

Title: **SPECTRAL PORTFOLIO THEORY**
The Role of Frequency in Investing

Speaker: **ANDREW LO**
MIT Sloan School of Management

Importance: Why this matters:

Spectral analysis has potential for helping investors to model time series that include higher and lower frequency components. The technique can be used to ensure that signals are aligned with the time horizon of the return they are trying to forecast. If successful, it could result in superior forecasts.

Investigation: "Speaker analyzed XXX data to address the questions yyy, zzz, etc."

Lo used several examples to illustrate that many time series are composed of components with different cyclical frequencies. The first example compared 1-day to 2-day mean stock return reversion strategies. He went on to illustrate how US GDP growth and the stock market can be decomposed into low and high-frequency components. He then showed how signals with a frequency that align with the returns produce superior results than signals that are misaligned.

Innovation: Are there new techniques of interest in the data or approach to the problem?

Lo showed how spectral analysis techniques can be used to model return dynamics across multiple time horizons which the frequency component is explicitly captured. Using discrete Fourier transform, traditional time-series measures can be decomposed into the sum of frequency-specific subcomponents, each having distinct variance, alpha, beta and correlations. By identifying the frequencies that are responsible for a strategy's expected returns and volatility, investors have an additional dimension with which to manage portfolios' the risk/reward characteristics.

Insights: 1-2-3, what are the three most important things the speaker offered?

1. Using spectral portfolio theory may help to model return series that have oscillations at multiple time frequencies.
2. It is important to align the frequency of the signals with the frequency of investing. Signals with frequencies that are aligned with returns produce superior results than signals that are misaligned.
3. A wide range of investment strategies are likely to have both low and high frequency components.

Audience rating: 4.49

Title: CAN FINANCIAL ENGINEERING CURE CANCER?

Speaker: ANDREW LO
MIT Sloan School of Management

Importance: Why this matters:

1. Drug research is incredibly expensive, and each project has a low probability of success. By using financial engineering, we can help investors diversify the risk of individual studies, and potentially increase the amount we invest in drug research.
2. Some modern drugs are very expensive. We may be able to increase their availability if we view them as investments in longer lives, and create securities that allow the investment to be paid over time, rather than at the time of treatment.

Investigation: "Speaker analyzed XXX data to address the questions yyy, zzz, etc."

Professor Lo revisited a presentation he gave to Q several years ago. He shows that by creating a bond that funds a large number (150) of drug development projects, each with low probability of success (5%), it would be possible to construct an instrument that has very attractive risk-return characteristics. He went on to discuss how to fund some of the new, but very expensive, drugs. If rather than looking only at the high cost of the treatments, we view the cost of the drugs as an investment in saving lives, and create mortgage-like securities to fund that investment.

Innovation: Are there new techniques of interest in the data or approach to the problem?

Creating a bond that diversifies the risk of individual drug research projects.
Creating a security that allows expensive drug treatments to be paid over time.

Insights: 1-2-3, what are the three most important things the speaker offered?

1. We can use financial engineering to address them problem of high-cost, low probability of success drug research
2. We should view expensive drug treatments as investments, and develop techniques to allow the cost of the investment to be paid over time.

Audience rating: 4.49