# MEASURING DAMAGES IN BUSINESS INTERRUPTION LOSSES

By Mark G. Filler, CPA/ABV, CBA, AM, CVA

## INTRODUCTION

Often in the course of business, a firm will be damaged by the actions of another individual or company. If such losses can be shown to have been caused by wrongful conduct, they may be recoverable by the injured party. Recoverable economic losses consist of the lost profits to the damaged business. In this article we present some simple forecasting models we have found to be useful in estimating damages in business interruption cases.

It should be noted at the outset that some business losses do not as easily lend themselves to the forecast modeling approaches discussed herein. One class of cases that does not fit in is that where the injured firm is a startup operation and has no past operating data, as historic operating data are necessary for building a forecast model. Another class of excluded cases consists of situations where specific contracts were lost or interfered with. In breach of contract cases, losses can usually be determined by computing the lost operating profit from the specific lost contracts, without reference to company historic operating or sales data.

Lost profits are defined as the revenues or sales not received as a result of the actions of another party, less the costs associated with producing those sales. The costs of producing the sales that do not continue, or are saved, might include sales commissions, cost of materials sold, direct labor, and distribution costs. To a forensic accountant, the computation of damages can be expressed in incremental revenue/cost terms, where the incremental change is caused by a specific event or series of events:

lost profits = lost revenues
- saved, non-continuing expenses
+ "extra" expense due to interruption

An implication of this model is that one should ignore those costs that continue to be incurred during the period of interruption. The injured party with or without the business interference generally would have incurred those costs.

Courts have generally agreed with forensic accountants on this proposition, and continuing expenses ("overhead" or "general and administrative" expenses in accounting terms) are nearly always ignored in measuring lost profits. There are instances where some fixed overhead, or continuing, costs would be included in the lost profits computation, such as when the injured party has to incur additional overhead costs in an attempt to mitigate the damages caused by another party. For example, there may be additional advertising expenses undertaken to reverse the effect on the name or goodwill of the business from actions by another party. Fixed costs are usually continuing expenses, but there can be exceptions to this rule, as in a fire loss where the rent is abated during the period of interruption – the rental expense would be non-continuing. Variable costs are usually saved expenses, but here too, there are exceptions to the rule. Direct labor might continue as an expense during the period of interruption because it is less costly to do so than to find, hire and replace, at a later date, those personnel laid off at the time of the injury. Given the propositions above, computation of lost profits is a four-step process, as described below.

### Step 1. Estimate "But For" Revenues

The first step in computing lost profits is to determine the level of sales that would have been received "but for" the interruption. In breach of contract cases where the level of service or value of product is specified, this is fairly easy to determine. However, in more general tort cases the forensic accountant must rely on a wide range of data and facts to project the "but for" level of sales. Economic forecasting models can be of great use in this step, since the best estimate of the interruption period sales is related to a variety of factors concerning the capacity to produce a service or product. This capacity is best determined by examining what has actually gone on before and/or after the business interruption itself. The business's performance, excluding interruption periods, sheds considerable light on what the business could have done during the interruption period.

### Step 2. Estimate Associated Costs (Saved Expenses)

Variable costs during other periods are usually the best evidence of the saved or incremental costs to the firm of not receiving the "lost" revenues claimed in step 1. Economic models can also be useful here to determine how certain types of costs vary with levels of service or production. Those costs that vary with production or sales should be included in determining lost profits, while those that do not vary with production (i.e., fixed, or continuing, costs) should be excluded in this computation. An example of a variable, or saved, cost is the accounting category called "cost of goods sold." Some or the entire amount of selling expense may be variable, and therefore saved, as well. Because accounting definitions do not uniquely identify which costs are variable and which are not, the forensic accountant must often use considerable judgment and statistical expertise to make the separation. Regression of costs on sales is helpful here.

### Step 3. Examine Continuing Expenses Patterns for Extra Expense

It is sometimes the case that certain typical overhead costs may increase during or after the business interruption period as a result of the injury. Detecting these increased costs is easier when management of the business is consulted concerning cost trends. For example, management may incur overtime expense to make up lost production. Examining any month-to-month changes in overhead can also identify these costs.

