

Lifetime Inflation Activity

Author

Mark Bayles, Senior Economic Education Specialist

Introduction

This online activity shows how to use FRED®, the Federal Reserve's free economic data website, to measure changes in the cost of living in your lifetime. Each month the Bureau of Labor Statistics (BLS) collects data on prices consumers pay for tens of thousands of goods and services, everything from software to car insurance. Using rigorous statistical methods, the BLS transforms this mountain of price data into the consumer price index (CPI). The CPI is a numerical index that measures inflation by tracking monthly changes in prices urban dwellers pay for a diverse market basket of thousands of goods and services. Following simple instructions, you will locate the overall level of U.S. consumer prices as it existed on your birthdate. You will then compare that level with the level today to see how prices have inflated during your lifetime. FRED®'s ability to create a graph with a custom index scale will allow you to visualize the rise in prices over your lifetime.

Concepts

Bureau of Labor Statistics (BLS)

A research agency of the U.S. Department of Labor that compiles statistics on employment, unemployment, and other economic data

Cost of living

The amount of income needed to achieve a given living standard

Consumer price index (CPI)

A measure of the average change over time in the prices paid by urban consumers for a market basket of consumer goods and services

Inflation

A general, sustained upward movement of prices for goods and services in an economy

Inflation rate

The percent change in the price level determined by comparing the percentage increase or decrease in the price level of goods and services from one time period to another

Price index

Numbers expressed in terms of a base year value of 100; for instance, a value of 105 means the variable measured by the index has risen by 5 percent compared with the base year

Purchasing power

The amount of goods and services that a unit of currency can buy

Standard of living

A measure of the goods and services available to each person in a country; a measure of economic well-being; also known as per capita real GDP (gross domestic product)

Getting Started

1. Begin by viewing the “Introduction to FRED®” video at <http://fredqa.stlouisfed.org/2014/02/27/video-introduction-to-fred/> and then continue as follows.
2. Navigate to the FRED® website: <http://research.stlouisfed.org/fred2/>. Or, just search the Internet for FRED®. Select the link that says “Federal Reserve Economic Data—FRED®—St. Louis Fed.” It will probably be the first link on the list.
3. In this activity you will measure the change in the cost of living—the amount of income needed to maintain your usual standard of living—during your lifetime. To do so, you will use consumer price index (CPI) data gathered by the Bureau of Labor Statistics (BLS). These data stretch back to 1947, so if your birthdate was during that year or later, this activity will be a perfect fit.
4. A price index is a great way to measure inflation because it uses a single number to track changes in the amount that consumers must spend to reach a certain standard of living. How does the CPI do this? In short, the BLS surveys prices each month for a specific market basket of consumer goods and services, calculates a total cost for the market basket, and reports the market basket’s cost as a number that is indexed (scaled) to a base year. The base year, which can be any year (or an average of consecutive years, as with the CPI), is assigned an index value of 100. With this method, the CPI for any year can be expressed as a single value that marks the change from the base year’s value of 100. Ignoring absolute values in favor of movements of index values makes comparisons over time simple to calculate and easy to understand.
5. You may ask yourself if a monthly price survey for a collection of goods and services is a reliable inflation measure. Consider this: Guided by diaries of purchased items and interviews with thousands of urban households about individual consumption habits, the BLS designs a virtual market basket of goods and services drawn from over 200

