

# THE PRICE LEVEL AND INFLATION

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# Introduction

- *Inflation is defined as the growth of overall prices in an economy over time.*
- Given this definition, it is easy to see that inflation is a natural economic phenomenon.
- You have certainly witnessed the rise of the prices of many goods you consume throughout your life.
- Here are a few examples:

# Introduction (2)

Item	Price in 1962	Price in 2011
Hamburger	0.20	0.99
Wrigley's doublemint chewing gum	0.05	0.35
Movie ticket	0.75	7.00
Upenn tuition	1,250	42,098
Gallon of regular gas	0.31	3.73
Average cost of a new car	2,600	32,000
Vespa scooter	319.95	5,999
Pound of bacons	0.79	4.77
Average cost of a house	12,700	150,000 – 250,000

# Introduction (3)

- There is always at least some level of inflation in the economy at every point in time.
- There is no need to worry about it so long as it is within a certain range.
- The long run inflation average in the USA is 4%, so policymakers do their best to keep it around 4%
- Of course, when inflation is very high, this is a sign of a malfunctioning economy and consumers suffer from it.

# Introduction (4)

- Germany experienced a period of severe inflation – also known as hyperinflation – in the years 1922-1923.
- The exchange rate of the Deutschmark (the German currency before they adopted the Euro) went from DM 4.2 to 4.2 trillion marks to \$1 by November 2013.
- Prices were rises so fast that waiters in Restaurants had to climb on tables to announce new menu prices.
- Banknotes became so useless than workers had to collect their daily wages with wheelbarrows and bundles were given to children to play with (because the bundles of marks had less value than a toy!)

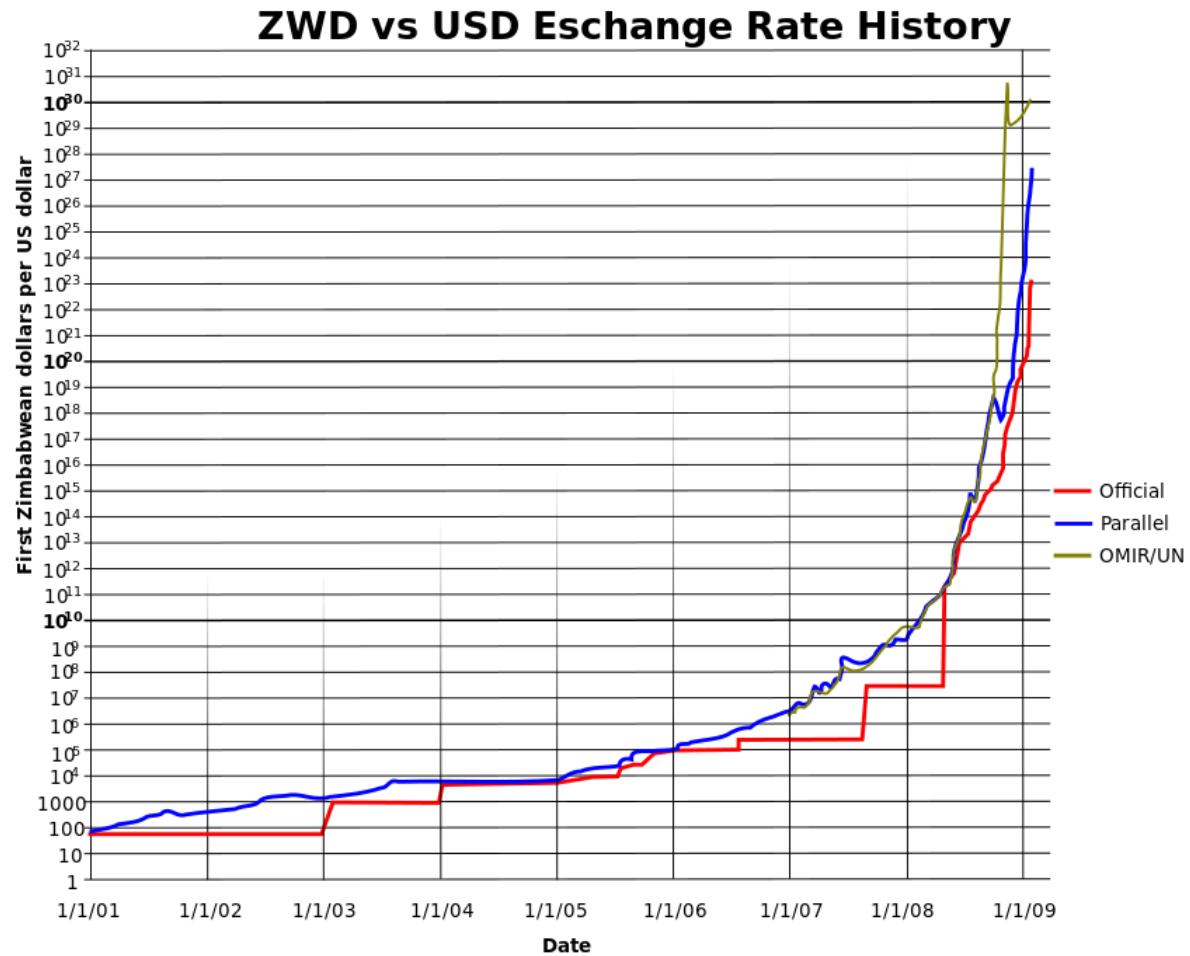
# Introduction (5)



