MACROECONOMICS 201
Spring 2020
NOTES 6

PRICE INFLATION AND ITS CAUSES

Reading Assignment:

Reading Assignments:

Principles of Economics: Chapter 19 (sections 2, 3,.5), Chapter 22
Madariaga: Chapters 41, 63, 71

Introduction:

During the great depression of the 1930's, there was little concern among most economists in the U.S. about inflation. The primary problem, in fact, to many people, the only problem, was unemployment, a consequence of the great depression, which they were living through. Surprisingly, for most of us who have experienced a steady growth in inflation during almost our entire lives, prices had risen *little* during the preceding centuries. It wasn't until and after WWII that the U.S. began to experience price increases (sometimes significant) almost every year. In consequence, economists quickly become increasingly concerned about the rate of inflation, and its effects on the economy. Currently, fear of inflation probably rivals fear of unemployment in the minds of many policy makers; in fact some may fear inflation more than unemployment, even during the recent severe recession. Going off of the gold standard (see notes 10) has made this fear even more acute since, in theory, there is no limit to the amount of new money that could be created. Using the years 1982-1984 as a base (to be explained shortly), the following provides estimates of price levels since the year 1913.

YEAR	PRICE LEVEL (1982-1984 = 100)	YEAR	PRICE LEVEL (1982-1984 = 100)
1913	9.9	1931	15.2
1914	10.0	1932	13.7
1915	10.1	1933	13.0
1916	10.9	1934	13.4
1917	12.8	1935	13.7
1918	15.1	1936	13.9
1919	17.3	1937	14.4
1920	20.0	1938	14.1
1921	17.9	1939	13.9
1922	16.8	1940	14.0
1923	17.1	1941	14.7
1924	17.1	1942	16.3
1925	17.5	1943	17.3
1926	17.7	1944	17.6
1927	17.4	1945	18.0
1928	17.1	1946	19.5
1929	17.1	1947	22.3
1930	16.7	1948	24.1

YEAR	PRICE LEVEL (1982-1984)	YEAR	PRICE LEVEL (1982-1984)
1949	23.8	1989	124.0
1950	24.1	1990	130.7
1951	26.0	1991	136.2
1952	26.5	1992	140.3
1953	26.7	1993	144.5
1954	26.9	1994	148.2
1955	26.8	1995	152.4
1956	27.2	1996	156.9
1957	28.1	1997	160.5
1958	28.9	1998	163.0
1959	29.1	1999	166.6
1960	29.6	2000	172.2
1961	29.9	2001	177.1
1962	30.2	2002	177.9
1963	30.6	2003	184.0
1964	31.0	2004	188.9
1965	31.5	2005	195.3
1966	32.4	2006	201.6
1967	33.4	2007	207.3
1968	34.8	2008	215.3
1969	36.7	2009	214.5
1970	38.8	2010	218.1
1971	40.5	2011	224.9
1972	41.8	2012	229.6
1973	44.4	2013	233.0
1974	49.3	2014	236.7
1975	53.8	2015	237.0
1976	56.9	2016	240.0
1977	60.6	2017	245.1
1978	65.2	2018	251..1
1979	72.6		
1980	82.4		
1981	90.9		
1982	96.5		
1983	99.6		
1984	103.9		
1985	107.6		
1986	109.6		
1987	113.6		
1988	118.3		

It is clear that after a long period of relative price stability, prices began rising at the onset

of WWII and with one slight exception, have increased every year since 1941, although the size of the increase (usually between the 2% and 3%) varied from year to year. During 2009, the CPI fell slightly from 2008, a rare occurrence and one that required a severe recession to accomplish. Even so, this was largely due to a reduction in housing and oil prices from the unusual levels of the prices of these commodities in 2008. Many other prices continued to rise during 2009.

