

Data Practice with FRED “Measures of Inflation” Objectives

In this FRED data practice, you will learn:

- About different ways to measure inflation (CPI, (steps 4-14), GDP deflator (step 15))
- Different ways to locate data time series in the FRED database (tags, search and browse (steps 2-4, & 15))
- Definitions for inflation, consumer price index (CPI), index, and price level (steps 1-5), core inflation (step 13)
- To view and interpret data in a FRED series (steps 5)
- Calculate the inflation rate from one year to another (step 7)
- To edit graphs in FRED (step 8-) by:
 - changing units (steps 9 & 17)
 - Downloading data from a series (step 10)
 - adding a series to a graph (steps 11-12, & 18-19)
 - adding multiple series to a graph (step 13)
 - Interpret graphs (step 14)

Measures of Inflation

Inflation is an important component of the Federal Reserve’s evaluation of its policy measures. Economists, politicians, policymakers, and the public all want to know the change in the general price level and if the price level is generally rising or falling. The government has several measures for inflation. This exercise will guide you through accessing them and ask some questions about the data you find.

1. The first step in this exercise is to find the Consumer Price Index for Urban Consumers. **Start at the FRED website, <http://research.stlouisfed.org/fred2>.**
2. As you follow along in this exercise, the red arrows and circles show you where to access the information. Click the **Tags** tab.



3. In the **Find Tags** search box type **CPI**, and hit enter. (Using Tags is a quick way to find a data series. See our video tutorial on using tags for more information). Then click on the **cpi** link in the results box.



There are several measures of the CPI; one is the Consumer Price Index for All Urban Consumers: All Items (CPI-U: All Items). Other measures break out the components of CPI—products such as food, energy, housing, and medical care. To begin, we first look at the CPI-U: All Items. Then we will examine the energy component of the index and make some comparisons.

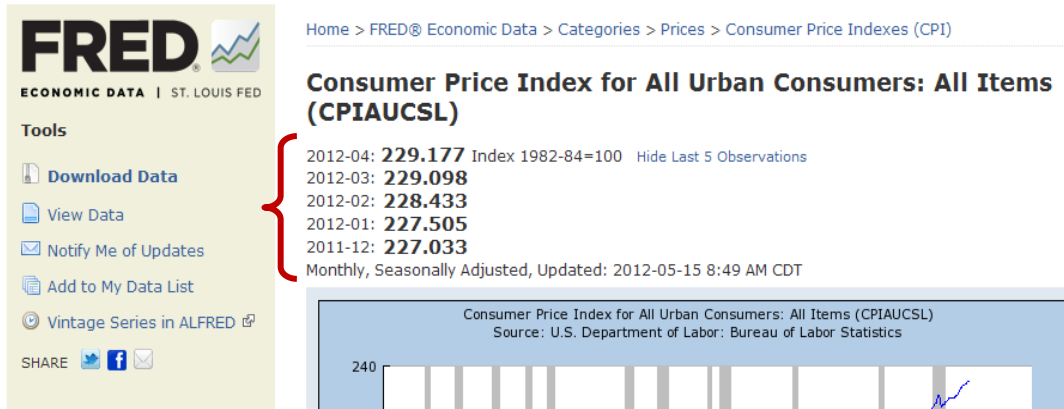
- Choose the **Consumer Price Index for All Urban Consumers: All Items, Seasonally Adjusted (SA)**. It is usually the first item on the list. **Click the Series title** to see the graph.

The screenshot shows the FRED Economic Data interface. On the left, there's a sidebar with the FRED logo and navigation options. The main content area is titled 'Series with Tag' and shows a list of series filtered by the tag 'cpi'. The first series, 'Consumer Price Index for All Urban Consumers: All Items', is highlighted with a red box. Below it, there are two more series with similar titles but different adjustment methods. The interface includes search bars, filters, and sorting options.

- Notice that the data for CPI are an **index**. The number (**on the left axis**) represents a **price level** of a basket of goods purchased at different points in time. To view the data in your browser, choose **View Data** (on the left side, under **Tools**). For the most recent observations, click **Last 5 Observations** link above the graph.

