an operational environment, these advantages may carry considerable weight. Information developed through the index number approach, providing ball-park estimates of the effects of inflation, may be satisfactory for some purposes. Such estimates, however, may not be sufficiently refined for internal management purposes. Bearing in mind the complexities of the situation we may be required to attack the problem with more complex, less familiar, techniques to derive information more suitable for the management decision process.

Regarding the calculation of the index, questions arise about the following areas:

a. The weighting system
    (1) the choice of weights
    (2) derivation of weights
    (3) actual vs intended weights
b. Use of the CPI
c. Level of aggregation
d. Value as a forecasting tool
    (1) Reliability
    (2) Degree of relationship.

A brief discussion of these problem areas will indicate the reasons why I believe the author's approach may fall short of our expectations in view of the nature of our problem.

a. Weights

The choice of weights for the Auto Bodily Injury index (ABILI) are discussed at length in the paper. Selection of weights always involves a certain element of arbitrary choice as does the choice of a base year for the index. Generally, it is necessary to provide some rationalization for the selection and an explanation of why the choice is made.

The development of ABILI is based on three basic indexes[2] which are weighted systematically leading to his statement:

"The ABI loss index is the combination of the above three components in these proportions for 1966: .15 for medical, .15 for personal income, and .70 for 'specials.' This is equivalent to basing the ABI loss index on the medical and average income indexes plus $2\frac{1}{3}$ times the 'specials' for pain and suffering, extra, etc. The calculated ABI loss index thus determined is 143.8 (excluding loss adjustment)."

Reference to the Appendix will show that the author is not in fact getting the weights he desires. Instead, the medical and average incomes are not weighted equally and the ABILI, because it consists of the same variables as his medical and specials, is equivalent to changing the weights of medical fees several times and income at least twice. As a result, the actual weights operating on the three basic indexes are:

> .325 on physicians fees
> .245 on hospital charges
> .430 on personal income.

It is not clear at all that this is what was intended.

A more serious criticism of the LPI revolves around the choice of weights selected. Two points should be considered: (1) are the weights optimum weights? (2) are they consistent weights, that is, does the weighting scheme do what we think it is doing?

There is no indication that these weights are optimum weights in the sense that he wants to use the ABILI to forecast losses. There is no test of the performance of his index compared with a relationship between ABI losses and the basic indexes treated separately in an estimating procedure.

The foregoing notwithstanding, Mr. Masterson presents a time series of the ABILI for the years 1935-1967 calculated not on the basis of a consistent set of weights for physicians' fees and hospital charges, but with the relative weights changing periodically. As a result it is extremely difficult to determine exactly what the ABILI means. Trying to find some analogy in the field of price indexes, we might say he has produced not a price index but a value index, if he is changing weights each year or at intervals. It is easier to say what it is not — it is not an index that consistently reflects the

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[2] These indexes are: (a) CPI hospital daily charges (HC); (b) CPI physicians' fees (PF); and (c) OBE per capita personal income (PI).

changes in auto bodily injury losses over an extended period of time. Each time he changed the weights, he changed the index basis; so the series lacks consistency.

b. Use of the CPI Components

Using components of the CPI relevant to particular lines of business may be a step in the right direction, but some attention should be given to the structure of lags between inflationary pressures and the price indexes. There is no indication that the author took into account the fact that the CPI tends to be a poor indicator of developing inflationary pressures because it tends to lag behind the general trend of inflation after it has become an accomplished fact. For forecasting purposes, we would have to have some indication of the time period involved in this lag, especially for ratemaking purposes. The WPI is, perhaps, a better indicator of incipient inflation:

> "The WPI does not provide a satisfactory measure of the general level of prices. . . . The WPI is mainly useful in connection with the timing of inflation. . . . The WPI reflects the price movements at earlier stages of the production-distribution process and hence often is a good indicator of future trends of finished goods prices at the retail level . . . . The WPI tends to be more directly responsive to economic pressures than either the IPI or CPI. The raw materials component usually is more responsive than the entire WPI and hence is especially valuable as an indication of developing trends.

