

“Making Sense of the Ups and Downs of Prices”

August 2013

An informative and accessible economic essay with a classroom application.

*Includes the full version of the Page One Economics Newsletter,
plus questions for students and an answer key for classroom use.*

Common Core Standards (see page 10)

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PAGE ONE Economics

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NEWSLETTER

August ■ 2013

Making Sense of the Ups and Downs of Prices

Erin A. Yetter, *Economic Education Specialist*

“In spite of the cost of living, it’s still popular.”—Kathleen Norris

How Do You Know the Real Price of Something?

“Back in my day, a gallon of gas cost a quarter!” Has your grandfather ever said something like this to make a point about how expensive things are now? The chart on the next page shows the prices of gasoline over the past 20 years. The price of gasoline indeed used to be much lower. In fact, the price of gasoline has risen from a little over \$1 per gallon in 1992 to a little over \$3.50 per gallon 20 years later.¹ However, this type of data cannot be interpreted casually because the prices do not account for **inflation**—the rise in the general price level—which must be factored in to accurately compare prices over time. This process is often referred to as deflating and involves using commonly agreed-upon measures of inflation, such as the **Consumer Price Index**, to account for inflation.

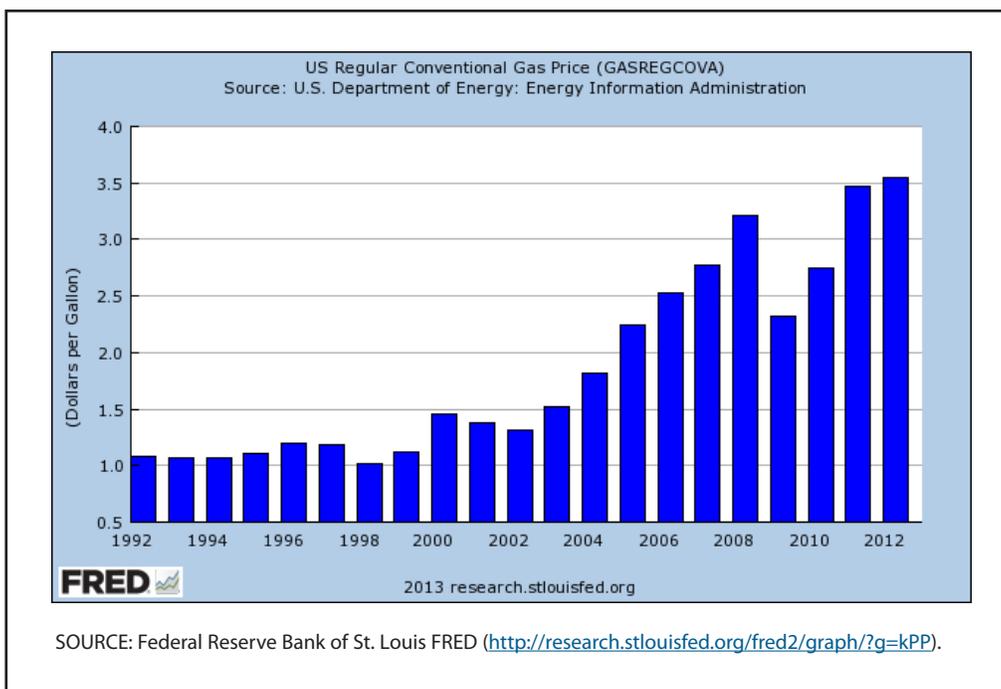
We first take the prices as given (that is, the **nominal** prices) and adjust for inflation, because we need to measure the two prices in constant terms. (A price adjusted for inflation is called the **real** price.) So, what would the real price of a 1992 gallon of gas be if purchased in 2012? The answer is approximately \$1.78²—only about a 99 percent (not 226 percent) increase—but still a pretty dramatic increase. In other words, the price of gas almost doubled from 1992 to 2012 when measured in terms of other goods and services.

This example shows the price increase for just one good, but inflation reflects the increase in the general price level for *all* goods. Occasionally, the general price level can fall but this happens less often. A fall in the general price level over a sustained period, as during the Great Depression in the United States, is known as **deflation**.

Costs of Inflation and Deflation

Unexpected inflation and deflation have consequences and costs. Since inflation occurs more frequently, we discuss its costs first. Inflation is costly for anyone who holds on to a large amount of cash (in a non-interest-bearing account) because cash will not buy as much tomorrow as it will today. In times of high inflation, people have incentives to keep as little cash on hand as possible, which means frequent trips to the bank or automated teller machines (and wearing out your shoes). **Shoe-leather costs** are the term used for these trips.