# Introduction (6)

- Another example of hyperinflation was in Zimbabwe in 2008.
- Inflation was so high that prices were doubling everyday.
- The rate of inflation reached a whopping 80 billion percent per month and the Zimbabwean currency became completely worthless.
- New banknotes of ZWD thousands, tens of thousands and even millions were printed, but this was still not enough.

# Introduction (7)





# Introduction (8)

- There also exists the opposite phenomenon of inflation known as **deflation**.
- *Deflation occurs when overall prices fall. It is a negative inflation.*

# How is inflation measured?

- Measuring inflation means measuring how overall prices change.
- This can be a very challenging task because we consume thousands of goods and services and not all of them can be continually monitored.
- Also, some prices may be increasing while others are decreasing in the same period.
- Another challenge is that not all price changes have the same impact on consumers.
- For example, an increase in the price of gas is certainly much more serious than an increase in the price of flowers.

# How is inflation measured? (2)

- Therefore, before we arrive at a meaningful inflation measure, it is important to determine:
  - what prices to monitor
  - how much weight each price will carry
- In order to achieve these two tasks, the Bureau of Labor Statistics (BLS):
  - Determines the prices of all goods and services that a typical consumer buys
  - How much of a typical consumer's budget is spent on these items

# The Consumer Price Index (CPI)

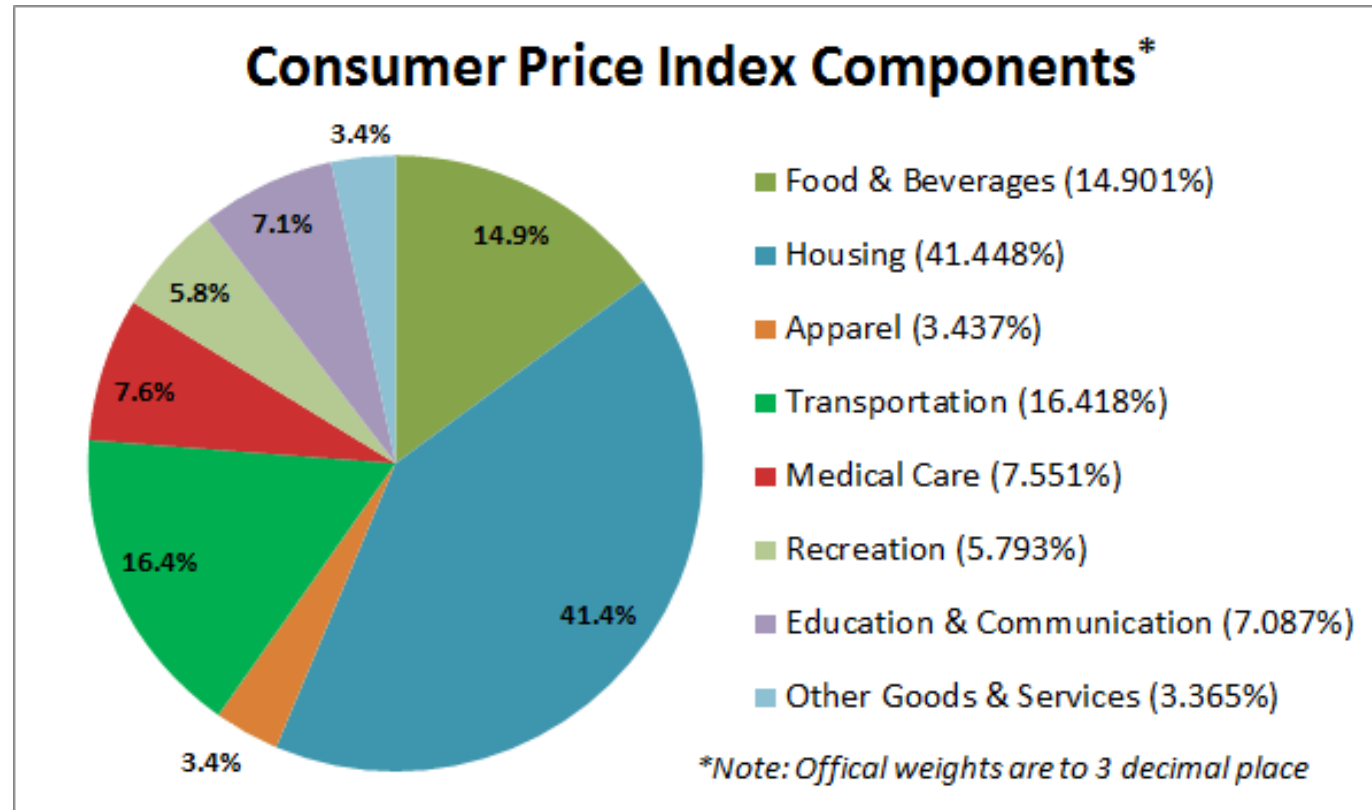
- The Consumer Price Index (CPI) is the measure of the price level based on the consumption patterns of a typical consumer.
- All reports of inflation in the news are most likely based on the CPI.
