Financial Services Laboratory

Application for ECO 145

(4/06/05)
Designed by: Profs. David Myers and Art King
Topic: Hypothesis test of two means

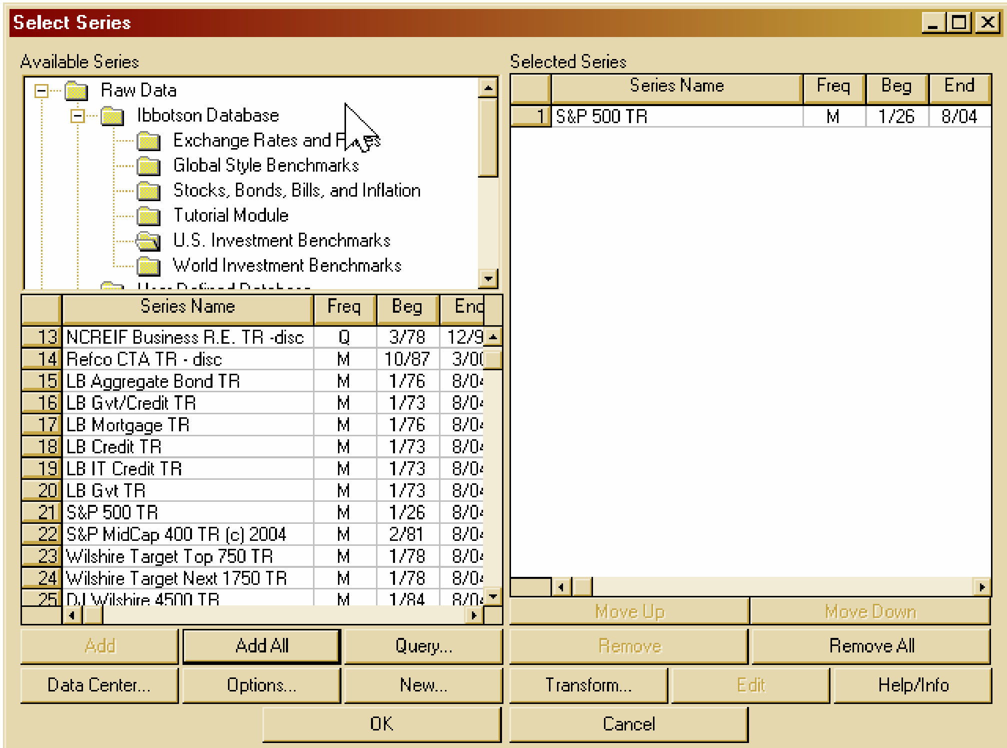
Learning objective: Apply real world financial data to test for the difference between the mean returns on two different classes of financial investments. This exercise might be the basis for a personal investment decision, for example.

Description:
Students will locate and download 3-5 years of total returns for two return measures and then test the hypothesis that the population means for the two sample data series are equal. Essentially, this amounts to testing whether there is a significant difference between the two investment returns. If there is, then a person could "make more money" on the "better investment."

The Ibbotson Database provides a large number of indices of returns so that each student can choose two to compare representing different sectors of the equity market US (S&P 500 TR, DJ Wilshire 5000 TR, Russell 1000 TR, or Russell 3000 TR). First, we will demonstrate the steps of the process with a comparison of US vs. World returns for a broad investment category.

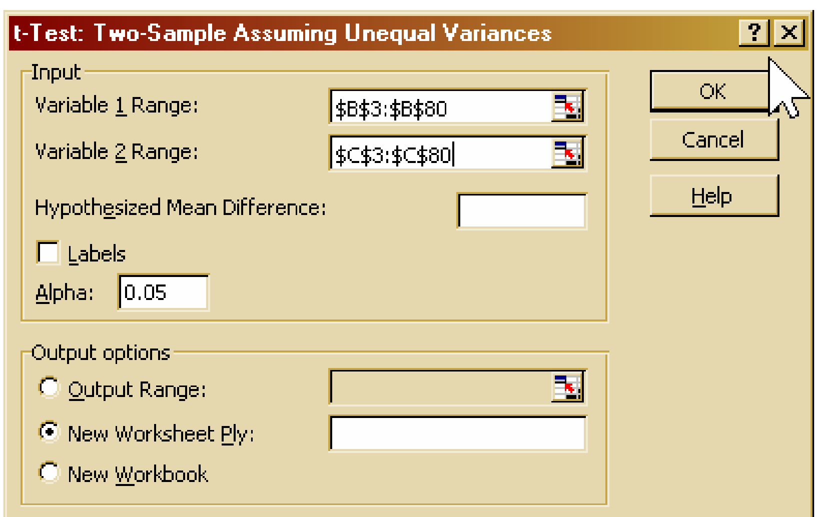
Step 1: Ibbotson Data

- Make sure that **Ibbotson Investment Software** is loaded on the computer. Check under Programs. If not, it can be downloaded to any computer in Rauch Business Center using Install Software, e.g., in RBC 50, 60 or 70.
- Open **All Programs → EnCorr Analyzer**
- Open **Select Series** window. Under **Raw Data**, **→ Ibbotson Database** and **→ U.S. Investment Benchmarks**. From the **Available Series** choose and click on one of the following broad market U.S. equity benchmarks: S&P 500 TR, DJ Wilshire 5000 TR, Russell 1000 TR, or Russell 3000 TR. Make sure the index you choose has **TR** after it for total returns (price and income returns).
- Click **Add** to copy the series to **Selected Series**.
- Choose another **TR** index from the **World Investment Benchmarks** and Add it **.**
- Click **OK.** When the **Date Settings** Window appears, choose **monthly** frequency and change the time period to include only the **last 3 years** of data. Click on **OK**. The series returns will be displayed in the Main Analyzer Window.
- Compute descriptive statistics for each series and compare. If needed, change choice of selected series.
- **Right click** over the series and choose **Send to Excel**. From Excel, you can **save** the file to your public space.