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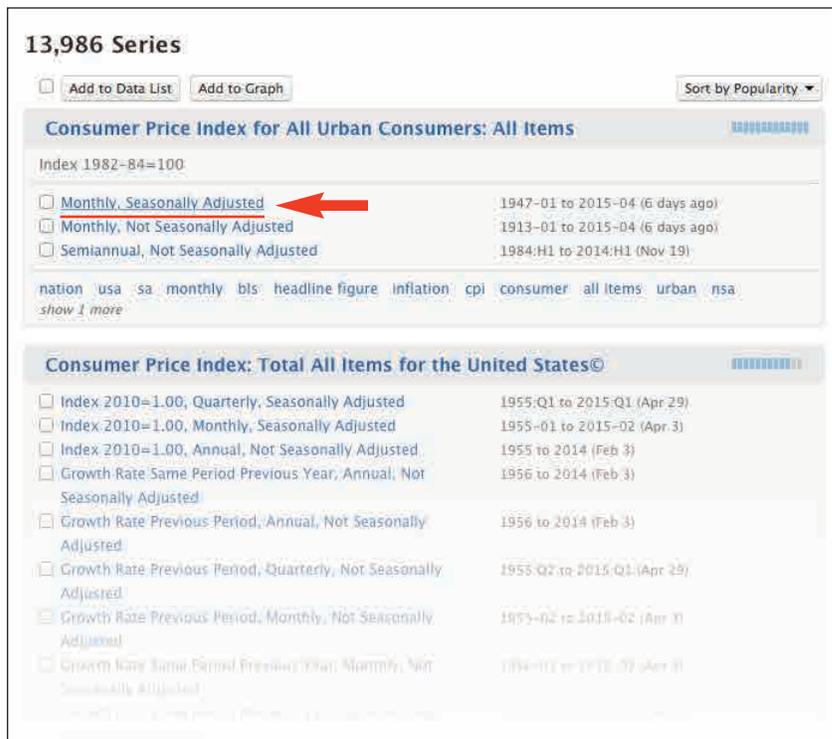
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separate categories. Each month BLS employees cast a wide statistical net over consumer purchasing behavior by sampling about 80,000 separate prices by visiting retail stores, service establishments, rental units, and even doctors' offices. The price data collected are checked for accuracy and consistency before complex statistical analyses are made. You'll learn more about the CPI as we move through this activity. (For more information about the CPI, however, see <http://www.bls.gov/cpi/cpifaq.htm>.)

Getting the Data

NOTE: The figures include arrows to indicate where to move your cursor and circles to show you where to look on the given webpages.

1. On the FRED® website, click in the search bar at the top-right corner of the page. Type "consumer price index" and hit "Enter." Your search should return results similar to those shown in Figure 1.
2. Under "Consumer Price Index for All Urban Consumers: All Items," click the first series, "Monthly, Seasonally Adjusted" (see Figure 1). This data series tracks the average monthly change in the price for goods and services paid by urban consumers between any two time periods. Using seasonally adjusted data removes the dips and bumps that occur during a typical calendar year.



13,986 Series

Add to Data List Add to Graph Sort by Popularity ▼

Consumer Price Index for All Urban Consumers: All Items

Index 1982-84=100

<input type="checkbox"/> <u>Monthly, Seasonally Adjusted</u>	1947-01 to 2015-04 (6 days ago)
<input type="checkbox"/> Monthly, Not Seasonally Adjusted	1913-01 to 2015-04 (6 days ago)
<input type="checkbox"/> Semiannual, Not Seasonally Adjusted	1984:H1 to 2014:H1 (Nov 19)

[nation](#) [usa](#) [sa](#) [monthly](#) [bls](#) [headline figure](#) [inflation](#) [cpi](#) [consumer](#) [all items](#) [urban](#) [nsa](#)

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Consumer Price Index: Total All Items for the United States

<input type="checkbox"/> Index 2010=1.00, Quarterly, Seasonally Adjusted	1955:Q1 to 2015:Q1 (Apr 29)
<input type="checkbox"/> Index 2010=1.00, Monthly, Seasonally Adjusted	1955-01 to 2015-02 (Apr 3)
<input type="checkbox"/> Index 2010=1.00, Annual, Not Seasonally Adjusted	1955 to 2014 (Feb 3)
<input type="checkbox"/> Growth Rate Same Period Previous Year, Annual, Not Seasonally Adjusted	1956 to 2014 (Feb 3)
<input type="checkbox"/> Growth Rate Previous Period, Annual, Not Seasonally Adjusted	1956 to 2014 (Feb 3)
<input type="checkbox"/> Growth Rate Previous Period, Quarterly, Not Seasonally Adjusted	1955:Q2 to 2015:Q1 (Apr 29)
<input type="checkbox"/> Growth Rate Previous Period, Monthly, Not Seasonally Adjusted	1955-02 to 2015-02 (Apr 3)
<input type="checkbox"/> Growth Rate Same Period Previous Year, Monthly, Not Seasonally Adjusted	1954-01 to 2015-02 (Apr 3)

Figure 1

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- FRED® opens an up-to-date line graph with seasonally adjusted CPI index values starting in 1947 (Figure 2).

