

Inflation and Unemployment

Topic 7

Learning Objectives

- Revisit the concept of the GDP deflator.
- Revisit the concept of the consumer price index.
- Learn how to derive the rate of inflation from both the GDP deflator and the consumer price index.
- Learn how the Fed's monetary policy helps stabilize price levels of the economy.
- Define the concept of unemployment and calculate the unemployment rate.
- Identify the causes of unemployment.

Revision

- Gross Domestic Product
 - The total value of all goods and services produced domestically within a certain time period.
- Nominal vs. Real GDP
 - Nominal GDP uses current prices.
 - Real GDP uses the prices of a base year and therefore controls for inflation.
- Price Level

Revision: Change in Price Level

GDP Deflator

$$GDP\ Deflator = \frac{NGDP}{RGDP} \times 100$$

- Calculating the price level using the formula of the GDP Deflator means to hold the prices of the base year fixed.

- $$GDP\ Deflator = \frac{(Q_{A_t} \times P_{A_t}) + (Q_{B_t} \times P_{B_t}) + \dots + (Q_{n_t} \times P_{n_t})}{(Q_{A_t} \times P_{A_b}) + (Q_{B_t} \times P_{B_b}) + \dots + (Q_{n_t} \times P_{n_b})} \times 100$$

CPI

$$CPI = \frac{Cost\ of\ Basket_t}{Cost\ of\ Basket_b} \times 100$$

- Calculating the price level using the formula of the CPI means to hold the quantities of the base year fixed.

- $$CPI = \frac{(Q_{A_b} \times P_{A_t}) + (Q_{B_b} \times P_{B_t}) + \dots + (Q_{n_b} \times P_{n_t})}{(Q_{A_b} \times P_{A_b}) + (Q_{B_b} \times P_{B_b}) + \dots + (Q_{n_b} \times P_{n_b})} \times 100$$

GDP Deflator and Inflation Rate

- GDP Deflator

- measure of the price level

- $GDP\ Deflator = \frac{NGDP}{RGDP} \times 100$

- Inflation Rate

- The percentage increase in the overall level of prices.

- $Inflation\ Rate = \frac{GDP\ Deflator_t - GDP\ Deflator_{t-1}}{GDP\ Deflator_{t-1}} \times 100$

GDP Deflator and Inflation Rate – Ctd.

- Compute GDP Deflator from nominal and real GDP.

$$- \text{GDP Deflator} = \frac{NGDP}{RGDP} \times 100$$

- Use the GDP deflator to compute the inflation rate from 2017 to 2018 and from 2018 to 2019.

$$- \text{Inflation Rate} = \frac{GDP\ Deflator_t - GDP\ Deflator_{t-1}}{GDP\ Deflator_{t-1}} \times 100$$

Year	NGDP	RGDP	GDP Deflator	Inflation rate
2017	46,200	46,200		
2018	51,400	50,000		
2019	58,300	52,000		

GDP Deflator and Inflation Rate – Ctd.

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Year	NGDP	RGDP	GDP Deflator	Inflation rate
2017	46,200	46,200	100.0	n.a
2018	51,400	50,000	102.8	2.8%
2019	58,300	52,000	112.1	9.1%

CPI and Inflation Rate

- CPI

- measure of the price level

- $$CPI = \frac{\text{Cost of Basket}_t}{\text{Cost of Basket}_b} \times 100$$

- Compute the cost of the basket:

- 20 pizzas

- 10 coca colas

Year	P _{Pizza}	P _{Coca Cola}	Cost of Basket _t
2017	\$10	\$15	
2018	\$11	\$15	
2019	\$12	\$16	
2020	\$13	\$15	

CPI and Inflation Rate – Ctd.

- CPI

- measure of the price level

- $CPI = \frac{Cost\ of\ Basket_t}{Cost\ of\ Basket_b} \times 100$

- Compute the cost of the basket:

- 20 pizzas

- 10 coca colas

Year	P _{Pizza}	P _{Coca Cola}	Cost of Basket _t
2017	\$10	\$15	\$350
2018	\$11	\$15	\$370
2019	\$12	\$16	\$400
2020	\$13	\$15	\$410

CPI and Inflation Rate – Ctd.

- Compute the CPI.

$$- \text{CPI} = \frac{\text{Cost of Basket}_t}{\text{Cost of Basket}_b} \times 100$$

- Use the CPI to compute the inflation rate from 2017 to 2018 and from 2018 to 2019.

$$- \text{Inflation Rate} = \frac{\text{CPI}_t - \text{CPI}_{t-1}}{\text{CPI}_{t-1}} \times 100$$

Year	Cost of Basket _t	CPI	Inflation Rate
2017	\$350		
2018	\$370		
2019	\$400		
2020	\$410		

CPI and Inflation Rate – Ctd.

