

# Ch. 16: Inflation and the Price Level

By the end of this chapter, you will be able to:

- **Construct a CPI and calculate the inflation rate (covered in pre-class video).**
- **Name some examples of hyperinflation.**
- **Adjust nominal quantities for the effects of inflation.**
- **List some biases in the official measure of inflation.**
- **Distinguish real and nominal interest rates.**

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## The Consumer Price Index (CPI)

- It is a way to measure the price level and to calculate the rate of inflation.
- It is also a useful gauge of the **cost of living**.

## Calculating the CPI for a simple example

Suppose the typical household has the following monthly purchases

Item	Quantity	Price per unit in 2010	Cost in 2010
Hamburgers	60	\$ 5	
T-shirts	4	\$ 15	
<b>Total</b>			

Now let's see the prices they have to pay in 2014 for the same basket of goods.

Item	Quantity	Price per unit in 2014	Cost in 2014
Hamburgers	60		
T-shirts	4		
<b>Total</b>			

Let's make 2010 the base year. Then we calculate the CPI in 2014 as follows:

## Note the following difference

When calculating **real GDP**,

- we use prices as weights, **hold prices fixed**, and compare quantities across different years.

When calculating the **CPI**,

- we use quantities as weights ("the market basket"), **hold quantities fixed**, and compare prices across different years.

# Question

Suppose that no prices changed between 2010 and 2014, but that our typical family in the previous example bought 20% more hamburgers and 20% more t-shirts. How would that affect the CPI in 2014?

# How the CPI is Constructed in Practice

- The Bureau of Labor Statistics (BLS) collects detailed expenditure information by surveying households.

It uses this information to construct the weight of each good in the basket. Current weights are based on the surveys in 2009 and 2010.

BLS checks prices of 80,000 goods and services each month in thousands of stores.



## How Do We Use the CPI to Calculate the Rate of Inflation?

The rate of inflation is just the **percent change in the price level**.

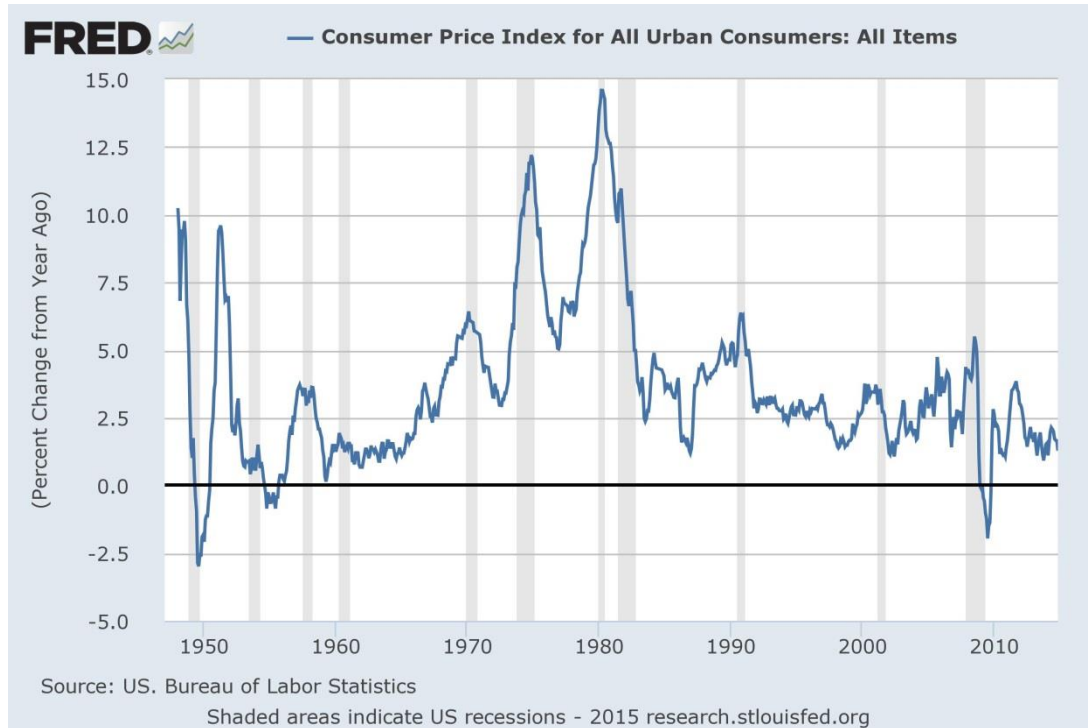
Year	CPI
2011	224.9
2012	229.6

## Some Inflation Relationships and Terminology

If inflation  $> 0$ , then the price level is **rising**.