### Step 4. Compute Lost Profits

Lost profits are the "but for" additional revenues, less associated saved expenses related to those lost revenues, plus any additional overhead costs incurred by the damaged party resulting from the interruption. (The questions of the timing of economic losses and the time value of money are briefly addressed at the end of this article.)

## OTHER CONSIDERATIONS

The reader may be asking why this isn't a two-step process: forecast "but for" profits, then subtract actual profits during the interruption period, to obtain the economic damages. The answer is twofold. First, the definition of profit or net income used by many firms in their accounting statements and/or tax returns may not provide the appropriate concept for determining losses in the context of business interruption litigation. Gross profit frequently excludes some saved expense items, such as sales commissions and certain saved labor costs that are treated as overhead. Net income is gross profit less expenses, but the expenses typically include continuing expense items like depreciation and compensation of officers. The latter is part of profit and may or may not have been reduced by the interruption. It is often the case that refining the accounting data is one of the more difficult tasks facing the forensic accountant in measuring business interruption losses.

Second, sales are almost always more readily forecastable than profits, even when the latter is appropriately defined and measured. Sales revenue is clearly defined, separately accounted for, and accurately measured. Trend and seasonal patterns show clearly if sales are recorded as accruals. Profit, however, is a residual and a smaller figure than sales. Cost/expense accounting errors can create large distortions; and if expenses are recorded on a cash basis and are either prepaid or paid late, profit patterns become quite variable and difficult to forecast.

## SELECTING A FORECASTING MODEL

Step 1 involves forecasting sales revenues over the interruption period, then subtracting actual sales to obtain periodic lost sales. As any business forecaster knows, there are many forecasting models available, and the question is how to select from among them. The appropriate choice will depend upon four characteristics of the forensic economic problem: (1) type of interruption, (2) database, (3) normal sales patterns, and, (4) simplicity of technique.

### Type of Interruption

It is our normal practice to characterize business interruptions as "closed," "open," or "infinite."

Closed = Business interruption is over.

With a closed interruption, the loss period has ended before the loss computations are performed. The forecaster has normal (i.e., uninterrupted) sales data from both before and after the business interruption loss period to use in estimating the sales during the interruption period.

Open = Losses continue into the future.

With an open interruption, sales have not returned to normal by the time of the loss computations, but the company is still in business. The forecaster has only pre-loss period normal sales data to work with and may have to forecast the end of the loss period, as well as the magnitude of the losses. The issue of how far into the future to measure lost profits is as much a legal as an economic issue.

Infinite = Business has ceased operations.

An interruption is deemed to be infinite if the company went through a period of operating losses, then went bankrupt or was sold at a reduced value. There are only pre-loss normal sales data, and the forecast is used to compute periodic losses up to the date of sale or bankruptcy and may also be useful in estimating the market value of the company at that date. In this type of loss a valuation of the business would usually also be necessary, since the worth of any business is the present value of its future cash flows. As there would no longer be any cash flows from a business that had ceased operations due to the actions of the tort-feasor, the measure of damages becomes the present value of those lost future cash flows.

## Database

The number and type of sales data provided to the forecaster may dictate the choice of a forecasting method. With only two or three annual sales figures, the options are much more limited than with several years' worth of daily, weekly, monthly, or quarterly data. Another deciding factor is whether the sales data are recorded at regular time intervals (days, weeks, and months) or irregularly (as in some contract-driven companies).

## Normal Sales Patterns

Almost all quantitative forecasting proceeds by identifying and measuring patterns in the observed part of a time series, then projecting that pattern into the future as a forecast. The two most important components of a pattern are trend (which may be up or down, and linear or nonlinear), and seasonal variation (e.g., toy sales are high in December but lower in January). A forecaster must also be concerned with abrupt changes in sales patterns, such as after the introduction of a new product, or opening of a new outlet, and random outliers (abnormally large or small non-periodic sales figures).

## Simplicity

Since most business interruption loss cases require only a single forecast, even relatively expensive forecast techniques might be contemplated. But because the method and results must be explained to a judge or jury not familiar with economic forecasting procedures, the simplicity of the method is important. Happily, most simple forecasting techniques are also relatively inexpensive.