The screenshot shows the FRED Economic Data interface for the 'Consumer Price Index for All Urban Consumers: All Items (CPIAUCSL)'. The 'View Data' button in the left sidebar is circled in red. The main content area displays a line graph of the index from 1947 to 2012. The y-axis is labeled '(Index 1982-84=100)' and is also circled in red. The graph shows a steady upward trend with some volatility, and shaded areas indicate US recessions. The current value is 229.177 as of 2012-04. The interface includes various tools and options for viewing and downloading the data.

6. Then the **last five data observations** will display.

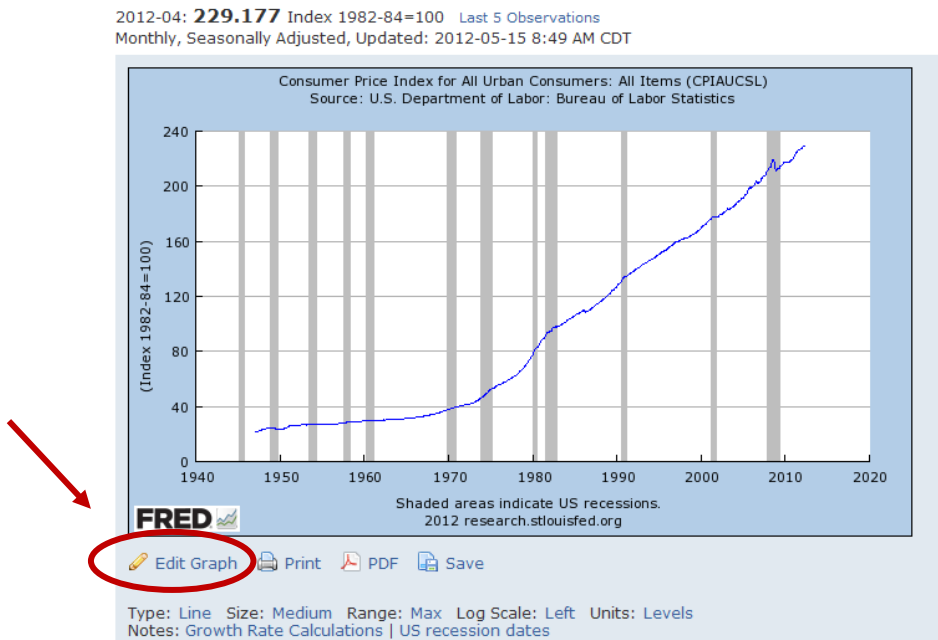


7. Calculate the inflation rate from February 2011 to February 2012. Hints: You'll need to either **View Data** or **Download Data** to see the data. The formula to use is:

$$\text{Inflation rate in year 2} = \frac{\text{CPI in year 2} - \text{CPI in year 1}}{\text{CPI in year 1}} \times 100.$$

8. Next, edit the CPI: All Items graph. After editing the graph, you will add the CPI for energy (CPI: Energy). CPI: Energy is a subset of the entire Consumer Price Index.

- Start with Consumer Price Index for All Urban Consumers (which you just had up).
- Click on the **Edit Graph** link.

