

Econometrics

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What is econometrics?

Econometrics is the application of statistical techniques to the study of economic relationships. It uses data to quantify the relationship between a set of variables which describe an economic system. Econometrics is a widely-used technique across a range of businesses. In particular, it is used as an aid to decision making in marketing where it provides the methodology for marketers to make predictions about the impact of marketing activity on a company's sales, profitability and shareholder value.

How is econometrics carried out?

In our experience, many organisations collect substantial amounts of data about their business – often at considerable expense - but it is not always analysed fully and consequently does not play its full role in informing business decisions. Econometrics is one technique which can assist evidenced-based decision making.

At heart, the concept is simple. Econometrics allows you to test which variables (called “independent variables” or “drivers”) have a significant effect on a variable in which you are interested (called the “dependent variable”). For example, the dependent variable may be sales volume and the independent variables may include price, advertising, bank holidays, the weather, competitor prices, competitor advertising, public relations events, economic indicators, etc.

Not only is econometric analysis able to tell you which of a long list of possible drivers is important and which is unimportant, for those that are important it is able to quantify the magnitude of their impact on the dependent variable in which you are interested. This ability to select the significant variables and to quantify the magnitude of their impact enables a predictive model to be constructed. This can then be used to explore scenarios for various decisions that can be made by the business and sensitivities to external factors beyond the control of the business.

In order to do its work, an econometric analysis needs to look at variations in the dependent and independent variables. Unlike other types of statistical analysis, these variations are not usually planned as controlled experiments in an econometric analysis but just happen as a result of changing circumstances and the reactions of the business to the environment in which it operates. The types of variation that are analysed fall into two main categories:

- Variations over time (called “time-series analysis”)
- Variations at a point in time between different groups or categories (called “cross-sectional analysis”)

These two forms of variation can, of course, be combined in a single analysis, sometimes called “panel data analysis” (the term referring in this context to the type of data, not the method of collection).

Although powerful and widely-used, econometrics is a specialist subject. Large organisations may well have a dedicated in-house team to carry out econometric analyses. Smaller organisations usually outsource this type of analysis to consultancy firms.

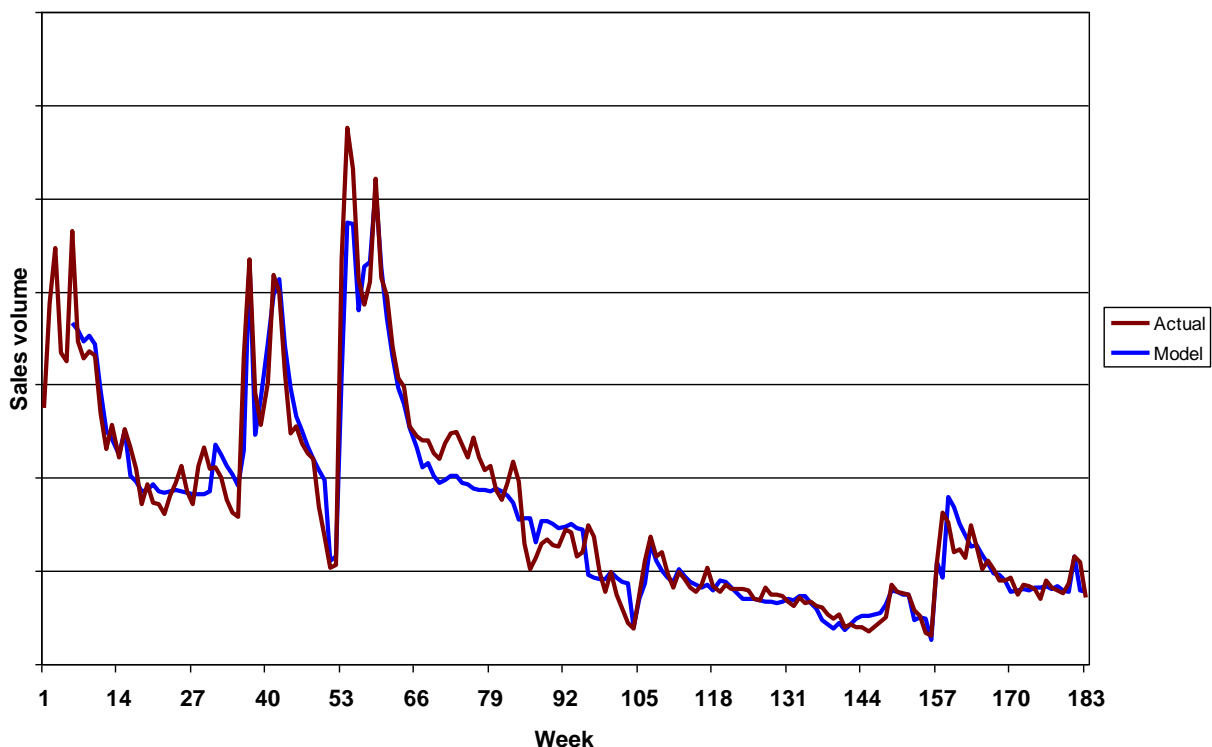
There are a number of other techniques that marketers can use to quantify the impact of their activities, in addition, or as an alternative to, econometrics. These include conjoint or “trade off” analysis which interprets market research on how consumers value various product or service attributes including price; statistical control experiments where comparisons are made between the behaviour of consumers some of whom have been exposed to a marketing stimulus and others who have not; and judgemental modelling techniques which rely on management and expert experience to quantify key marketing relationships.