If inflation  $< 0$ , then the price level is **falling**.

# Question



1. Name a time period when the U.S. experienced deflation.
2. During what period were prices rising the fastest?
3. Name a time period when the U.S. experienced disinflation.


# Summary

## The Consumer Price Index (CPI)

- Is a measure of the general price level.
- Calculates the cost of a market basket of goods relative to some base year.
- Is constructed by the BLS.
- Is used to calculate inflation (using the percent change in the index).

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## Highest Monthly Inflation Rates in History

<b>Country</b>	<b>Month with highest inflation rate</b>	<b>Highest monthly inflation rate</b>	<b>Equivalent daily inflation rate</b>	<b>Time required for prices to double</b>
Hungary	July 1946	$1.30 \times 10^{16}\%$	195%	15.6 hours
Zimbabwe	Mid-November 2008 (latest measurable)	79,600,000,000%	98.0%	24.7 hours
Yugoslavia	January 1994	313,000,000%	64.6%	1.4 days
Germany	October 1923	29,500%	20.9%	3.7 days

Source: Prof. Steve H. Hanke, February 5, 2009.



# Life in Zimbabwe's hyperinflation



52 us\$

The Victoria Falls Hotel  
Jungle Junction  
VAT# 10010273  
Tel:(+263 13) 44203, 44751  
Reservations@tvfh.zimsun.co.zw

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2 Castle  
@ Z\$95,6 Z\$191,270,000.00  
1 Min Water Z\$95,635,000.00  
1 Dinner B Z\$956,350,000.00

Food      Z\$956,350,000.00  
Beverage Z\$286,905,000.00  
Z\$1,243,255,000.00  
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Gratuity.....





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## Adjusting for inflation

Example : starting salaries for econ assistant profs

Have **real** starting salaries for econ profs increased?

To compare, we need to put both salaries in same dollar terms.

Let's put 1987 salary in 2014 \$.

The official CPI base year is the average of 1982-84.

CPI in 1987:  $113.6 = 1987\$/1982-84\%$

CPI in 2014:  $238.3 = 2014\$/1982-84\%$

To convert, take the ratio of the two CPIs:

# Question

The following table shows the average hourly wage in manufacturing and the CPI in 2 years.

<b>Year</b>	<b>Nominal hourly wage</b>	<b>CPI</b>
1970		38.8
2014	\$19.60	238

The real wage in 2014 was equal to what it was in 1970.

What was the nominal hourly wage in 1970?

## Converting multi-year changes to average annual rates

Year	CPI
1987	113.6
2014	238.0

Prices rose 110% over this 27 year period. What was the average **annual rate** of inflation during that 26 year period?




You don't want to just divide 110 by 27 because it doesn't take into account **compounding**.

Recall on the first day that we discussed compounding.

Compounding: Let  $\pi_t =$  % change in the CPI between  $t-1$  and  $t$ .

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## Does the CPI Measure "True" Inflation

This is a really important issue because significant amounts of government spending are linked to the CPI (e.g. Social Security cost of living increases)





Biases:

1. Quality adjustment bias
2. Commodity substitution bias



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## Inflation and Interest Rates

The interest rates reported by the newspaper are what we call **nominal interest rates**.

We will now demonstrate the relationship between nominal interest rates and inflation.

To do this, we need the concept of **real interest rates**.

We will show that:

Current rate on 10 year Treasury Bond: 2.1% per year.

In Sept. 1981, it was 15.3%. Why so much higher?

Part of the reason is **inflation**. Inflation is currently running around 1.3 %. In 1981, it was around 15%.

When someone lends you money, they care about the purchasing power of what they get back.

Think about Zimbabwe. Suppose you lend someone a 100 billion and charge just 10% interest. With their hyperinflation, \$110 billion in one year will be worth little in terms of the goods it can buy.