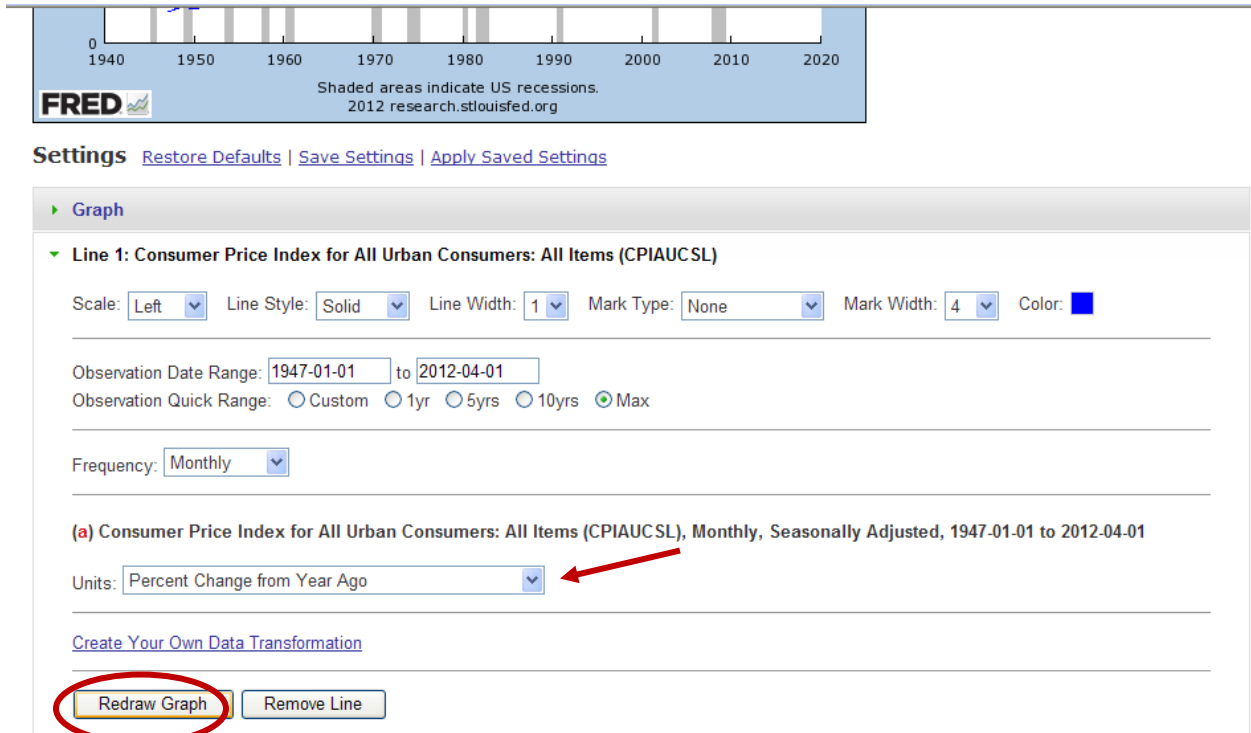


That will bring up a graph to which series can be added, units can be changed, and time period covered can be modified (e.g., 5 years, 1 year).

9. Graph Settings are found below the graph, scroll down to find the units.

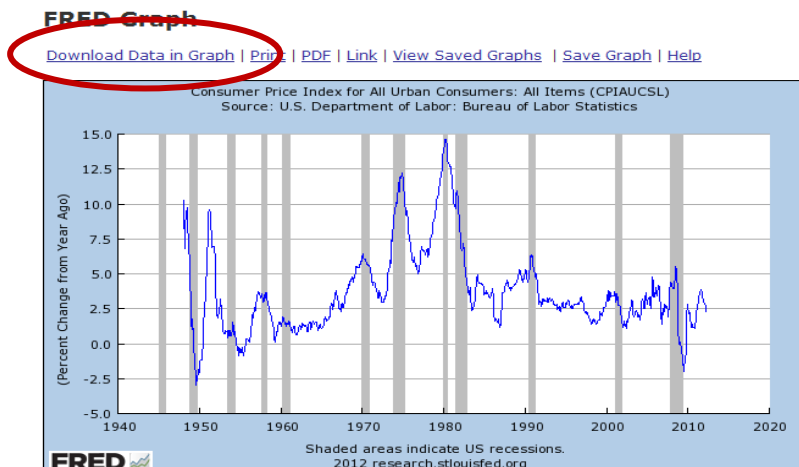
- **Change** the display of the units to **“Percent Change from Year Ago”**
- Click **Redraw Graph**.

This is a common way to describe inflation—the change year over year.



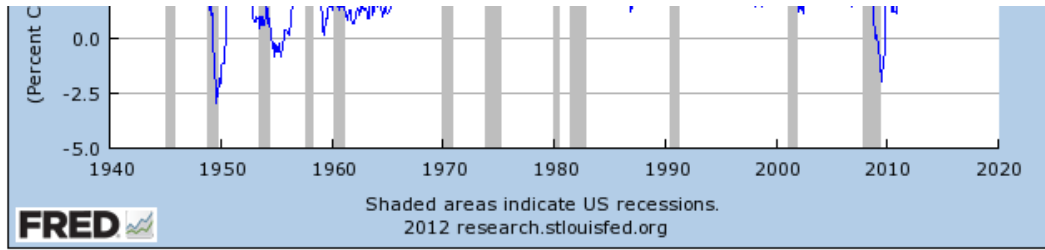
The screenshot shows the FRED website interface. At the top, there is a timeline from 1940 to 2020 with shaded areas indicating US recessions. Below this is the 'Settings' section for the graph. The 'Graph' tab is selected. The series is identified as 'Line 1: Consumer Price Index for All Urban Consumers: All Items (CPIAUCSL)'. The settings for this series are: Scale: Left, Line Style: Solid, Line Width: 1, Mark Type: None, Mark Width: 4, Color: Blue. The Observation Date Range is set to 1947-01-01 to 2012-04-01, with 'Max' selected for the Observation Quick Range. The Frequency is set to Monthly. The title of the graph is '(a) Consumer Price Index for All Urban Consumers: All Items (CPIAUCSL), Monthly, Seasonally Adjusted, 1947-01-01 to 2012-04-01'. The Units are set to 'Percent Change from Year Ago', which is highlighted with a red arrow. Below the settings, there is a link for 'Create Your Own Data Transformation' and two buttons: 'Redraw Graph' (circled in red) and 'Remove Line'.