1. What do we mean by price inflation?

Price inflation, in economics, refers to an ***average*** rise in prices for all goods and services, or sometimes, for selected subsets of goods and services. Price deflation, which rarely occurs, is the opposite, a fall in average prices. Despite the anomaly between 2008 and 2009, when prices fell slightly, it *is not currently anticipated that prices will decline over time, even for short periods.* One reason not to anticipate price declines is that the Federal Reserve in the U.S. (The U.S. central bank) regards a 2-3% inflation as desirable (as do European banks). Another reason, as just noted, is that prices must cover the costs of production and wages are a large part of that cost. It is difficult to lower wages, an observation that originated with John Maynard Keynes and is noted in the text. One reason for **wage rigidity** used to be union contracts. Union contracts typically set wages for one to three years at a time. Often these contracts have an escalator clause, usually known as a cost of living adjustment **(COLA**), which means wages are increased annually ***by the rate of inflation,*** or something close to it.

I know of no comparable provision for reducing wages in times of price deflation. Reducing wages would be resisted strongly (particularly since many people owe debts, such as a mortgage or car payment that will not decline regardless of any fall in prices). Even without union contracts, most employers hesitate to lower wages - unless they can relocate their business and hire a new work force. It takes an extreme situation, usually an imminent threat of insolvency, such as was recently faced during the great recession by American car makers, for employers to take a strong position on lowering wages.[1] Many government programs, most notably Social Security retirement benefits, are indexed to rises in prices (A COLA ADJUSTMENT).

It must be emphasized that during a time of inflation, prices do not rise equally, percentagewise, among goods and services. If prices in a particular sector rise abnormally fast, this is sometimes referred to as a price bubble. The term "bubble" implies that prices in that sector may be subject to a sharp correction, which does, on occasion, happen, e.g., the housing and stock markets during 2009.

Our purpose in this lesson is twofold.

- First, how do we measure the growth of ***real GDP*** over time, i.e., how do we ***remove*** the effects of price change on nominal GDP when comparing GDP over time;

- Second, how do we measure price changes on purchases of goods and services

[1]Automakers, airlines, and many state and local governments were stuck with what are termed "legacy costs." Legacy costs are generous pension and health care benefits that were negotiated during times in which these companies were much more prosperous, but which did not come due until much later. These legacy costs create enormous problems if companies fall upon hard times. Companies, when faced with bankruptcy, sometimes win concessions from unions, albeit grudgingly, on wages.

over time.

2. Why is it important to measure the rate of increase in prices, and the rise in real GDP? What is nominal GDP and Real GDP?

We have already mentioned one important use of measuring changes in prices and that is to adjust wages and pensions (and sometimes interest rates on mortgages) in order to protect recipients from losing buying power because of inflation. Another purpose is to accurately measure the ***real*** (that term again) ***growth*** in our standard of living and productivity. Frequently, you will hear politicians, columnists, and others report on the enormous nominal GDP in the U.S. and sometimes they will report, with great satisfaction, about the growth of nominal GDP from the previous year to the present. Part of the reason for this satisfaction is the implied and erroneous assumption that any increase in nominal GDP improves the average well-being of Americans.

In reality, nominal GDP can rise for ***two*** reasons, ***rising output and rising prices***. ***Only*** increases due to rising levels of output are useful for satisfying human wants. Increases due to rising prices may give the illusion of improvement and may cause some redistribution of real income (depending upon whose earnings rise the most), but, increases due to rising prices alone contribute **nothing** to the nation's overall prosperity.[2] People cannot consume rising prices.

Real gross domestic product, as we discussed in the last set of notes, refers to the actual total physical production of goods and services available to satisfy human needs and desires, sometimes referred to as the ***real economy. Nominal gross domestic product*** refers to the value of gross domestic output valued in the ***current*** year's prices (notes 5).

This raises the question: How do we distinguish changes in **real** GDP, i.e., the real economy, from changes in **nominal** GDP? These terms will be used throughout the course, and in many other courses during your college (and subsequent) years. **The distinction is indispensable for understanding discussions of public economic policy**. The majority of Federal tables showing changes in GDP over time are presented in terms of real GDP, ***not*** nominal GDP**.** Without question, one or, more likely, both of these terms will show up on examinations.

