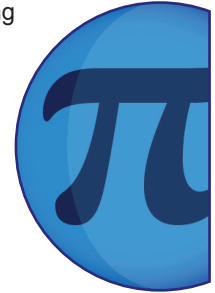




Beating the Stock Market

Key Learning Content

The film explains how options, a type of financial derivative, can be used to minimise the risks in holding stocks and shares. The Black-Scholes option pricing model is mentioned, and the role of hedging in minimising risk is outlined. Although the Black-Scholes model is widely used by the financial community, extreme events such as the 1998 stock market crash showed that this method is not infallible. A full understanding of the Black-Scholes model cannot be gained here, but the film may still be used to introduce ideas of correlation, volatility and financial return.



Core Outcomes

Learning Points

- Be able to understand that symbols may be used to represent numbers in equations or variables in expressions and formulae.
- Be able to carry out calculations using money.
- Be able to interpret information presented in a range of linear and non-linear graphs.
- Be able to understand the concept of a financial option.

Suggested Activities

- Plot graphs of stock market indices over time and interpret troughs and peaks in terms of major economic events.
- Calculate and compare the value of \$1000, when both invested in the stock market and deposited in a bank, over different periods of time.

Extension Outcomes

Learning Points

- Be able to understand what is meant by correlation and assess levels of correlations from scatter plots.
- Be able to understand the concept of a measure of spread.

Suggested Activities

- Plot scatter plots of interest rates and inflation for different countries over time and interpret the correlation of the data.
- Plot graphs of different share prices over time and assess difference in the variation or spread of the data.
- Use a spreadsheet or scientific calculator to calculate correlation coefficients and variance for sets of data over time.



Black and Scholes devised a formula that effectively cancelled out the risks associated with the stock market.

Related Films

To use before the lesson plan:

Why Do Shares Change Price?

This film identifies the factors that might drive the price of an individual share.

To use after the lesson plan:

The Prisoner's Dilemma

This film asks: how do you work out what to do if it depends on what others do and if their decision depends on yours?

Could You Owe More Than America?

This film discusses how a company that doesn't raise money through shares needs to borrow and incur debt – but how much debt is a manageable amount?

Hyperinflation: 1920s Germany

This film gives a historical example of the dangers of printing money to get out of debt.

Variables: Dating By Numbers

This film explores an arguably even more ambitious undertaking than predicting share prices: that of predicting whether you can find the right partner in love.

How Algorithms Change the World

This film shows that while modelling share prices may be difficult, many other aspects of everyday life are easier to capture mathematically.

Can Eating Fish Prevent Murder?

This film discusses how correlation (or lack of it) is key to diversifying risk, and asks whether it can also explain murder rates.

Guide Lesson Plan

Introduction

Tell the students that you are going to offer them an option on their next exam result. You are prepared to sell an option to them to get 65% in their next exam, irrespective of their actual performance. They have to bid for this option, but if the next exam is so easy that everyone gets marks higher than 65%, then the option will be worthless. How much would they bid? Explore the factors that change the value of the option.

Show Film

Beating the Stock Market

Main Activity

Foundation

Prepare sets of time-series data showing stock market indices and interest rates over time. Get students to plot these on a graph and interpret the troughs and peaks in terms of economic events that they may be aware of – banking crises, internet bubbles, extreme weather events, changes in oil prices, wars, and so on. Calculate a best-fit trend line for the indices (either by eye or by using spreadsheet software) and assess the percentage change from trend to peak or trough. Which index would they say is more risky?

Advanced

Using time-series data, plot interest rates and inflation for a given country on the same graph and look for any patterns in the data. Then draw a scatter plot of interest rates (y) against inflation (x) and comment on any correlation of the data. Do the same for the share price of a major company and the relevant stock market index. Is there any pattern between the movement of the two data sets?

Extension Activity

Foundation

Tell students that they had both invested \$1000 in the stock market and deposited \$1000 in an interest-bearing bank account a certain number of years ago. Get them to work out the values of their investments over time and comment on any differences between the two value lines.

Advanced

Enter the data plotted above on a spreadsheet and use spreadsheet functions to calculate numerical values for the correlation between the different data sets, and the variance (measure of spread) for each data set. Are the numerical values consistent with the students' previous assessments by eye from the graphs? Could either of the measures be used to assess risk?

Optional Extra

Get students to research financial options and distinguish between call and put options. Identify the factors that make each type of option more or less attractive in different market conditions.



$$C = SN(d) - Le^{-rt} N(d - \sigma\sqrt{t})$$

In 1997, Scholes and Merton were awarded the Nobel Prize for this formula.