> "The National Bureau of Economic Research has classified the price index of basic commodities as a leading index, that is, one which tends to change direction before turning points in the business cycle; the index of wholesale prices of manufactured goods is classified as a coincident type series, one that moves in the same direction as the economic cycles with similar timing of turning points. On the other hand, consumer price indexes in general have conformed poorly to business cycles."[3]

The point of our discussion is that it may not be enough to take current values of prices indexes, especially the CPI. Rather some attention must be given to the lags involved between the onslaught of inflation and the time

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[3] M. R. Gainsbrugh and Jules Bachman, *Inflation and the Price Indexes,* Studies in Business Economics, No. 94, New York: National Industrial Conference Board, Inc., 1966, p. 70.

when it is reflected in the CPI in an estimating equation and improve our forecasts.

If an index is to be used in a forecast of losses, it is going to be necessary to forecast future values of the index. The author has provided no indication that his index can be forecast any more reliably than the components of the CPI or WPI which he is aggregating into his index. It would seem some of these problems would be removed if he had attempted to measure the degree of relationship between actual losses and various index numbers standing as proxies for price pressures in the economy.

c. The Level of Aggregation

Although this point may be beyond the scope of the paper, and is not meant as a criticism of it, some thought should be given to the level of aggregation for which Mr. Masterson's index has been created. It appears his indexes apply to national data based on national average price indexes. For our purposes this may not be desirable. There may be reason to consider the possibility of regional or state differentials in the rates at which inflation affects our losses. The impact of inflation is not evenly distributed throughout the country, nor are the levels of costs the same throughout the country. Because of this phenomenon, it may be necessary for us to consider the possibility of a regional breakdown of losses, in addition to a line of business breakdown.

d. Value as a Forecasting Tool

The main difficulty with the work done is that there is no indication of the extent to which the author's indexes are reliable forecasters of losses. They may, although there is no evidence present, adequately reflect the changes in some of the basic costs associated with losses. But, Mr. Masterson has not extended his analysis to the point of trying to establish the relationship between actual losses and his indicators. There is, at this stage, no way of judging whether his method or approach has more merit than an alternate approach which might take separately the component indexes he uses to derive his formulation. I believe it is this shortcoming of the analysis which is the source of the vague feeling of dissatisfaction culminated in asking the questions — "What is it Mr. Masterson has done?" or "How do we use his indexes?"

It may be that Mr. Masterson recognizes this weakness and would pursue the matter further with the same diligence demonstrated by him in his

paper. The summary judgment is, however, that he has stopped short of the problem, given that the problem is to forecast losses.

We are still left with the problem of trying to determine whether it will be easier to forecast future values for his index compared with the several components of the price indexes he uses. Beyond that lies the main question of whether a strong measurable relationship exists between his index and losses; are the variables he selected the most desirable for forecasting losses?

APPENDIX

This appendix refers to the calculation of the Auto Bodily Injury Loss index (ABILI), excluding loss adjustment expenses, performed by Mr. Masterson. As indicated in his paper, three basic indexes are used: (a) CPI hospital daily charges (*HC*); (b) CPI physicians' fees (*PF*); and OBE per capita personal income (*PI*). As shown below in Steps 1 through 3, he creates first a medical index (*MI*) by weighting *PF* and *HC*. Next, he developes an index for "specials" (*S*) which consists of *MI* and *PI*. The last stage (3) is the ABILI consisting of the *MI*, *S*, and *PI* components. By the time he gets to the ABILI he has changed considerably the weights applying to each of the basic components, raising questions about whether this is what he intended. The actual (equivalent) weights applying to those components appear in (4) below.

(1) MI = .57 (PF) + .43 (HC)

(2) S = .60 (MI) + .40 (PI)

(3) ABILI = .15 (MI) + .15 (PI) + .70 (S)

Multiplying and collecting terms

(4) ABILI = .3249 (PF) + .2451 (HC) + .43 (PI)