10. For more detailed information, you can choose to **Download Data in Graph**. What was the rate of inflation (compared with the previous year) in July 2009?



11. Next, scroll down below the graph to the “**Add Data Series**” section.
- Open it and type **CPI energy** in the search box. The search box automatically makes suggestions based on the words entered.
 - For the comparison, **choose Consumer Price Index for All Urban Consumers: Energy (SA)**.

Once you select it, those data will be added to a new line on the graph. Notice that the data are automatically represented in the same manner as Line 1 CPI data (percent change from a year ago).



Settings [Restore Defaults](#) | [Save Settings](#) | [Apply Saved Settings](#)

► **Graph**

► **Line 1: Consumer Price Index for All Urban Consumers: All Items (CPIAUCSL)**

▼ **Add Data Series**

To: New Line Line 1 [What's This?](#)

Search: [Browse](#)

[Notes on arc](#)

MY ACCOUNT:

FOLLOW THE

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TOOLS: FRED

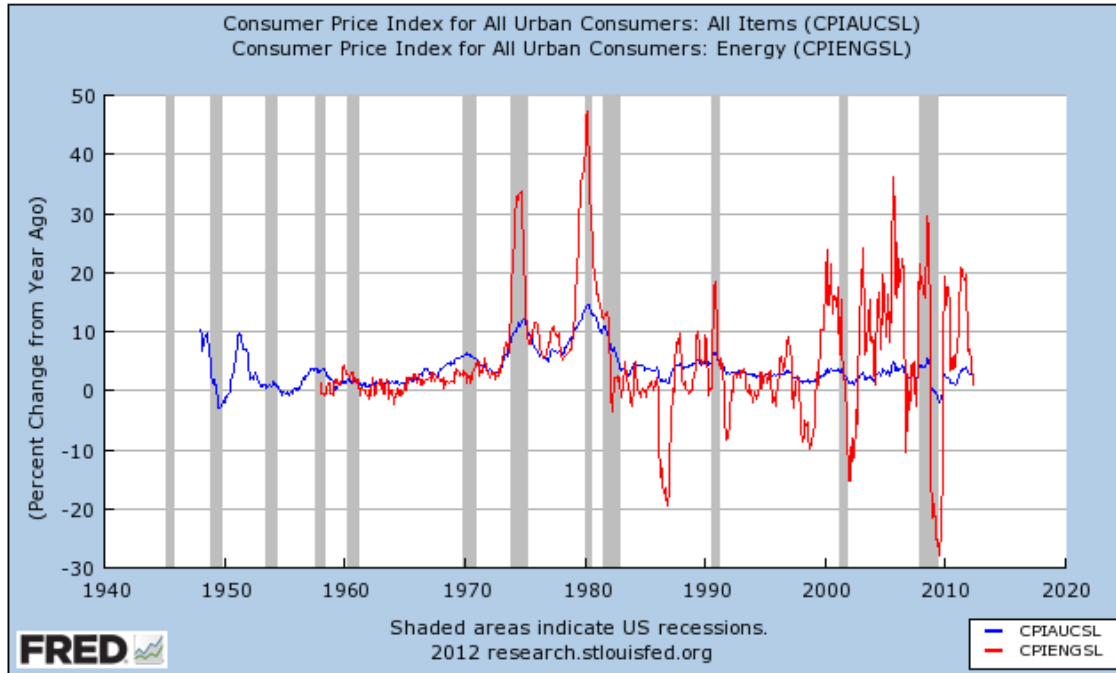
OUR SITES: S

- Consumer Price Index for All Urban Consumers: All Items Less Food & Energy
CPILFESL, M, Index 1982-84=100, SA
- Consumer Price Index for All Urban Consumers: All Items Less Food & Energy
CPILFENS, M, Index 1982-84=100, NSA
- Consumer Price Index for All Urban Consumers: Energy**
CPIENGSL, M, Index 1982-84=100, SA
- Consumer Price Index for All Urban Consumers: Energy
CPIENGNS, M, Index 1982-84=100, NSA
- Chained Consumer Price Index for all Urban Consumers: All items less food and energy
SUUR000SA0L1E, M, Index Dec 1999=100, NSA
- Consumer Price Index for All Urban Consumers: All Items Less Energy
CPILEGSL, M, Index 1982-84=100, SA
- Consumer Price Index for All Urban Consumers: All Items Less Energy
CPILEGNS, M, Index 1982-84=100, NSA

12. The graph now shows the **CPI-U All Items (in blue)** and the **CPI-U Energy (in red)**
Note the legend for the graph is in the lower-right corner.

FRED Graph

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- ▶ Graph