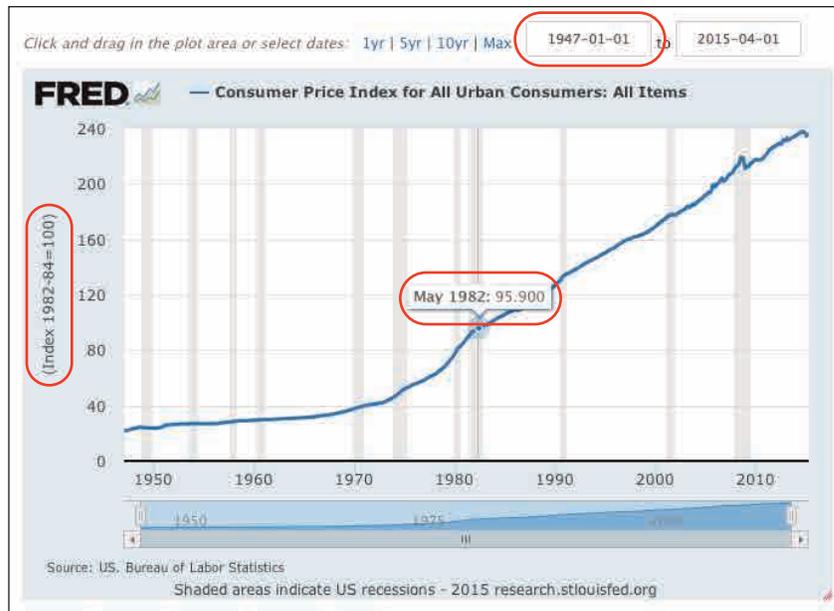


Figure 2

- A glance at the graph's left vertical axis shows the units: Index 1982-84=100. In this case, the average of the price levels for the years 1982, 1983, and 1984 is set equal to 100, so the base year is actually an average of 3 years. Later (and earlier) monthly price levels are easily compared with the base year's value of 100. As the BLS explains, a CPI value of 110, for example, means there has been a 10 percent increase in the price level (inflation) since the base year, and each consumer must spend an additional 10 percent to maintain the previous year's standard of living. (SOURCE: http://stats.bls.gov/cpi/cpi-faq.htm#Question_1.) A CPI value of 200 would mean that overall prices—the cost of living—doubled from the base year; that is, there was 100 percent inflation. Looking at inflation in terms of money, with 100 percent inflation, each dollar you earn would lose one-half its purchasing power.
- To confirm the level of the base year, move your cursor along the graph line to see the index values for each month. When you hover over the line for the years 1982 to 1984, you see values above and below 100. For example, May 1982 = 95.900 (see Figure 2) and April 1984 = 103.300. If you sum the monthly readings for the years 1982 to 1984 and divide by 36, you get 100. Now that you have an understanding of the CPI and how the BLS uses it to measure inflation from month to month, you are ready to measure inflation over your lifetime.

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6. The next step is to enter your birthdate in the first date-range window at the top-right of the graph (see Figure 2). In the box (currently showing "1947-01-01"), type in your birthdate in the format shown (so, e.g., "1998-05-15" for May 15, 1998). Notice the graph is automatically redrawn to start at that date.
7. Now you need to change the graph's base year of the index to your birthdate. You do this by changing the units: Below the graph and under the "Graph" tab, click "EDIT DATA SERIES 1: CONSUMER PRICE INDEX FOR ALL URBAN CONSUMERS: ALL ITEMS" (Figure 3).