Second, inflation is costly in terms of **menu costs**, which are the costs incurred by firms when they change the prices of their goods. When prices are stable, firms have little incentive to change prices as long as they are maximizing profits. However, when prices change, as occurs with inflation, firms either have to change prices to keep pace with inflation or operate at prices that do not maximize profits. For example, if a restaurant changes its prices, it incurs the cost of printing new menus with the new prices for meals (hence the origin of the “menu” term).



A third cost of inflation is related to the use of resources in producing goods and services. Consumers decide what goods and services to buy by comparing the prices and quality of various goods and services. Their decisions determine whether steel is allocated, for example, to minivans or sports cars or whether milk is allocated to cheese or ice cream. Inflation causes the prices of some goods to rise more than others. This means when consumers make these price comparisons in times of high and unstable inflation, they are using garbled price information and resources are not allocated to their best use.

Fourth, inflation distorts money’s ability to act as a standard measure of value, which causes inconvenience and/or confusion.³ For example, imagine how confusing it would be if 1 inch this year did not equal exactly 1 inch next year. We expect units of measurement to be constant over time, and inflation erodes money’s ability to maintain a constant value.

Finally, it is worth noting that the above-mentioned costs all occur even if inflation is expected. However, when inflation is *unexpected*, it has an additional cost: the arbitrary redistribution of wealth. Since not all **interest rates** on investments or debt take inflation into account, inflation benefits those who borrow money by lowering the real cost of their debt. In other words, people who borrow money will repay their loans with dollars that are worth less than the ones they borrowed, thus arbitrarily making them wealthier. Conversely, unexpected inflation hurts investors, savers, and lenders by lowering the real return on their assets. For example, lenders will be repaid with dollars that are worth less today than the ones they lent, thus arbitrarily making them less wealthy.

Deflation occurs less often than inflation but also creates economic costs. Some costs, such as menu costs and **relative price** changes, mirror inflation costs. However, deflation is perhaps most costly because it is usually triggered by a weak economy; thus, it arises amid other undesirable economic episodes (e.g., stagnant growth or high unemployment).

Price Stability

When inflation is low and stable, both producers and consumers are better able to plan for the future, keeping economic growth and employment stable as well. Therefore, as one part of its con-

gressional dual mandate, the Federal Reserve System seeks to promote **price stability**. The Fed uses **monetary policy** to promote a low and stable **inflation rate** (around 2 percent) by influencing interest rates and the money supply.⁴ However, it is important to keep in mind that monetary policy affects the average rate of inflation over the long run. People's expectations about prices matter more for inflation over shorter periods.

Conclusion

Comparisons of prices from one period with prices in another period must take inflation into account. Economic costs are associated with both inflation and deflation. Since price instability is costly, it is the Fed's mission to use monetary policy to promote stable prices. ■

NOTES

¹ Actual prices were \$1.09 and \$3.55 per gallon, respectively, for an increase of 226 percent (rounded). This is calculated as follows: $((\$3.55 - \$1.09) / \$1.09) \times 100 = 226\%$ (rounded).

² Source: Bureau of Labor Statistics Consumer Price Index Data—All Urban Consumers: All Items, Annual Average 1992 = 140.3 and 2012 = 229.6 (<ftp://ftp.bls.gov/pub/special.requests/cpi/cpi.ai.txt>). Calculation: $\$1.09 \times (229.6 / 140.3) = \1.78 ; then $((\$3.55 - \$1.78) / \$1.78) \times 100 = 99\%$ (rounded).

³ For a discussion on the functions of money, see "Money and Inflation: A Functional Relationship" in the March 2013 issue of this newsletter (http://research.stlouisfed.org/pageone-economics/pages/newsletter_summary.php?id=76&title=Money+and+Inflation%3A+A+Functional+Relationship).

⁴ It is beyond the scope of this essay to provide an in-depth discussion of monetary policy tools and how they affect interest rates. For a detailed discussion of this process, see our Monetary Policy online course (http://www.stlouisfed.org/education_resources/monetary-policy-online-course/) or Feduction video series on money and inflation (http://www.stlouisfed.org/education_resources/feduction-money-and-inflation/) and monetary policy tools (http://www.stlouisfed.org/education_resources/feduction-traditional-and-non-traditional-monetary-policy-tools/).

GLOSSARY

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.

Deflation: A general, sustained downward movement of prices for goods and services in an economy.

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

Inflation rate: The percent change in price determined by comparing the percentage increase or decrease in the price of goods and services from one time period with prices in another period.

Interest rate: The price of using someone else's money, expressed as a percentage of the amount borrowed.

Menu costs: The costs to a firm incurred as a result of changing prices. The term comes from the cost incurred for printing new menus when a restaurant raises prices.

Monetary policy: Central bank actions involving the use of interest rate or money supply tools to achieve such goals as maximum employment, stable prices, and moderate long-term interest rates.