- ▶ Line 1: Consumer Price Index for All Urban Consumers: All Items (CPIAUCSL)
- ▶ Line 2: Consumer Price Index for All Urban Consumers: Energy (CPIENGSL)
- ▶ Add Data Series

13. CPI-U measures that have food and energy removed (the two most volatile parts of CPI) are often referred to as **core** or **underlying inflation**. When a news headline or the FOMC statement refers to a core inflation measure, it typically is referring to CPI-U Less Food and Energy.

Using some of the earlier skills of locating data, locate the seasonally adjusted data for **CPI-U less food and energy**.

The screenshot shows the FRED Economic Data website interface. At the top, there is a navigation bar with the FRED logo, 'ECONOMIC RESEARCH FEDERAL RESERVE BANK OF ST. LOUIS', and links for 'MY ACCOUNT', 'REGISTER', and 'SIGN IN'. A search bar labeled 'Search FRED' is also present. Below the navigation bar, there are links for 'FRED Economic Data', 'Data Tools', 'Publications', 'Working Papers', 'Economists', and 'More'. The main content area is titled 'Series with Tags' and shows a list of search results. On the left side, there is a sidebar with '98 Series with Tags:' and a list of tags including 'core' and 'cpi'. A red arrow points from the 'cpi' tag to the first search result. The first result is 'Consumer Price Index for All Urban Consumers: All Items Less Food & Energy' (CPIUFESL), which is highlighted with a red box. The second result is 'Consumer Price Index for All Urban Consumers: All Items Less Food & Energy' (CPIUFENS), and the third is 'Chained Consumer Price Index for all Urban Consumers: All items less food and energy' (SUUR0000SA0L1E).

Home > FRED® Economic Data > Tags

Series with Tags

Series 1 - 50 1 2 Next >

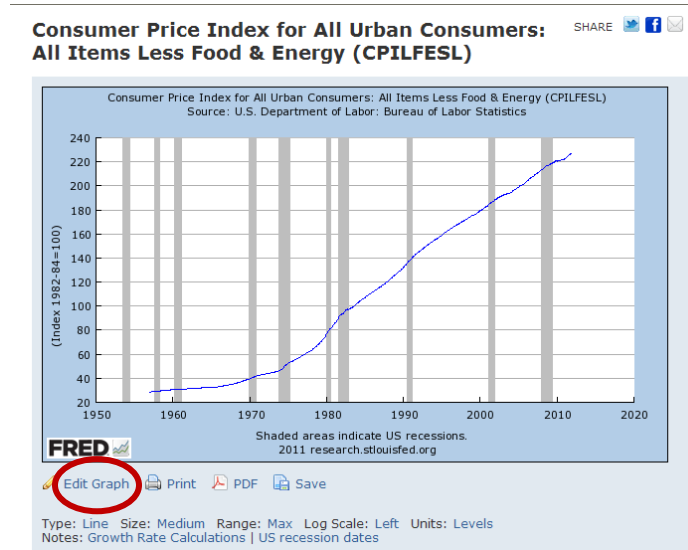
Selected Series: Sort by: Popularity ▾

Consumer Price Index for All Urban Consumers: All Items Less Food & Energy ■■■■■■■■■■
CPIUFESL, 1957-01 to 2012-04, Monthly, Index 1982-84=100, Seasonally Adjusted (1 day ago)
usa nation monthly sa bls consumer cpi urban all items core