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Year	Cost of Basket _t	CPI	Inflation Rate
2017	\$350	100.0	n.a.
2018	\$370	105.7	5.7%
2019	\$400	114.3	8.1%
2020	\$410	117.1	2.5%

Why the CPI may Overstate Inflation

The CPI uses fixed quantities.

- Substitution bias:
 - Thus, it cannot reflect consumers' substituting towards those goods whose relative prices have fallen.
- Introduction of new goods:
 - Thus, it cannot reflect the increase in the real value of the currency due to the introduction of new goods (which makes consumers better off).
- Unmeasured changes in quality:
 - Quality improvements increase the value of the currency but are not reflected in the CPI.

CPI vs. GDP Deflator

	CPI	GDP Deflator
Prices of capital goods	no	If produced domestically
Prices of imported consumer goods	yes	no
The basket of goods	fixed	Changes yearly

Money and Inflation

- Money
 - An asset, which is socially and legally accepted as a medium of exchange.
 - A store of value.
 - A unit of account
- Money Supply
 - The amount of money in circulation.

The Equation of Exchange

- The equation of exchange, or Cambridge Equation, describes the relationship between the money supply and the price level.

$$M \times V = Y \times P$$

- Where
 - M = Nominal Money Supply
 - V = Velocity of Money (how often money changes hands)
 - Y = Real Production (the amount of apples and pears produced)
 - P = Price Level

The Fed, Policy Decisions, and Inflation

- Assume the year 1750:
 - Velocity is constant; assume $V=1$.
 - The money supply is $M=100$ bills.
 - Also assume that the real domestic product is constant, let's say $Y=100$ apples.
 - What is the price level?
- Now, assume the year 1751:
 - Velocity is still constant at $V=1$
 - Apple production is still $Y=100$
 - but due to mercantilist policies the money supply increased to $M=110$.
 - What is the new price level?

The Fed, Policy Decisions, and Inflation – Ctd.

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- Now, assume the year 1751:
 - Velocity is still constant at $V=1$
 - Apple production is still $Y=100$
 - but due to mercantilist policies the money supply increased to $M=110$.
 - What is the new price level?

- From $M \times V = Y \times P$

- get $P = \frac{M \times V}{Y}$

Thus,

- $P_{1750} = \frac{M \times V}{Y} = \frac{100 \times 1}{100} = 1$

- $P_{1751} = \frac{M \times V}{Y} = \frac{110 \times 1}{100} = 1.1$

The Fed, Policy Decisions, and Inflation – Ctd.

- Assume the year 1928:
 - Velocity is constant; assume $V=1$.
 - The money supply is $M=100$ bills.
 - Also assume that the real domestic product is constant, let's say $Y=100$ apples.
 - What is the price level?
- Now, assume the year 1929:
 - Velocity is still constant at $V=1$
 - Apple production went up to $Y=125$
 - but the central bank could only get 10 additional Gold nuggets to increase the money supply to $M=110$.
 - What is the new price level?

The Fed, Policy Decisions, and Inflation – Ctd.

- Assume the year 1928:
 - Velocity is constant; assume $V=1$.
 - The money supply is $M=100$ bills.
 - Also assume that the real domestic product is constant, let's say $Y=100$ apples.
 - What is the price level?
- Now, assume the year 1929:
 - Velocity is still constant at $V=1$
 - Apple production went up to $Y=125$
 - but the central bank could only get 10 additional Gold nuggets to increase the money supply to $M=110$.
 - What is the new price level?

- From $M \times V = Y \times P$
- get $P = \frac{M \times V}{Y}$

Thus,

- $P_{1928} = \frac{M \times V}{Y} = \frac{100 \times 1}{100} = 1$
- $P_{1929} = \frac{M \times V}{Y} = \frac{110 \times 1}{125} = 0.88$

