MATHEMATICAL MODELLING Series 2

MACSI

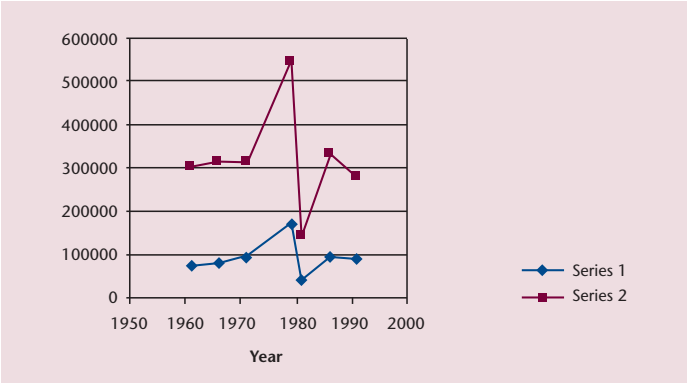
STEPS ENGINEERS IRELAND

First comes love, second comes marriage, third comes the baby in the golden carriage?

Mathematics and applied mathematics are used in everyday life. Stock markets, mobile phones, car manufacturing, Google, Hollywood special effects, digital TV and satellites all use cutting-edge mathematics tools in their basic functions. The Mathematical Modelling Series presents a number of applications of mathematics in domains as varied as the human body, volcanology, telecommunications or finance.

Can we predict births based on past marital trends?

Is there a link between the number of weddings and the number of babies born? Can we explain changes in marriage and birth trends over time using historical data? Statistics can be used to analyse and explain past trends, to identify unusual data and to forecast future events. Computer programs can be used to analyse and present data effectively.



How it works

A time series illustrates the occurrence of a particular event over a period of time. The time is plotted on the horizontal axis and the variable being observed is measured on the vertical axis. The internet is a useful tool for collecting historical data. In this instance data was collected using census records from www.cso.ie. Quantitative data such as marriage and birth rates can be an indicator of changes in society over a period of time and may reflect historical events. By plotting the data – as on the diagram (left) – over a period of time trends can be observed and compared. This allows future events to be predicted.

Conclusion

Time series methods are an effective tool for analysing past data and presenting it in an effective and comprehensive way. The time series above shows a strong relationship between marriage and births. Time series are particularly effective in observing trends over a period of time and can be useful in predicting both the frequency of other connected events and future trends. Other uses of time series include weather forecasting and predicting financial trends.

Parts of the curriculum used in this project:

- Statistics
- Time series
- Differential equations
- Finding, collecting and organising data
- Representing data graphically and numerically
- Dynamical systems
- Linear algebra

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If you want more information about MACSI and this project:

- Contact Martina O'Sullivan (project facilitator) – martina.osullivan@ul.ie
- Visit the MACSI website – www.macsi.ul.ie.

UNIVERSITY of LIMERICK
OLLSCOIL LUIMNIGH

MACSI Mathematics Applications Consortium for Science & Industry

sfi Science Foundation Ireland