- The CPI is essentially the price of a typical “basket” of goods purchased by a representative consumer in the economy.
- While it is the most predominant measure of price levels, it is not the only one. For example, we mentioned the GDP deflator which includes the prices of all final goods and services used in the computation of GDP.

# Computing the CPI

- Each month, the BLS conducts surveys by sending employees into stores in 38 geographic locations to gather and input price information on over 8000 goods.
- The BLS surveyors estimate how each good and service affect a typical consumer's budget.
- Once they do this, they attach a weight in the typical consumer's basket of goods.
- Finally, they compile the Consumer's Price Index.

$$\text{CPI} = (\text{basket price} / \text{basket price in base year}) * 100$$

# Computing the CPI (2)



Source: BLS; The most recent reweighting was in December 2013.

# Measuring inflation rates

- The CPI is the representative index for the prices of all goods and services in the economy.
- It measures the cost of living at a given time period compared to previous periods and it is generally used to compute the inflation rate.
- If the CPI rises, it means that prices overall have increased. In other words, a rise in the CPI also means a

$$\text{Inflation rate (i)} = (\text{CPI}_2 - \text{CPI}_1) / \text{CPI}_1$$

# The CPI and the value of the dollar over time

- In economics, the price of a good conveys a lot of information about that good.
- However, prices from different periods can lead to confusion as seen in the table on slide 3.
- For example, a movie ticket cost 75 cents in 1962, but costs over \$10 today.
- Can we say that movie tickets are more expensive today than they were in 1962?



