

Step one: Get and arrange the data

- 1) Open your browser and go to <http://research.stlouisfed.org/fred/index.html>
- 2) Scroll down the page and click on the link [Employment and Population](#)
- 3) Scroll down the page and click on the link [Unemployment Rate -- 1948.01](#) (This is the series of civilian unemployment from January 1948)
- 4) Open Excel
- 5) Go back to the browser and highlight with your mouse all the data starting from “1948.01 3.4”
- 6) Copy and paste the data into the cell A1 on the Excel spreadsheet
- 7) Click on data and then select “Text to columns...”
- 8) Click “Next”, select “Space”, and hit “Finish” (Now column A includes the dates and column B the unemployment rates)
- 9) Get back to the browser and click “Back” twice, to get to Fred’s home page
- 10) Click on the link [Consumer Price Indexes \(CPI\)](#)
- 11) Click on the link [Consumer Price Index \(CPI\) for All Urban Consumers -- 1947.01](#)
- 12) Copy and paste the data into the cell C1 on the Excel spreadsheet
- 13) Repeat steps 7 and 8 above (You will have the dates in column C and the CPI data in column D)
- 14) Click on the “C” in the spreadsheet to highlight column C, then right-click the mouse and select “Insert” (now the CPI data is displaced to columns D and E)
- 15) Click the mouse on the cell C1 and type the following Excel formula: $=100*(E13/E1-1)$. Formulas in Excel are preceded by the = sign. This one calculates the annual inflation rate.
- 16) Right-click the mouse on the cell C1 and select “Copy”
- 17) Click the mouse on cell C2 and drag it down till the last date shown on column A, then right-click the mouse and select “Paste”. Now you have the inflation rate on column C.
- 18) Click on the “1” in the spreadsheet to highlight row 1, then right-click the mouse and select “Insert”
- 19) Type UNEMP in cell B1 and INF in cell C1
- 20) Click on the “B” and drag the mouse to the “C” to highlight columns B and C. Then click on “Format” → “Cells...” → “Number” and select 1 for decimal places. Finally click “OK”.
- 21) Click on the “A” to highlight column A. Then click on “Format” → “Cells...” → “Number” and select 2 for decimal places. Finally click “OK”.

Step two: Graphical analysis

- 1) Highlight columns A, B, and C and click on the “Chart Wizard” icon
- 2) Select Line and the first chart sub-type on the upper right corner. Then hit Finish. You have created a time series chart for the inflation and unemployment rates from January 1948. What does the data show?
- 3) You can experiment yourself on the many options to change the look of the chart by right-clicking on different sections of the chart. Charts can be copied and pasted into a Word document to embellish your term papers.
- 4) Now click on an empty cell and click on the “Chart Wizard” icon