Nominal: Monetary values, wages, or prices, measured in current prices.

Price stability: A low and stable rate of inflation maintained over an extended period of time.

Real: Monetary values, wages, or prices, adjusted for inflation and measured in constant prices—that is, in prices of a given or base period. Real monetary values are obtained by adjusting nominal wages or prices with a price measure such as the CPI.

Relative price: The cost of a good or service in terms of another good or service.

Shoe-leather costs: The figurative costs of replacing shoes more often because of increased trips to the bank. This would occur during times of inflation when there is a real cost associated with holding currency in non-interest-bearing checking accounts.

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Name _____ Period _____

Federal Reserve Bank of St. Louis *Page One Economics Newsletter*:
"Making Sense of the Ups and Downs of Prices"

After reading the article, answer the following questions.

1. "Bread is so expensive now. In 1942, a loaf of bread cost just 58¢, but today it's \$2.20!" Explain why this statement is misleading.
2. Economic data can be categorized as "real" or "nominal." What is the difference between the two types of data?
3. Explain two of the costs of inflation.
4. Define price stability and explain why it is important.

Teacher's Guide

Federal Reserve Bank of St. Louis *Page One Economics Newsletter*: "Making Sense of the Ups and Downs of Prices"

After reading the article, answer the following questions.

1. "Bread is so expensive now. In 1942, a loaf of bread cost just 58¢, but today it's \$2.20!" Explain why this statement is misleading.

This statement is misleading because the prices of bread from two different periods do not account for inflation—which must be factored in to accurately compare prices over time.

2. Economic data can be categorized as "real" or "nominal." What is the difference between the two types of data?

The real data are deflated (adjusted) to reflect the impact of inflation.

3. Explain two of the costs of inflation.

Multiple answers are possible, including shoe-leather costs, menu costs, the misallocation of goods and services, distortion of money's ability to act as a standard measure of value, and the arbitrary redistribution of wealth.

4. Define price stability and explain why it is important.

Price stability refers to inflation that is low and stable. When this occurs, both producers and consumers are better able to plan for the future, keeping economic growth and employment stable as well.

For Further Discussion

Use the following examples to lead a classroom discussion on how to calculate the consumer price index and what it is used for.

Calculating the CPI

The consumer price index (CPI) is one way to measure the price level, but how are those prices calculated? The CPI is computed by the Bureau of Labor Statistics (BLS) based on a representative market basket of goods—in other words, what a typical person might buy. For example, goods and services such as milk, bread, gas, and haircuts would be included in the calculation. In theory, computing the CPI is a simple process and involves only four steps. Each of these steps is shown below with mathematical examples.

Step 1. Define a fixed (meaning it won't change from one time period to the next) market basket of goods a typical person spends his or her money on. The BLS does this by surveying people. For ease of discussion, let's pretend a person buys only two goods each year: hot dogs and hamburgers. Specifically, they buy four hot dogs and two hamburgers:

Market basket = 4 hot dogs and 2 hamburgers.

Step 2. Find the prices of the items in the basket. Let P_{hd} be the price of hot dogs each year and P_{ham} be the price of hamburgers. Then the prices for the past three years are as follows:

Year	P_{hd}	P_{ham}
2011	\$1	\$2
2012	\$2	\$3
2013	\$3	\$4

Step 3. Compute the market basket's cost (MBC). The MBC is found by multiplying the quantity (Q) of each item by its price (P) and then adding them: $(Q_{hd} \times P_{hd}) + (Q_{ham} \times P_{ham}) = \text{MBC}$.

Year	$(Q_{hd} \times P_{hd}) + (Q_{ham} \times P_{ham}) = \text{MBC}$
2011	$(4 \times \$1) + (2 \times \$2) = \$8$
2012	$(4 \times \$2) + (2 \times \$3) = \$14$
2013	$(4 \times \$3) + (2 \times \$4) = \$20$

Step 4. Choose a base year and calculate the CPI based on each year's MBC. A base year is a benchmark by which other years are compared. The CPI in the base year will always equal 100. Let's select 2011 as our base year. The calculation for the CPI is as follows: $(\text{MB}_{\text{current year}} \div \text{MBC}_{\text{base year}}) \times 100 = \text{CPI}$.

Year	$(\text{MB}_{\text{current year}} \div \text{MBC}_{\text{base year}}) \times 100 = \text{CPI}$
2011	$(\$8 \div \$8) \times 100 = 100$
2012	$(\$14 \div \$8) \times 100 = 175$
2013	$(\$20 \div \$8) \times 100 = 250$

Now that we know how the CPI is calculated, what's the point in calculating it? Tracking overall price levels for the economy allows us to (i) calculate the inflation rate and (ii) compare dollar figures in one time period with dollar figures in another period. Let's look at examples of how each is done.