Step 2: Excel t-test

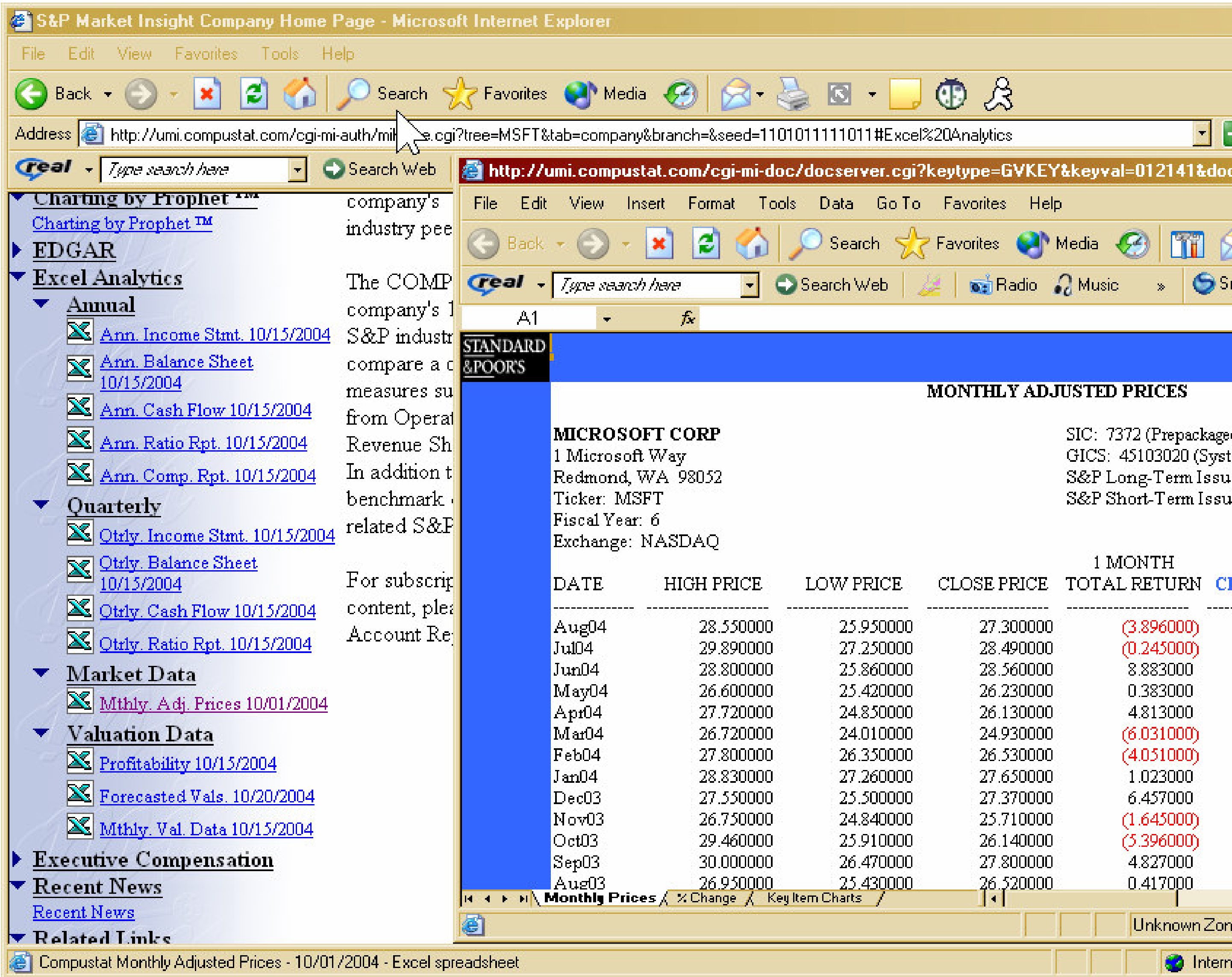
- Use the Excel file with the imported data from the Ibbotson Database
  - Open **Tools -> Data Analysis -> t-test: Two Samples Assuming Unequal Variances** (Note: if Data Analysis is not listed, you may have to open a new Excel file and copy the data into it.)



  - Click on the box for **Variable 1 Range** and highlight your US benchmark return series. Click on the box for **Variable 2 range** and highlight your other index return series.
  - Click **OK**.
    - Examine the results. What is the t-statistic? What significance level?
    - Are the means equal? (Are the variances equal? Use Excel's **F-Test Two Sample for Variances** to check out the p-value.)

Step 3: Repeat Steps 1 and 2 with 2 individual companies of your choice to compare

- Download return data for 2 companies from **Market Insight**
- Cut and paste 3 years of month end total return data for 2 stocks. From the LU home page **Libraries → Electronic Resources → Databases → Standard & Poor's Market Insight → Company → Ticker → Excel Analytics → Monthly Adjusted Prices**, to compile the data series. First, find the ticker abbreviation (e.g., Merck = MRK; Microsoft = MSFT) for each company (See screenshot below)



- Compute the sample mean and variance for each series over the time period (**Excel Tools → Data Analysis → Descriptive Statistics → Summary statistics**)
- Use Excel to test whether the 2 companies' mean returns are significantly different.

If possible, save your Excel file to your own space or disk (floppy or flash). Print a copy of your hypothesis results and bring it to class on Friday, 4/7/05