# The CPI and the value of the dollar over time (2)

- The answer is “NO”.
- The reason being that the value of the dollar in 1962 is different from the value of the dollar today.
- In finance, we talk about the time value of money.
- This means that the value of money changes over time. It decreases.
- The purchasing power of a 100-dollar bill in 1962 is much higher than it is today.

# The CPI and the value of the dollar over time (3)

- To compare the prices of goods over time, we convert all prices to today's prices, or "prices in today's dollars"

Price in today's dollars = price in earlier \* (CPI today / CPI earlier time)

- Let's use an example.
- Following are pieces of info about the cost of a brand new car in 1924 and 2012.

Year	Price (\$)	CPI (price level)
1924	1,969	17
2012	25,000	230

# The CPI and the value of the dollar over time (4)

- As we said, it is impossible to compare the prices of a brand new car (as they are) in both periods.
- In order to compare them, we will need to convert the price of a 1929 brand new car into 2012's prices.

$$\text{Price in 2012} = 1969 * (230 / 17) = \$26,639$$

- In other words, a brand new car that cost \$1,969 in 1924 would be evaluated at \$26,639 in 2012.

# The CPI and the value of the dollar over time (5)

- According to the table, the actual price of a car in 2012 is \$25,000.
- Therefore, we can say that for the cost of living that was prevailing at the time, brand new cars were more expensive in 1924 than they are today with the current cost of living.

# The CPI and the value of the dollar over time (6)

Product	Year	Price	Conversion	2012 dollars	2012's actual price
Coca-Cola	1942	\$0.05	$0.05 * (230/16)$	\$0.72	\$0.63
Hershey's chocolate	1921	\$0.05	$0.05 * (230/18)$	\$0.64	\$0.69
McDonald's hamburger	1955	\$0.15	$0.15 * (230/27)$	\$1.28	\$0.89
Nabisco's Oreo cookies (1 lb)	1922	\$0.32	$0.32 * (230/17)$	\$4.33	\$2.99

# The accuracy of the CPI

- Just like GDP and the unemployment rate, CPI is an important macroeconomic indicator since it tells us how expensive life is at a certain point.
- Many labor unions make wage agreements with companies that tie the wage level to the CPI. The agreements state that when the CPI rises, so should wages and if the CPI falls, wages fall too.
- Therefore, it is really crucial for CPI to be computed with accuracy. Failing to do so will be very detrimental to economic agents.
- There are 3 main concerns when it comes to computing the CPI:

# The accuracy of the CPI (2)

- **Substitution**

- When the price of a good rises, consumers instinctively look for cheaper substitutes.
- This makes CPI calculations difficult because the typical consumer basket changes.
- Changes in the prices of goods which are included in the basket alter the weights of these goods in the consumer's budget.
- Without acknowledging the substitution of less expensive items, the CPI will not be accurately computed.

# The accuracy of the CPI (3)

- **Changes in quality**

- Over time, the quality of goods generally increases.
- For example, if a movie theater begins to offer all movies in 3D, the price of the movie ticket is very likely to increase.
- Customers will pay more to watch movies; however, they will also derive more satisfaction from the movies. So, this is not an example of inflation.
- Yet, the computation of CPI will be distorted by this change in price, which comes as a result of a change in the quality of the service.



# The accuracy of the CPI (4)

- **New products and locations**

- In an evolving economy, new products are constantly introduced.
- 20 years ago, tablets and flash drives were not part of the typical consumer's basket as they are today.
- Traditionally, the BLS took long periods of time before updating the basket and consequently overlooked the new products and miscalculated the CPI.
- Also, virtual markets such as Amazon or Ebay were not available before the 1990s.