Suppose you lend someone 100 bags of seed corn and they pay back 105 bags one year later.

The **real return** (or **real interest rate**) is:

Suppose we wanted to write the contract in \$ but wanted to maintain a real return

Price of seed corn:	2014	\$1 per bag
	2015	\$1.03 (expected)

So, \$ value of loan =

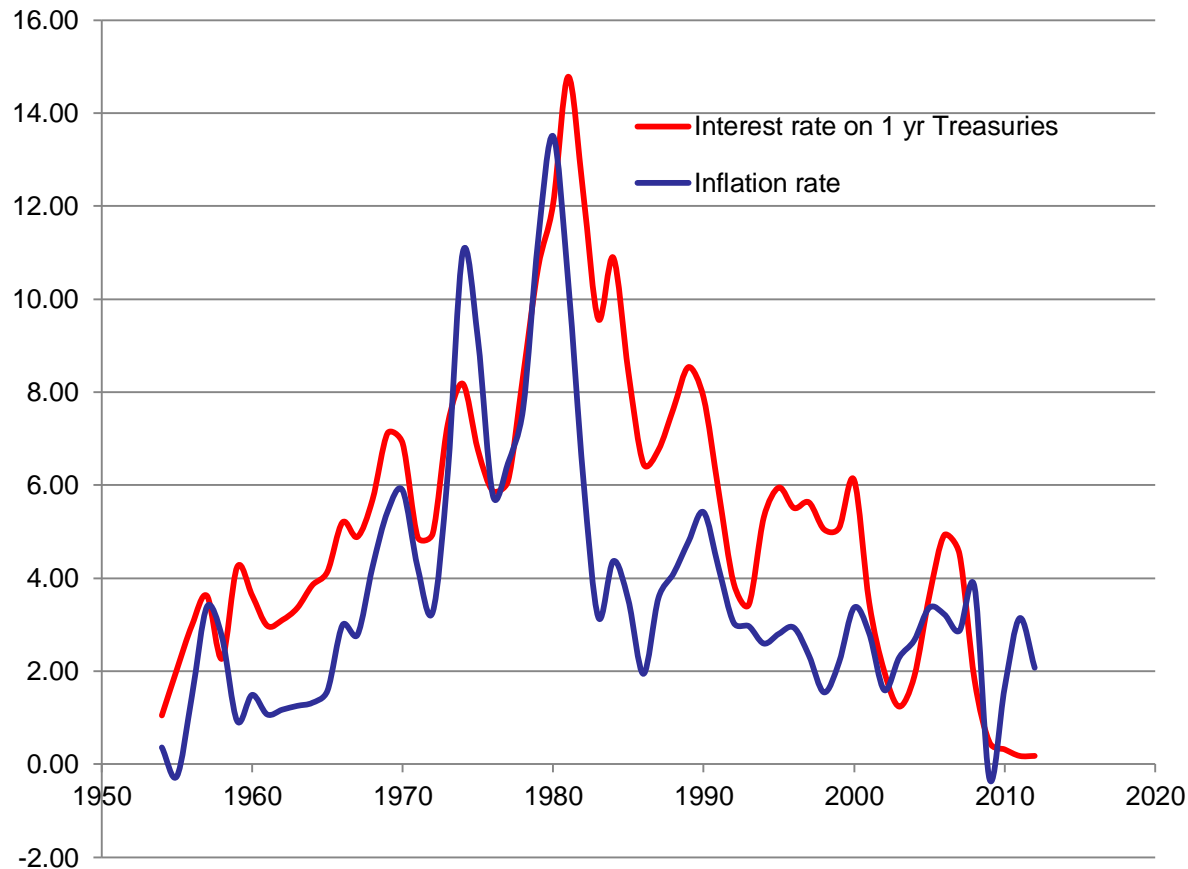
\$ value of payback =

Return in \$ =

Return in current \$ is the **nominal interest rate**.

# The Fisher Effect

Irving Fisher noted that nominal interest rates tend to be higher when inflation is higher.







# Question

Suppose the CPI is 100 this year and is expected to be 120 two years from now. I am making a two-year loan to you and I want to earn a 6% annual real rate of interest.

What annual nominal interest rate should I charge you?

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