Consumer Price Index for All Urban Consumers: All Items Less Food & Energy ■■■■■■■■■■
CPIUFENS, 1957-01 to 2012-04, Monthly, Index 1982-84=100, Not Seasonally Adjusted (1 day ago)
usa nation monthly bls nsa consumer cpi urban all items core

Chained Consumer Price Index for all Urban Consumers: All items less food and energy ■■■■■■■■■■
SUUR0000SA0L1E, 1999-12 to 2012-04, Monthly, Index December 1999=100, Not Seasonally Adjusted (1 day ago)

Now add either CPI-U Food or the CPI-U Energy as a separate line on the graph. The steps are illustrated below.



Settings [Restore Defaults](#) | [Save Settings](#) | [Apply Saved Settings](#)

▶ **Graph**

▶ **Line 1: Consumer Price Index for All Urban Consumers: All Items Less Food & Energy (CPILFESL)**

▼ **Add Data Series**

To: New Line Line 1 [What's This?](#)

Search: [Browse](#)

Notes on arc...

Research

- Consumer Price Index for All Urban Consumers: All Items Less Food & Energy
CPILFESL, M, Index 1982-84=100, SA
- Consumer Price Index for All Urban Consumers: Food
CPIUFDNS, M, Index 1982-84=100, NSA
- Consumer Price Index for All Urban Consumers: All Items Less Food & Energy
CPILFENS, M, Index 1982-84=100, NSA
- Consumer Price Index for All Urban Consumers: Food**
CPIUFDSE, M, Index 1982-84=100, SA
- Consumer Price Index for All Urban Consumers: Food away from home
CUUR000SEFV, M, Index 1982-84=100, NSA
- Consumer Price Index for All Urban Consumers: Food and Beverages
CPIFABSL, M, Index 1982-84=100, SA
- Chained Consumer Price Index for all Urban Consumers: All items less food and energy
SUUR000SA0L1E, M, Index Dec 1999=100, NSA

FRED iPh...

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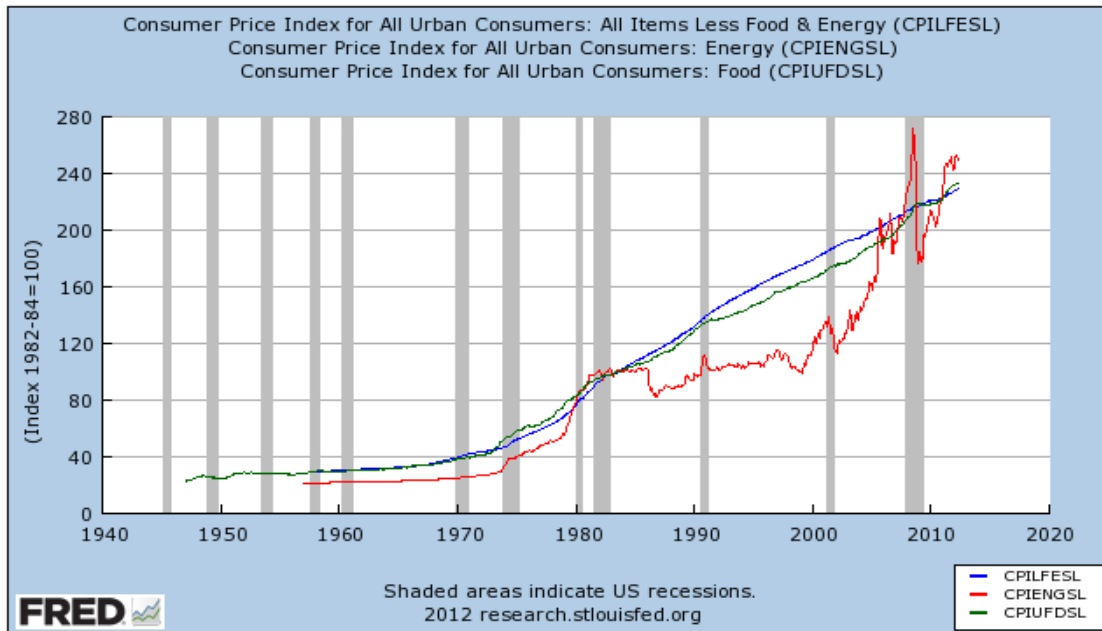
CPI-U: All Items Less Food & Energy is shown in blue

CPI-U: Energy is shown in red

CPI-U: Food is shown in green

FRED Graph

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14. Based on this graph, during the 1990s was the relative rise in the level of energy prices generally higher or lower than the overall price level?