# The accuracy of the CPI (5)

- Typically, they offer lower prices than traditional retail stores do, so more consumers purchase their items from them.
- So, if the BLS keeps monitoring prices from the retail stores for the computation of CPI, the final result will be inaccurate.

# The consequences of inflation

- Inflation is a natural economic phenomenon when it is at manageable levels (around 4% in the USA).
- It becomes a concern when it gets out of hands.
- However, whether the inflation level is high or low, it has a number of consequences on the economy.
- We will talk about a 3 of them here:

# The consequences of inflation (2)

- **A decrease in the purchasing power of money**
  - As goods and services in the economy become more and more expensive, the same amounts of money can purchase less and less of those goods and services.
  - For example, if a consumer has a 10-dollar bill, he/she will be able to buy 5 bottles of a drink which costs \$2.
  - However, if the price of the drink increases to \$3 due to inflation, a 10-dollar bill will lose its purchasing power and will only be able to buy 3 bottles of the drink.

# The consequences of inflation (3)

- **Money illusion**

- It is important to realize that wages and salaries are the price of labor.
- This means that inflation also increases them.
- *If goods and services become more expensive due to inflation and, in parallel, wages and salaries receive a proportional increase, we say that nominal income has increased, but real income is still the same.*
- An increase in nominal wage may trick consumers into thinking that they can afford more; however, this is not the case because prices have increased proportionally – real income has not changed.

# The consequences of inflation (4)

- **Distortions in the credit market**

- This is a consequence related to the fact that inflation decreases the purchasing power of money.
- Let's consider a businessman who gets a \$10,000 loan from a bank and is supposed to pay \$15,000 back in 2 years.
- Let's also assume that inflation rises considerably during the pay back period.
- When the money is actually paid back, its real purchasing power will have declined. The businessman wins but the bank loses.

# What is the cause of inflation

- Milton Friedman very famously said: *“Inflation is always and everywhere a monetary phenomenon”*
- This means that the main cause of inflation is the increase in the money supply in an economy relative to the quantity of real goods and services in the economy.
- The money supply is the quantity of money in circulation in the economy as decided by the Fed (i.e. the Central Bank).
- If there is too much money in circulation, the real value of money falls and inflation increases.
- The printing of new money is known as a *monetary expansion* or *quantitative easing*.

# Why would the Government increase the money supply?

- If the main cause of inflation is known (i.e. monetary expansion), it is rational to ask why would the Government implement such a policy?
- Why would the Government expand the monetary base in the economy knowing that this will cause inflation in the economy?
- We will talk about two main reasons:



# Why would the Government increase the money supply? (2)

- Large Government debts

- The Government controls the printing of money, so when they owe large sums of money, there is an urge to print new money in order to pay off their debt.
- At the end of World War 1, the German Government owed billions of Deutschmarks to other nations and to German workers. So they printed new money.
- The consequence was an inflation rate that rose to 30,000%

# Why would the Government increase the money supply? (3)

- **Short-term gains**

- An increase in the money supply can temporarily stimulate the economy.
- So Governments are often tempted to increase the money supply in order to benefit from these short-term gains.
- However, when inflation goes out of control, the measures in order to solve the problem take long periods of time and usually require many sacrifices.

# You should now be able to...

- Define and explain the concept of inflation.
- Explain whether inflation is to be feared and why?
- Define and explain the concept of deflation.
- State a few challenges in the measurement of inflation.
- Explain what the CPI is.
- Explain the process of the computation of the CPI (and the formula).
- Calculate the inflation rate given the CPI of two different years.
- Compare prices across time by using the CPI

# You should now be able to... (2)

- Identify problems related to the accuracy of the CPI when it is computed by the BLS.
- Explain a few consequences of inflation.
- Explain the main cause of inflation.
- Explain reasons for quantitative easing.