- 5) Select XY (Scatter) and the first chart sub-type on the upper right corner; then click Next
- 6) Click on "Series" → "Add" and on the icon to the right of the "X Values" box
- 7) Click on the cell B2 and drag the mouse down to the last data point for unemployment; then click on the icon at the right of the "Source Data – X Values" box
- 8) Click on the icon at the right of the "Y Values" box
- 9) Click on the cell C2 and drag the mouse down to the last data point for inflation; then click on the icon at the right of the "Source Data – Y Values" box; finally click "Next"
- 10) Under the "Titles" tab type "Phillips Curve" in Chart Title, "Unemployment" in Value (X) axis, and "Inflation" in Value (Y) axis
- 11) Click on the "Legend" tab and uncheck "Show legend"; then click on "Finish". You have produced a chart of the empirical relationship between inflation and unemployment known as the Phillips curve for the US with monthly data since 1948. Does the data confirm what you have learned in your introductory economics class?
- 12) Now go an empty cell such as J1 and type =MIN(Then click at the right of the left parenthesis (on the box where the formula is displayed; click the mouse on the cell B2 and drag it to the last unemployment data point; finally type a right parenthesis) and press "Enter". You have entered a formula that computes the minimum value for the unemployment series (which is 2.5).
- 13) Click on the cell where the formula is written again (J1) and insert dollar signs before each letter and number. For example if your formula is =MIN(B2:B6), change it to =MIN(\$B\$2:\$B\$6) and press "Enter". This makes the data range fixed, which makes it easy to create other formulas.
- 14) Copy the formula and paste it to the cell immediately below; then click on the cell where you copied the formula, replace MIN with MAX [so you will have, following the example, =MAX(\$B\$2:\$B\$6)], and press "Enter". The maximum unemployment in the period studied is 10.8. Knowing that the unemployment rate ranges from 2.5% to 10.8%, it makes sense to draw a histogram with intervals of 1%.
- 15) Go to another empty cell, say K2, and type 3; then type 4, 5, 6, 7, 8, 9, 10, and 11 in each of the cells below. (These numbers should be in the range K2:K10.)
- 16) Copy either of the formulas for the minimum or the maximum and paste it in the cell at the right of the 3 (that would be L2). Then edit the formula so that it looks like (following the example) =FREQUENCY(\$B\$2:\$B\$6,K2). This formula counts how many numbers in the range entered in the first argument (in this example \$B\$2:\$B\$6) are less than the number in the second argument (in this case 3, which is the number you have typed in the cell K2).
- 17) Copy the formula you just created to the eight cells below it. After this you will have the numbers 3 to 11 in the cells K2:K10 and the frequency formulas in the cells L2:L10.
- 18) To make a histogram you need to find the absolute frequencies, that is the number of observations in each interval. To get them first copy the number in L2 to the cell on the right (M2). Then type the following formula in the cell below (M3): =L3-L2. Finally copy that last formula and pasted it in the seven cells below, so your relative frequencies will be in the range M2:M10.
- 19) Go to an empty cell and click on the "Chart Wizard" icon; select "Column and the first chart sub-type in the upper right corner; then click on "Next".
- 20) Click on "Series" → "Add" and on the icon to the right of the "Values" box, then select with the mouse the range of the absolute frequencies (M2:M10)
- 21) Click on the icon to the right of the "Category (X) axis labels" and select with the mouse the range with the numbers 3 to 11 (K2:K10); then click "Next"
- 22) Under the "Title" tab type "Histogram of Unemployment" in the Chart title box, "Unemployment rate" in the Category (X) axis box, and "Frequency" in the Category (Y)

- axis box; then click on the “Legend” tab and uncheck “Show legend”; finally click on “Finish”.
- 23) Right-click on any of the columns in the chart and select “Format data series...”; then click on the Options tab, type 0 in the “Gap with” box, and click “OK”. You have now produced a histogram of the monthly unemployment rates in the US since 1948. How would you describe the distribution of unemployment rates?
 - 24) Extension: You can also make the histogram based on relative frequencies. For that purpose you can just divide each relative frequency by the total number of observations (figure out the formula). Make sure that the sum of relative frequencies is 1.

Step three: Statistical analysis

- 1) Copy the formula for the minimum (in J1) and paste it in a range of seven empty cells, say J15:J21
- 2) In the first cell of this range (J15) edit the formula by replacing MIN with AVERAGE; you get the mean unemployment rate
- 3) In the second cell (J16) edit the formula by replacing MIN with MEDIAN. Are the mean and median unemployment rates during the period studied different?
- 4) In the third cell (J17) edit the formula by replacing MIN with STDEV to get the standard deviation of the unemployment rate. What does this mean?
- 5) In the fourth cell (J18) edit the formula by replacing MIN with QUARTILE; then add a comma followed by the number 1 after the range inside the parenthesis (in the example, this would be =QUARTILE(\$B\$2:\$B\$6,1). This gives you the first quartile of the unemployment data.
- 6) In the fifth cell (J19) enter the formula for the third quartile, which is identical to the one you entered in the previous step, with a 3 instead of a 1.
- 7) In the sixth cell (J20) enter the formula =J19-J18, which gives you the inter-quartile range, another measure of dispersion. How does this compare with the standard deviation?
- 8) Finally, in the seventh cell edit the formula by replacing MIN with CORREL, and add the range for the inflation range as a second argument [in the example, it would be =CORREL(\$B\$2:\$B\$6,\$C\$2:\$C\$6)]. What does this number tell you? Is it consistent with the Phillips curve story?
- 9) Extension 1: Repeat steps 1-7 for the inflation rate data. How do the results compare?
- 10) Extension 2: Another useful Excel formula is =PERCENTILE(*range*,*k*), where *range* is the data range (as \$B\$2:\$B\$6,\$C\$2:\$C\$6) in the example, and *k* is the percentile number. For example *k*=10 is the tenth percentile, also called the first decile. It indicates the value in the dataset that separates the lowest 10% of the values from the higher 90%. Check the textbook for examples of percentiles.
- 11) Extension 3: Once you know the means, standard deviations, and correlation coefficient, you can easily compute a simple regression. (Check textbook to get the formulas for the slope and intercept of a simple regression.)