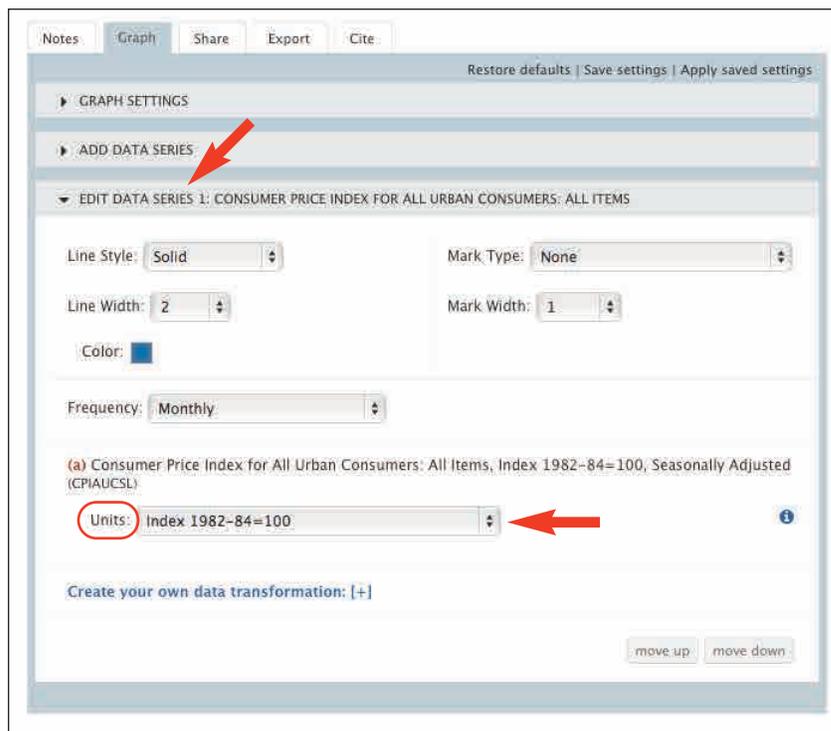


Figure 3

8. In this section, find "Units," which shows the current base year setting (Index 1982-84 =100). Click the drop-down menu next to "Units" (see Figure 3) and select "Index (Scale value to 100 for chosen period)" (Figure 4). Additional boxes will pop up. Now type in your birthdate in the "Observation Date" in the format shown (so, for example, "1998-05-15" for May 15, 1998 [see Figure 4]). Filling in the Observation Date box overrides the "U.S. Recession Peak" default. The graph is automatically redrawn.

Take a look at the graph. It now plots the CPI only since your birthdate—the newly selected base year. Note that the new base year is shown in the legend label at the top of the graph (see Figure 4). Checking the graph's vertical axis shows that it is now labeled "(Index)" (see Figure 4). You have now customized the graph to show inflation over your lifetime.

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Figure 4

9. Now let's check your understanding of the CPI: Where on this graph will an index value of exactly 100 be found? You will find it in your birth month. In our example it's in May 1998, the beginning of the data range (Figure 5, bottom-left corner of the graph). When you selected the observation date in the graph's Units section, you changed the base year—the starting point—for tracking changes in the CPI.

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Figure 5

10. Customizing the base year simplifies arriving at your personal lifetime inflation, which can be expressed as a percentage. Hover your cursor over the far-right side of the line to see the most recent CPI value (Figure 5, top-right corner). Recall that a CPI value of 110 means that there has been a 10 percent increase in the price level (inflation) since the base year reference period. So, a CPI of 145.1 signals that a typical household would have to spend about 45 percent more today to purchase the same level of goods and services it consumed in 1998.
11. How does your CPI-measured lifetime inflation compare with our 1998 example? How have prices for goods and services inflated in your lifetime? Repeat the steps, changing the first date-range window and the base year to a parent's or a grandparent's birthdate. How does your relative's lifetime inflation compare with yours?

Developing Questions and Discussion

FRED® currently hosts over 250,000 time series of data, and each one can be displayed using a variety of different units (e.g., change, percent change from a year ago, index). These datasets are called “time series” because each one reports a value on a linear time scale at a specific frequency (e.g., daily or annually). In other words, FRED® graphs show how one or more variables changed over time.

Graphs, of course, provide a visual prompt for discussions about data relationships. FRED® graphs, with their horizontal time axis, provide historical context, a crucial dimension for analysis, questions, and discussions. This discussion relates to the first CPI graph created above (see Figure 2).