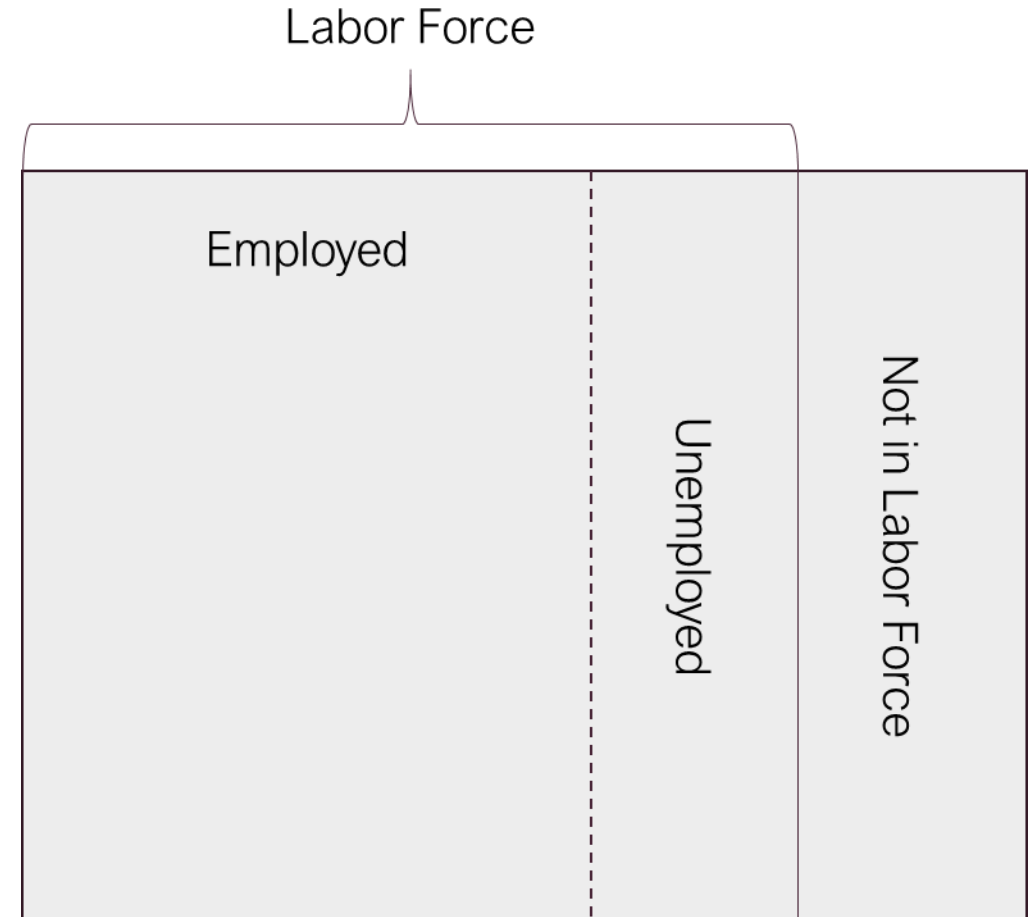
The Fed, Policy Decisions, and Inflation – Ctd.

- Thus, when the money supply grows faster than the real economy, prices rise. This is called inflation.
- Similarly, when the real economy grows faster than the money supply, prices fall. This is called deflation.
- Throughout history, we have observed financial crises due to extreme changes in the price level.
- In order to ensure price stability, **the Federal Reserve** (“the Fed”) was established, using **monetary policy** as their tool of choice.
- As illustrated in the prior examples, changes in the price level can be alleviated through **controlling the money supply**.

Unemployment

Categories of the Population

- Employed
 - Working at a paid job
- Unemployed
 - Not employed but looking for a job
- Labor Force
 - The amount of labor available for producing goods and services
- Not in Labor Force
 - Not employed, not looking for work



Unemployment – Ctd.

- Labor Force
 - Employed + unemployed
- Labor Force Participation Rate
 - The fraction of the adult population that participates in the labor force
 - $LFPR = \frac{\text{Labor Force}}{\text{Population}} \times 100$
- Unemployment Rate
 - Percentage of the labor force that is unemployed
 - $UER = \frac{\text{Unemployment}}{\text{Labor Force}} \times 100$

Computing Labor Statistics

U.S adult population by group:

- Number employed
 - 147.4 million
- Number unemployed
 - 8.7 million
- Adult Population
 - 249.0 million

Calculate:

- The labor force
- The unemployment rate
- The labor force participation rate

Computing Labor Statistics – Ctd.

U.S adult population by group:

- Number employed
 - 147.4 million
- Number unemployed
 - 8.7 million
- Adult Population
 - 249.0 million

- The labor force
 - Employed + unemployed
 - 147.4 million + 8.7 million = 156.1 million

- The unemployment rate
 - $\frac{\textit{Unemployment}}{\textit{Labor Force}} \times 100$
 - $\frac{8.7 \textit{ million}}{156.1 \textit{ million}} \times 100 = 5.5\%$

- The labor force participation rate
 - $\frac{\textit{Labor Force}}{\textit{Population}} \times 100$
 - $\frac{156.1 \textit{ million}}{249.0 \textit{ million}} \times 100 = 62.7\%$

Causes of Unemployment

- Frictional Unemployment
 - Caused by the time it takes to search for a job.
- Structural Unemployment
 - Caused by structural factors like inflation, deflation, high wages, taxes, and regulations
- Cyclical Unemployment
 - Caused by seasonal factors and general business cycles

The Natural Rate of Unemployment

- The average rate of unemployment around which the economy fluctuates.
- In a recession, the actual unemployment rate rises above the natural rate.
- In a boom, the actual unemployment rate falls below the natural rate.

Summary

- Inflation and unemployment are important macroeconomic concepts that macroeconomic policy tries to target.
- Inflation is defined as an overall increase in the level of prices.
- The inflation rate measures the annual percentage increase in the general price level of goods and services.
- There are two ways to describe the price level:
 - GDP Deflator
 - CPI
- The inflation rate can be calculated based on both the GDP Deflator and the CPI.
- The unemployment rate is defined as the percentage of the labor force that is unemployed, and it is important to understand their underlying concepts.