15. Another measure of prices can be found in the data collected for calculating national income. The GDP deflator is the ratio of nominal GDP to real GDP. There are two ways to locate the GDP deflator.

Use the FRED search box and type in **GDP deflator**,

MY ACCOUNT | REGISTER | SIGN IN |

gdp price deflato

- Real Gross Domestic Product, 1 Decimal
- Gross Domestic Product: Implicit Price Deflator**
- Real Potential Gross Domestic Product
- Real Gross Domestic Product
- Real Gross Domestic Product, 3 Decimal
- Real GDP per Capita in the United States
- Real GDP in the United States

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or browse FRED's categories, choosing the **National Accounts** category, then **National Income & Product Accounts**,

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Categories

Money, Banking, & Finance (3,794)

Banking (701) | Business Lending (1,910) | Exchange Rates (98) | Financial Indicators (96) | Foreign Exchange Intervention (21) | Interest Rates (552) | Monetary Data (420) |

National Accounts (704)

Federal Government Debt (18) | Flow of Funds (194) | **National Income & Product Accounts** (241) | U.S. Trade & International Transactions (251) |

and finally **Price Indexes & Deflators**.

Home > FRED® Economic Data > Categories > National Accounts

National Income & Product Accounts

Categories

- Domestic Capital Account (Saving & Investment) (29)
- Foreign Transactions (22)
- GDP/GNP (24)
- Gov't Receipts, Expenditures & Investment (76)
- Personal Income & Outlays (66)
- **Price Indexes & Deflators (9)**
- Private Enterprise Income (15)

16. From this list, choose **Gross Domestic Product: Implicit Price Deflator**. (Note: Another frequently used measure of prices on the list is the Personal Consumption Expenditures: Chain-type Price Index.)

Home > FRED® Economic Data > Categories > National Accounts > National Income & Product Accounts

Price Indexes & Deflators

Series 1 - 9

Selected Series: Sort by:

Gross Domestic Product: Implicit Price Deflator ■■■■■■■■■■
GDPDEF, 1947:Q1 to 2012:Q1, Quarterly, Index 2005=100, Seasonally Adjusted (Apr 27)
usa nation sa quarterly bea gdp implicit price deflator

Personal Consumption Expenditures: Chain-type Price Index ■■■■■■■■■■
PCEPI, 1959-01 to 2012-03, Monthly, Index 2005=100, Seasonally Adjusted (Apr 30)
usa nation monthly sa bea price index consumption expenditures pce chained

Personal Consumption Expenditures: Chain-Type Price Index Less Food and Energy ■■■■■■■■■■
PCEPILFE, 1959-01 to 2012-03, Monthly, Index 2005=100, Seasonally Adjusted (Apr 30)
usa nation monthly sa bea price index consumption expenditures pce chained core

Personal Consumption Expenditures: Chain-type Price Index ■■■■■■■■■■
PCECTPI, 1947:Q1 to 2012:Q1, Quarterly, Index 2005=100, Seasonally Adjusted (Apr 27)
usa nation sa quarterly bea price index consumption expenditures pce chained

17. Now, to add some information to this choice, **change the units** to Percent Change from Year Ago (**% Chg. from Yr. Ago**)

Shaded areas indicate US recessions. 2012 research.stlouisfed.org

[Edit Graph](#)
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Type: Line Size: Medium Range: Max Log Scale: Left Units: Levels
 Notes: Growth Rate Calculations | US recession dates

Source: U.S. Department of Commerce: Bureau of Economic Analysis
Release: Gross Domestic Product
Notes: The number of decimal places reported varies over time. A Guide to the National Income and Product Accounts of the United States (NIPA) - (<http://www.bea.gov/national/pdf/nipaguid.pdf>)

Chg.
 Chg. from Yr. Ago
 % Chg.
Change from Year Ago, Index 2005=100
 % Chg. from 1982=100
 Comp. Annual Rate of Chg.
 Cont. Comp. Rate of Chg.
 Cont. Comp. Annual Rate of Chg.

