THE ROLE OF ECONOMISTS AND OF ECONOMIC STATISTICS IN PERSONAL INJURY LITIGATION

Robert Carson
Principal
Associated Economic Consultants, Ltd.

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1. STATISTICS AND ECONOMIC THEORY

Last year, on the CBC National News, it was reported that a researcher at the University of Victoria had found a connection between the use of road salt and cancer. Of course the introduction to the story made it sound as though there was a proven connection between cancer and road salt because it is a reporter's job to get us to listen.

As the story unfolded, it turned out that the U.Vic. researcher was a professor of geography who had taken a map of Canada showing incidence of cancer by location and compared it to a large number of other maps — 267 I think — showing concentrations of industrial chemicals in the environment. It turned out that there was a correlation between the amount of road salt used and the incidence of some forms of cancer.

Correlations like this are often the starting point for much more exhaustive research programs, but at this point, our knowledge of the link between road salt and cancer is about where it was before the National ran its story. That is, at this point, we are about as far as we ever were from being able to conclude that road salt causes cancer. It may well be that the use of road salt is correlated with some other agent or condition and that the cause and effect relationship is between cancer and that other factor. It may be that the correlation is entirely coincidence. To go beyond correlation and to prove causation, some hypothesis describing the mechanism connecting road salt to cancer must be developed, followed by a test of the hypothesis, an experimental design, to enable acceptance or rejection of the existence of a causal link. All that has happened to date is that a somewhat curious correlation has been noted between road salt and cancer. The correlation, or the news item might inspire another researcher — probably not a geography professor — to look into cause and effect relationships. Hopefully this would precede any conclusion on the part of the public that road salt poses a public health risk.

Correlation is simply the tendency for two sets of numbers to increase or decrease in somewhat similar ways. Correlation does not, however, imply that a cause and effect relationship between the two sets of numbers exists.

In order to consider cause and effect, economists first propose a model, or a theory of how a particular aspect of the economy works. Certainly the most relevant theory, insofar as personal injury litigation is concerned, is human capital theory, which goes something like this. Differences in people's earnings can be explained by differences in their endowments of physical capacities to do work, of knowledge and of skill. Knowledge and skills may be acquired through education, or through work experience. There are two types of human capital — general and specific. General human capital has value in many or most jobs. One prediction of human capital theory is that if employers incur costs as their employees acquire general human capital, employers try to cover the costs by paying lower wages, because they know there is a risk that they will not earn a return on their investment in employees' general human capital, if employees choose to work elsewhere once it has been acquired. The second kind of human capital — specific human capital — has value only in a particular place of work. A second prediction of the theory is that specific human capital tends to bind employees to work in the place in which their knowledge or experience was acquired, because the work place in which it is acquired is the only place in which it is valued.

Human capital includes such things as product knowledge, knowing the capacities and limitations of superiors, colleagues and subordinates, production processes and customers' preferences (these are examples of specific human capital) as well as physical stamina, academic skill and professional knowledge (likely to be examples of general human capital). Because products, processes, customers, customers' preferences, colleagues, colleagues' abilities and professional knowledge all change overtime human capital, somewhat unlike physical capital, tends to depreciate with disuse and to appreciate with use.

Human capital theory does not deny the importance of other factors which influence wage levels, such as collective bargaining, legislation and discrimination. It does, however, provide a context through which such issues as the effectiveness of collective bargaining or legislation and the extent to which discrimination has an impact on wages may be considered.

Having described human capital as an example of a bit of economic theorizing, I return to the more general question of using statistics to consider cause and effect.

Once a coherent theory has been developed, the next step is to turn to empirical (statistical) analysis to determine whether the predictions of the theory are consistent with how things turn out in reality.

Unlike physical scientists, economists generally have no opportunity to do controlled experiments. Rather, we rely on statistics to measure response to events and in effect, we treat events as experiments.

In economics, the primary role of statistical analysis is to test theories. The branch of economics which is concerned with this process is called econometrics and the principal tool used by econometricians is regression analysis. However, using a regression package in a computer, as opposed to correlation (as in the road salt story) does not mean that cause and effect necessarily have been addressed. Rather, it is through the formal process of developing a theory, modelling the predictions of the theory, gathering statistics and then using regression to test the predictions of the model against observation that, in effect, an experiment is performed and cause and effect are addressed.