Calculating the Inflation Rate

Recall that the inflation rate is the percent change in price level determined by comparing the percentage increase (or decrease) in the price level of goods and services from one time period with prices in another period. Thus, the calculation is just a simple percentage change (Δ) using the CPI:

$$\% \Delta \text{ in price level} = [(CPI_{\text{later year}} - CPI_{\text{earlier year}}) \div CPI_{\text{earlier year}}] \times 100.$$

Using the CPI computed in Step 4 above, let's calculate the inflation rate from 2011 to 2012:

$$\% \Delta \text{ in the price level} = [(175 - 100) \div 100] \times 100 = 75\%.$$

This means prices rose 75 percent from 2011 to 2012. If that number seems high, that's because it is! Remember, to simplify things we computed the CPI based on a market basket of only two goods when in reality the market basket consists of thousands of goods. The actual inflation rate from 2011 to 2012 was only 2.1 percent.¹

Calculating Dollar Figures

In 1962, when John F. Kennedy was president of the United States, he earned an annual salary of \$100,000. Today, President Barack Obama earns an annual salary of \$400,000. In nominal terms, President Obama clearly earns more, but as you have learned from reading the essay, casual interpretations are misleading. To compare the salaries, we must adjust for the effects of inflation and convert President Kennedy's salary into current-year dollars. Let's use 2012 as the current year and the actual CPI, as computed by the BLS, from 1962 (30.2) and 2012 (229.6).² The calculation is shown below:

$$\text{Amount}_{\text{later-year dollars}} = \text{Amount}_{\text{earlier-year dollars}} \times (CPI_{\text{later year}} \div CPI_{\text{earlier year}}).$$

President Kennedy's 1962 salary in 2012 dollars = \$100,000 \times (229.6 \div 30.2) = \$760,264.90.

Now that both figures are in current-year (2012) dollars, President Kennedy's salary was clearly much higher.

Notes

¹ Source: Bureau of Labor Statistics Consumer Price Index Data—All Urban Consumers: All Items, Percentage Change Avg—Avg 2011 to 2012 = 2.1 (<ftp://ftp.bls.gov/pub/special.requests/cpi/cpiiai.txt>).

² Source for the 1962 and 2012 average annual CPI figures: Bureau of Labor Statistics Consumer Price Index Data—All Urban Consumers: All Items, Annual Average (<ftp://ftp.bls.gov/pub/special.requests/cpi/cpiiai.txt>).

Extension Activity Handout

Name _____ Period _____

What was the top-grossing movie of all time? Use the data below to rank the movies in order from highest to lowest domestic total sales in 2012 dollars.

$$\text{Amount}_{\text{earlier-year dollars}} \times (\text{CPI}_{\text{later year}} \div \text{CPI}_{\text{earlier year}})$$

Movie	Year Released	Domestic Total Gross Revenue (millions of year-released \$)	CPI (year released)
Avatar	2009	750	214.5
Gone With the Wind	1939	190	13.9
Star Wars	1977	307	60.6
The Dark Knight Rises	2012	448	229.6
The Sound of Music	1965	159	31.5
Titanic	1997	601	160.5

SOURCE: Box Office Mojo; <http://www.boxofficemojo.com/alltime/>.

Extension Activity: Teacher's Answer Key

Calculations:

Movie	Amount _{earlier-year dollars} × (CPI _{later year} ÷ CPI _{earlier year})
Avatar	$750 \times (229.6 \div 214.5) = 803$
Gone With the Wind	$190 \times (229.6 \div 13.9) = 3,138$
Star Wars	$307 \times (229.6 \div 60.6) = 1,163$
The Dark Knight Rises	Already in 2012\$ = 448
The Sound of Music	$159 \times (229.6 \div 31.5) = 1,159$
Titanic	$601 \times (229.6 \div 160.5) = 860$

Answers:

Movie	Domestic Total Gross Revenue (millions of 2012 \$)
Gone With the Wind	3,138
Star Wars	1,163
The Sound of Music	1,159
Titanic	860
Avatar	803
The Dark Knight Rises	448

Common Core State Standards

Grades 6-12 Literacy in History/Social Studies and Technical Subjects

- **Key Ideas and Details**

RH.11-12.1: Cite specific textual evidence to support analysis of primary and secondary sources, connecting insights gained from specific details to an understanding of the text as a whole.

RH.11-12.2: Determine the central ideas or information of a primary or secondary source; provide an accurate summary that makes clear the relationships among the key details and ideas.

- **Craft and Structure**

RH.11-12.4: Determine the meaning of words and phrases as they are used in a text, including analyzing how an author uses and refines the meaning of a key term over the course of a text (e.g., how Madison defines *faction* in *Federalist* No. 10).