Examples of what econometrics can do

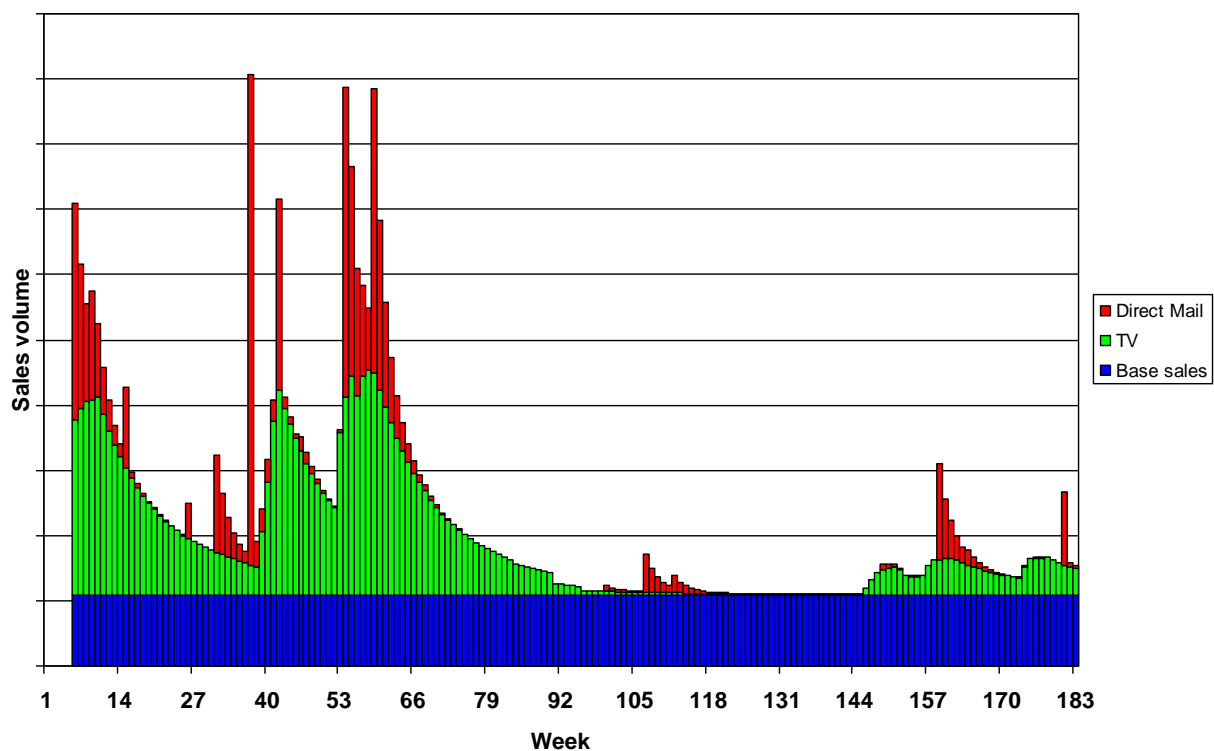
Econometrics is of interest to business in general and marketing in particular because it provides a rational and often insightful framework for decision-making. A few examples of marketing issues on which it is frequently applied are:

- Demand forecasting
- Evaluating the effectiveness of advertising, promotions and other marketing activities
- Identifying key drivers of market changes and trends
- Quantifying price sensitivities
- Identifying and quantifying the impact of competitor behaviours

A number of detailed statistical tests are available to test the validity and reliability of an econometric model in order to have confidence that it can be used as a reliable basis for planning and decision-making. In addition, however, we can look at how well the model is able to describe the existing data. A typical comparison between the model predictions and actual sales volumes is shown in the chart below.



However, econometrics can do more than just provide an equation that can be validated against historic data and used to prepare estimates for the future. It can also break out the various factors that have contributed to variations in the past, and thereby provide insights and understanding. A simple example in which sales are broken down between base demand, demand created by TV advertising and demand created by Direct mail is shown below.



This shows the extent to which TV advertising and Direct Mail campaigns have contributed to sales over the period.

Summary and conclusions

Econometrics is a powerful technique that is able to inform business decisions by providing evidence-based analysis. The analytical techniques required are specialised but, even so, are widely used because of the insights that they are able to provide. Of course, in order to deliver robust conclusions, econometric analysis relies on good data being available. Often the data are available but, when this is not the case, asking what data would be needed for an econometric analysis can be a valuable prompt for improved data capture.