When a theory is subjected to empirical testing, what generally happens is something like this. A prediction made by the theoretical model is selected and statistical data which, it is thought, can be used to support or to contradict the prediction is assembled. The prediction is expressed as a mathematical equation — for example, the rate at which human capital depreciates (the market wage falls) during a period of absence from the labour market is a function of the amount of time spent out of the labour force and of a number of other "explanatory variables," such as the pre-departure wage level, location, level of education and occupational status among, perhaps, if the data are available, other factors. The equation is then solved with data, using some version of multiple regression analysis. Once the regression has been run the investigator then reviews the results to see if the "explanatory variables" influence the dependent variable in the anticipated way (do the things that were expected to have negative or positive effects actually have negative or positive effects), if the individual explanatory variables are statistically significant and if the overall regression equation is statistically significant.

It should be noted that even favourable econometric results — plus signs where they are expected, negative signs where they are expected, statistically significant coefficients — do not prove a theory to be correct. Rather, such results only tend to support the theory or not. Well supported theories,

like human capital theory, continue to be used as analytical frameworks. Others fall by the wayside or become subsumed into more generally successful theories.

To summarize, economists use statistics to see if their theories are consistent with the way the world works. The fundamental statistical tool used to do this is regression analysis. Regression equations are used by economists to test for cause and effect relationships between a "dependent variable" — in the case of human capital theory, this is usually employment income — and a set of explanatory variables.

2. ECONOMISTS, THEIR STATISTICS AND LITIGATION

Knowledge of the determinants of income comprises much of what economists have to offer in personal injury litigation. Models which initially seek to explain behaviour and the statistics used to test them also can be used to predict things like employment income levels, and of course, personal injury litigation most often deals with future income loss.

Economists' evidence, although supported by regression analysis, does not often consist of developing or explaining regression equations specific to a particular case. There are several very good reasons for this. The first is that individuals tend to have very specific characteristics — like level of schooling, or occupation, and regression equations are somewhat limited in their capacity to deal with what economists call "category variables". The second related issue is that regression tends to produce general results (economists see generality as a virtue) whereas courts tend to be looking for things that can be related to a specific person. The third is that regression analysis, done properly, is very much dependent on the data available and it is rarely the case that the required volume and quality of data is available in a personal injury lawsuit or that it can be assembled at a reasonable cost. (It might be in a class action suit). A corollary of this is that if a regression which is largely based on data directly related to a lawsuit is part of an opponent's case, be prepared to have it scrutinized carefully.

For the most part, economists' evidence in personal injury matters is based on cross-tabulated data. Cross tabulation is a process which better lends itself to categorizations which lawyers and triers of

fact can relate to a plaintiff. Such models follow the directions provided by more sophisticated econometric models but do not use econometric equations.[1]

What has become increasingly clear in recent judgments is that the courts do not seek to calculate losses but rather, to assess them. The output of economists' earnings models, however, take the form of calculated values. The question therefore arises, what is the role of such calculations, in an assessment process?

Statistics and statistical models are substitutes for case specific facts, where no facts can exist. The most obvious example is in litigation involving injured children where there is no earnings history and no indication of occupation or career on which to base an assessment of future loss. However, even in the absence of a case-specific basis from which to choose a career, there generally is some basis to consider educational prospects and this, in turn, provides a basis from which to consider earnings prospects and the extent of earnings loss. It is a fairly simple matter for an economist to develop a set of earnings models, for varying levels of educational attainment, as starting points in a loss assessment process.

If statistical models which economists bring to court are viewed as information concerning normal patterns of lifetime earnings, rather than as answers to questions like "How much has been lost?" then they may be seen as useful components in an assessment process.

An essential part of an economist's evidence should be to explain to the court what the model has taken into consideration and what it has not. For example, many academic studies of the determinants of income indicate that years of schooling, years of experience, motivation and family's socio-economic status (among other factors) directly affect earnings. Virtually all statistical models in court take account only of the first two of these four items. Given the inability to account for all relevant variables and of course, the reliance on measures of central tendency (means and medians) economists' models inherently leave a lot of room for non-mathematical assessment.

If it was the case that personal injuries always caused 100% loss of earning capacity then economists' models could be quickly described in fairly simple terms. However, in most instances the challenge is for economists to provide loss models which can be responsive to varying fact

[1] There are hybrid models which use both regression and cross tabulation.

patterns in situations involving diminished earning capacity, not total loss. Thus it is most desirable for models to permit a "What if" style of analysis. The challenge is not only to provide such a model but to make it understandable and usable by lawyers, in settlement negotiations, and by triers of fact. One way to do this is to produce the loss model and to provide a number of example calculations based on clearly stated assumed facts. In this process the economist should clearly show the connection between the assumptions, the models and the examples.

Somebody, I do not remember who, said that people misuse statistics in the same way that drunks misuse lamp posts — for support, rather than for illumination. In an adversarial process, this tendency can be anticipated. In preparing a report for court, and in providing expert testimony, an expert economist must remain mindful of who has the adversarial role, and who is there to shed light.