18. Once you've done that, the options for editing the graph are available. Add the **CPI-U Less Food and Energy** (seasonally adjusted) series.

Gross Domestic Product: Implicit Price Deflator (GDPDEF)
 Source: U.S. Department of Commerce: Bureau of Economic Analysis

(Percent Change from Year Ago)

Shaded areas indicate US recessions. 2012 research.stlouisfed.org

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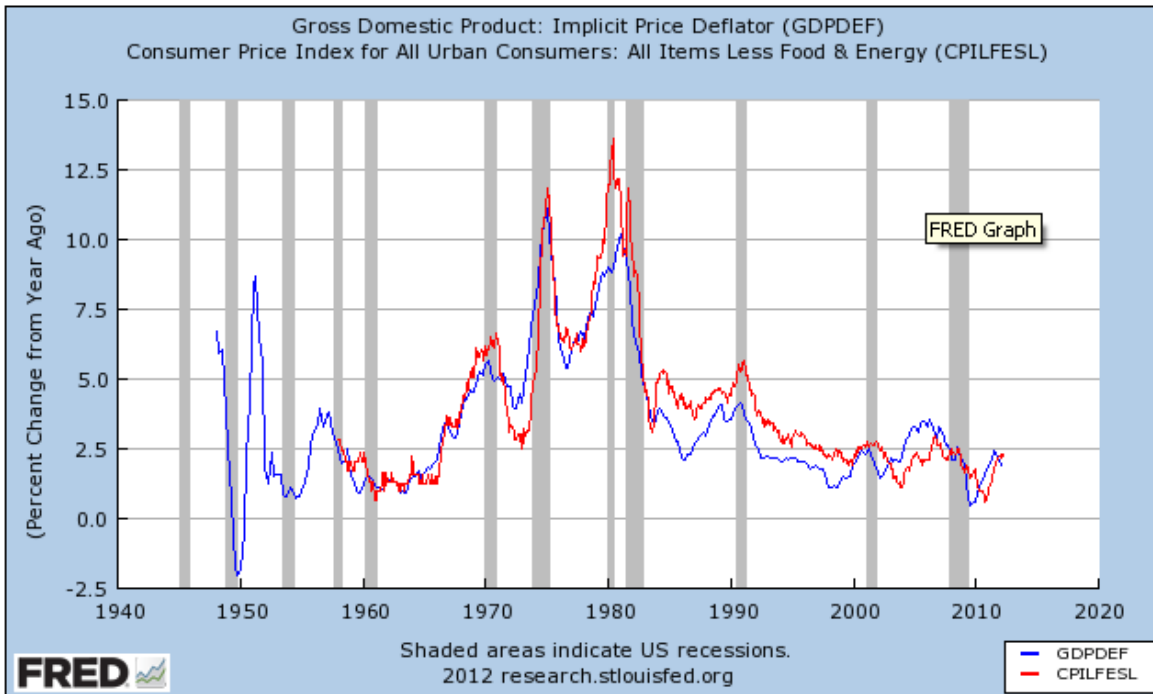
Graph
 Line 1: Gross Domestic Product: Implicit Price Deflator (GDPDEF)

Add Data Series
 Type: New Line Line 1 What's This?
 Search: **cpi less** [Browse](#)
Consumer Price Index for All Urban Consumers: All Items Less Food & Energy
 CPIUFESL, M, Index 1982-84=100, SA
[Notes on arc](#)
 Consumer Price Index for All Urban Consumers: All Items Less Food & Energy
 CPIUFENS, M, Index 1982-84=100, NSA

19. The GDP deflator (blue line in the graph below) reflects the prices of all goods and services produced domestically, while the CPI (red line below) reflects prices of all goods and services bought by consumers.

FRED Graph

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▶ **Graph**

▶ **Line 1: Gross Domestic Product: Implicit Price Deflator (GDPDEF)**

▼ **Line 2: Consumer Price Index for All Urban Consumers: All Items Less Food & Energy (CPILFESL)**

Measuring inflation is crucial to the FOMC's mandate for price stability. And, understanding inflation and how it is measured is key to being an informed citizen. We hope that you have found FRED to be a useful tool in your understanding of inflation and price stability.