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1. Repeat steps 1 and 2 in the “Getting the Data” section above to view the graph “Consumer Price Index for All Urban Consumers: All Items.” Study the graph. Describe how inflation—as measured by the CPI—has changed since 1947, just two years after the end of World War II. (*Prices rose relatively slowly until the mid-1970s when inflation began to rise dramatically. It took over 25 years—until 1973—for inflation to double the 1947 price level; a persistently high rate of inflation for the remainder of the 1970s doubled the price level by 1980, a period of only seven years. Inflation again moderated: It took 20 years, from 1980 to 2000, for consumer prices to inflate by 100 percent [double].*)
2. Today, teenagers have experienced approximately 45 percent inflation in consumer prices in their lifetime, and 21 year olds have experienced nearly 60 percent inflation. Recall past prices of some items that you frequently purchase (e.g., food, beverages, or gas). Have these price changes affected your standard of living? (*Each person will answer this question differently, but in making your analysis consider that the CPI's 80,000-item market basket of goods and services scales changes in the overall price level experienced by all urban consumers, not just a handful of prices most familiar to the typical younger consumer. Equally important, consider that purchasing power lessens only when income fails to keep up with increases in the overall price level [inflation].*)
3. Is it possible for prices consumers pay for goods and services to rise significantly without lowering the standard of living? (*Yes, that is possible if incomes rise at the same rate as inflation. For example, a 100 percent rise in the CPI joined with a matching rise in incomes would leave consumers no better or worse off than before the price level [CPI] doubled.*)
4. What evidence can you find to show that your personal income has kept up with the rise in overall prices during your life? (*Consider all of your sources of income. Do you earn wages from a job or receive an allowance for household chores? The CPI has risen about 5 percent since 2011. Calculate the changes in your sources of income to see if they match or exceed 5 percent.*)
5. The CPI measurement shows that only one year since 1955 has had a lower price level than the prior year. That year was 2009, which began with a still-shrinking economy mired in what has become known as the Great Recession. To view this section of the graph more closely, under the horizontal axis, use your mouse to grab the slider bar in the date range and move it to the right. Notice the date changing in the date-range window at the top-right of the graph. Move the bar to start the graph anywhere in 1998 (Figure 6). Focus on the gray vertical bars that mark periods of economic recession. What reasons can you think of to explain why the CPI might fall during a deep, prolonged recessionary period? (*A recession is characterized by elevated unemployment and reduced national output of goods and services. Households with an idled worker often reduce consumption when faced with a reduction in personal income. For pro-*

ducers, higher unemployment means that more workers are available for each job, so wages are likely to remain the same or decrease. Consumers may become pessimistic about the future and reduce consumption, especially of so-called big-ticket items such as houses and cars. These supply and demand considerations along with others can result in a temporary reduction of the overall price level.)