So far, nothing has been said about forecast accuracy. A business forecaster can make a projection, wait to see how accurate the forecast turns out to be, and then modify the model if accuracy is below some acceptable level. Such is not the case in forecasting past sales or losses-the uninterrupted sales levels will never be observed. Nevertheless, the forecaster must still achieve credibility and goodness of fit. That is, the forecast model should be one that is widely known in the forensic accounting arena and with a proven track record, and the forecasted levels of sales should track closely with actual sales during normal pre- or post-loss periods.

## COMMON FORECASTING TECHNIQUES

With the previous caveats and criteria in mind, what forecasting models are likely to work well in business interruption cases? Our experience has shown that virtually every situation can be handled with one or more of the techniques described below.

### Simple Arithmetic Models

There are a number of forecasting computations that can be made that involve no more than the four arithmetic functions. For example, computing a simple daily average of the days' sales in any month prior to the injury, and multiplying that daily average by the number of days of expected interruption to arrive at estimated lost sales for the period. Another type of simple arithmetic model is to take the average of the prior and succeeding four weeks' daily sales for those days in question, e.g., Wednesday – Friday, and use that three day average as the estimate for lost sales for the missing three days.

### More Complex Arithmetic Models

Given enough historical sales data, say sixty consecutive monthly sales figures up to the month of injury, two computations can be made, that when averaged together, will produce a realistic sales forecast. The first of these takes year-to-date sales and by extrapolation, annualizes them. Next, a five-year average of each interrupted months' percentage of annual sales is calculated, and then applied against the annualized sales to produce forecasted sales. For example, if sales through May (five months) are $865,000, then annualized sales will be $2,076,000 ($865,000 ÷ 5 X 12). If June is the interrupted period, and the five prior Junes averaged 10% of each year's annual sales, then forecasted sales for this June would be $207,600 ($2,076,000 X 10%).

The second model compares year-to-date sales for the current year with that of the immediately preceding year, and calculates the percentage increase or decrease. This percentage is then applied against last year's same month's sales as this year's interrupted month, and the result is the expected sales for this year's interrupted period. For example, if last year's sales through May were $850,000, then the percentage increase for this year is 1.76% ($850,000 X 1.0176 = $865,000). If June's sales for last year were $201,500, then this year's expected sales for June would be $ 205,046 ($201,500 X 1.0176).

Averaging these two results gives June's expected sales of $ 206,323.

## Trend-Line and Curve-Fitting Models

Trend and curve-fitting models, using time as the predictor, or independent variable, and pre- and/or post-loss sales as the response, or dependent variable, are more sophisticated but still lucid, forecasting techniques. The idea is to estimate the equation of a line or curve that fits (i.e., lies close to) the observed actual sales figures outside the interruption period.

If the normal sales figures plot in a roughly horizontal line (a "constant" pattern), the arithmetic mean of the uninterrupted sales can be used as a forecast of probable sales during the interruption period, as described above. However, where normal sales show a rising or falling pattern, ordinary least squares (OLS) regression can be used to define the equation of a straight line or a polynomial curve which best "fits" the actual sales in normal periods. Projecting the curve over the loss period yields the desired sales forecasts. The same regression methods, when applied to the logarithm of sales, can be used to fit exponentially rising or falling curves characterized by a constant percentage rate of growth or decay.

Some caution is called for in applying curve-fitting methods. Many curves, when projected forward or backward in time, predict negative or infinitely positive sales, which are clear impossibilities. An exponentially growing trend curve rises sharply as time goes by, and the sales of Mom's Boutique would rival Exxon's revenues in short order! More complicated curves with reasonable asymptotic limits are often required in such cases. For example, the sales by a new company or of a new product during the development and growth stages often exhibit an S-shaped pattern. A number of curve fitting models including the reciprocal and logistic curves, can replicate this shape.

## Classical Decomposition

This method is really just an extension of trend and curve-fitting methods to cases where sales show seasonal variation. The normal sales data are smoothed or averaged out to remove the seasonal variation, then compared with the original numbers to estimate the seasonal factors. A trend curve is fitted to the smoothed sales series and projected over the loss period. These projected sales trend figures are then adjusted by the appropriate seasonal factors to obtain the desired forecasts.