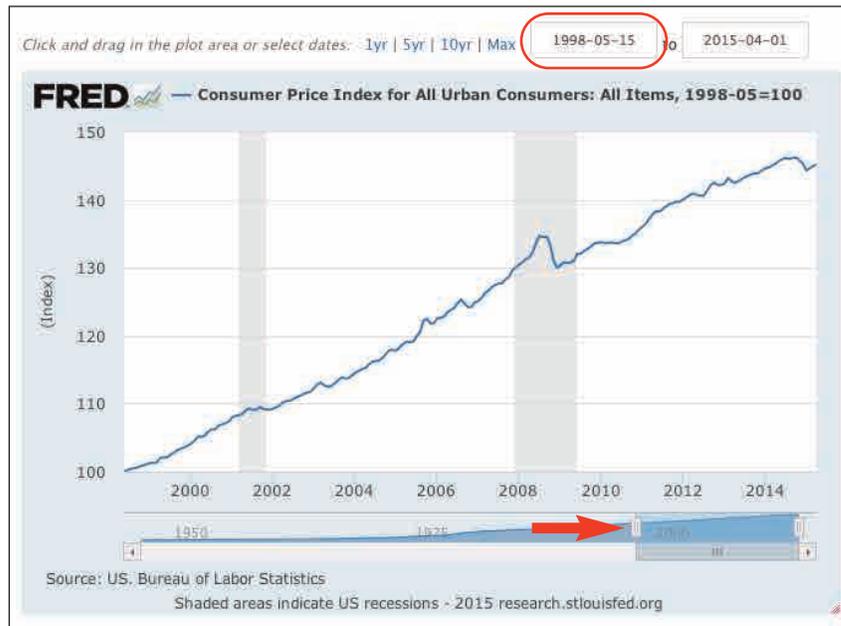


Figure 6

- Here is a quick exercise to help you further understand comparison using the CPI: In the far-left column under "Data," click "View Data" (Figure 7). The monthly "raw" CPI data (displayed on the graph) will open. Scroll down the page and find the CPI value for your birth month (for example, as shown for May 1998 in Figure 8) and write it down. Next, scroll to the end of the data column and record the final value. (To return to the graph, use the back arrow.) Using a calculator, compute and record the percentage increase in the CPI during your lifetime. Why is this result identical to the percent increase you saw on the graph when you used your birth month and year as the CPI base year? (Returning to the example of a person born in May 1998, the CPI in that month was 162.600. The index as of April 2015 is 235.186 [235.982 – 162.600 = 73.328. 73.328/162.600 = 0.451, or 45 percent]. This is the same increase shown in Figure 5, which uses a May 1998 base year and has a beginning value



Figure 7

1998-04-01	162.200
1998-05-01	162.600
1998-06-01	162.800
1998-07-01	163.200
1998-08-01	163.400
1998-09-01	163.500
1998-10-01	163.900
1998-11-01	164.100
1998-12-01	164.400
1999-01-01	164.700
1999-02-01	164.700
1999-03-01	164.800
1999-04-01	165.200
1999-05-01	165.000

Figure 8

of 100 and an end value of 145.1. Despite different beginning and end values, the overall change is identical because you calculated the percent change in CPI over time, not the difference between monthly values. Keeping that in mind, the base year is unimportant, and the percentage difference between any two months is the same.)

7. A final question: Consumers may conclude that prices in their city increased at a faster rate than reflected by changes in the CPI. How might it be possible for some consumers to experience more inflation than the national average reported by the CPI? (*It is possible because as the BLS acknowledges in its responses to Frequently Asked Questions, the market basket and pricing procedures are based "on the experience of the relevant average household, not of any specific family or individual. It is unlikely that your experience will correspond precisely with either the national indexes or the indexes for specific cities or regions."*) (SOURCE: <http://www.bls.gov/cpi/cpifaq.htm>.)

Saving and Recalling Your Graph

1. With a (free) FRED® account, you can easily save any FRED® graph. (To create an account, follow the steps outlined in the "Introduction to FRED®" video link in the "Getting Started" section.) To save your graph, click "Save Graph" in the far-left column menu and follow the prompts. You may give a graph any name you choose, and you can create categories for sorting your graphs.
2. To recall a saved graph, once you have logged in, you will see your "My Account" page. Click "Saved Graphs" in the gray menu bar near the top of the page. Alternatively, if you are already working in FRED®, click "MY ACCOUNT" in the top-right corner and select "MY GRAPHS" from the drop-down menu. From either option, titles of all the graphs you have created will appear along with other information about the graphs. You can create categories for new and existing graphs.

Sharing Your Graph

1. You can share FRED® graphs via permanent links. Click the "Share" tab under the graph to access the sharing options.
2. The icons shown first allow you to share your graphs through Twitter, Facebook, Google Plus, and email. Choose the option that best meets your needs and follow the prompts.
3. The next three options provide permanent links that can be copied and pasted:
 - "Embed in website" inserts the graph you created and when clicked links back to FRED®, allowing the viewer to use FRED®'s interactivity. This option also provides a link to download the graphed data directly.

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- “Link” provides a URL that links to FRED® and the specific graph you created.
- “Image” provides a link to the image of the graph.

Printing Your Graph and Downloading the Data

1. Click the “Export” tab under the graph to access your exporting options.
2. Under “Graph Data,” click “Download as XLS” to download the “raw” data in the form of a Microsoft Excel spreadsheet.

Under “Graph Image,” you will see these options: Print, Export as PDF, Export as PNG, Export as JPG, and Export as SVG. Choose the option that best meets your needs and follow the prompts.