## Smoothing Methods

The use of smoothing techniques in forecasting is a source of some confusion. There are a number of ways of averaging out the highs and lows in a series of sales figures, with exponentially weighted and centered moving averages being the two most common. A plot of the resulting smoothed series may more clearly reveal the underlying patterns than the original data series, thereby facilitating the choice of an appropriate forecast model. Used in this way, smoothing can be an antecedent of any forecast method. In certain circumstances, however, smoothing can generate the forecasts themselves.

The curve-fitting models mentioned above typically involve an OLS regression of sales or logarithm of sales on time or some function of time. These OLS models can easily be extended to multiple regression cases where several variables are used on the right-hand side to explain the pattern in sales. One common multiple regression specification is the "seasonal dummy variable" model, in which sales are regressed on a time trend and on monthly or quarterly seasonal indicator variables. The result is a combination of curve fitting and classical decomposition; it is easy to estimate and explain and can be quite accurate.

A more advanced form of multiple regression methodology is employed when a forecaster must resort to a "pure econometric model." Econometrics is a branch of statistics concerned with identifying and measuring the strength of relationships among economic phenomena. An econometric model might be used in the context of loss estimation when the sales variable depends heavily on other external, economic variables and does not exhibit a clear pattern of its own. For example, the sales of an after-market auto parts dealer may depend heavily on new automobile sales during the previous quarter and on the average price charged per part, but show no particular trend or other pattern when graphed in isolation. A second example of an external, economic predictor variable is that of total motel sales in any one of Maine's Economic Summary Areas. These sales can be regressed against the pre- and post-loss sales of any motel in that particular ESA, allowing us to forecast lost sales during the period of interruption once we have total motel sales for that ESA for the period in question. Another example, one of an internal, economic variable, is where revenue was suspected of being underreported at a campground by newly installed management, but a regression of prior sales against electricity usage allowed expected sales to be accurately predicted and matched against reported sales. Econometric modeling is the most complicated kind of forecasting discussed in this article. It requires knowledge of statistical regression theory and methodology.

In choosing among the forecast models listed above, the following points should be kept in mind. Smoothing method forecast models should not be used in closed interruption cases or where sales data are recorded at irregular intervals, as projected levels may not then correspond closely to actual values, especially in the post-loss period. Trend-curve fitting can be used in any situation where the pre-loss pattern is established and classical decomposition in any such situation where seasonal factors are also important. Multiple regression methods can handle almost any situation and are especially useful in closed interruptions.

## CONCLUSION

The calculation of economic damages in business interruption loss cases can be fairly straightforward. We have had quite satisfactory results using only simple, arithmetic sales projection models. The proper sorting of accounting costs into saved versus continuing categories occasionally requires considerable experience and judgment, but the final analysis can usually be summed up and explained to a jury in intuitive terms. There are other difficulties involved when the duration of the loss period (in open interruptions) or the future fair-market value of the company (in infinite interruptions) is in question, but frequently even these are resolved or alleviated by stipulations between the parties to the litigation.

This article explains methods a forensic accountant can use to estimate business interruption cash flow losses during some specified loss period. The issue of how to bring those losses forward to a current valuation necessary for trial testimony has not been addressed herein, because it is a complex issue in itself. The two primary ways of viewing business losses are the opportunity loss theory and the outcome loss theory. The two theories diverge in their assumptions about use of post-injury economic and financial data. Our practice has been to first compute the cash flow losses and then find the present value of those losses as of the date of injury. There is then a variety of ways to bring that past loss to the present, including using the injured firm's cost of capital, using a risk-free interest rate, or simply putting the losses in today's dollars via the Consumer Price Index.

It is probably worth emphasizing that visual exhibits play a major role in the presentation of results to opposing attorneys and in the courtroom. The judicious use of line, bar, and pie graphs serves not only to explain technique but also to convince all concerned that the forensic accountant has remained within the bounds of realism in arriving at the estimated damages and has met the tests established by *Daubert/Kumho*.

Mark G. Filler, CPA/ABV, CBA, AM, CVA is the founder and president of Filler & Associates, P.A., a CPA firm in Portland, Maine. His personal practice focuses on providing business valuations, measurement of damages for lost profits, and assistance in adjusting business interruption losses. Contact: mfiller@filler.com