Changes in nominal GDP are measured by comparing changes in annual GDP based on the actual prices charged for goods and services that exist each year . This means that nominal GDP can rise because of increasing production, ***or*** increasing prices***, or,*** more likely, both**.**

Changes in real GDP, the real economy, are measured by comparing changes in annual nominal GDP ***adjusted for price changes*** that occur from a ***base year to the current year***. It is used to estimate the ***actual*** year to year increase in ***real*** goods and services that can be used for consumption, investment, or government services, i.e., changes in, the ***"real" economy***.

Earlier, when we developed our chart showing AD and AS, the horizontal axis was identified as real GDP. We emphasized that in that chart, real GDP refers to the ***actual physical production of goods and services for*** **a particular year only, i.e., the real economy.** The average

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[2]This might be disputed if small annual increases in prices make it easier to reallocate resources from less productive to more productive uses.

price level is shown by the intersection of the AD and AS curves.

Now we are shifting gears somewhat and using the term "real GDP" to indicate the value of output in different years measured valuing all goods and services in terms of the prices prevailing in a **base year.** We do this in order to estimate the ***real increase*** in goods and services over a period of years, (to put it in another way, the change in real GDP). If this is confusing, spend a little time in deep thought on this issue.

These are two different ways in which the term "real GDP" is used in the literature and in the popular media, and even in some of your other courses and textbooks. I know that this may be confusing. But knowing which type of real GDP that is being discussed is essential to avoid misunderstanding when the term, "real GDP" is discussed.

To repeat: real GDP refers to the actual amount of physical goods and services produced each year. The ***change*** in real GDP is measured by valuing each years production of goods and services in terms of the prices prevailing in a single base year (basically assuming no rise in prices).

Although above I have applied the term "real" primarily to GDP, the term can also be applied, and often is, to a number of different terms, like "real income" i.e., the real rise in the value of your income from year to year, or, expressed in another way, the actual increase in goods and services that this income will purchase. When you see the term "real," it usually means that the variable has been adjusted for price change.

3. What are the most important ways of adjusting for price change over time?

Price indices are measures of how prices change from year to year. Using these price indices, we can estimate changes in ***real GDP*** and the cost of goods and services over time. There are two different measures of price change that you must be familiar with.

1. Consumer Price Index (CPI). This shows the rise in prices for an **average market basket of goods i.e., only** those goods that consumers are likely to buy, **not** every type of good or service produced. The CPI is the index sometimes used to adjust wages and pensions annually (and sometimes other variables, such as mortgage interest). To repeat, this is called a COLA (I. e., cost of living adjustment) and enables recipients maintain their buying power in ***real*** terms (there is that term again). This index is designed to measure the ***average*** price changes faced by the ***average*** consumer for the goods and services he or she is likely to purchase.

2. Implicit price deflators for Gross Domestic Production. This is the way which we take the effects of inflation out of measures of ***all*** **goods and services entering into GDP** in order to estimate the **real** increase in ***total*** GDP from year to year. This includes consumer goods, investment goods, and government**.** Although a price index for changes in GDP can be easily derived, you will rarely come across a gross domestic production price index (although they exist). More commonly, you will see the term **Price Deflator**, and that is the term used in the text**.** A price deflator shows the percentage that each year's monetary/nominal GDP must be deflated to eliminate the effects of price changes from a base year and measure only the change in real GDP.

We will present a broad outline of how the Consumer Price Index and implicit price

deflators for GDP are calculated. In reality, there are actually many different types of price indices. However, If you understand the basic principles underlying the calculation of the CPI and the construction of implicit price deflators, then you will have no difficulty understanding other price indices when you read about them in the newspaper, or when you need to examine them for some purpose.

4. How do we construct implicit price deflators for *Gross Domestic Production* using the "base-year approach?" How do we use this index to calculate *Real* GDP?

This is the method of measuring ***real*** GDP changes over time that is described in the text. The primary purpose of an implicit price deflator to estimate the ***change*** in the ***growth of real goods and services over time on the assumption that prices are unchanged from a base year***. It adjusts for the effect of price changes of *all* goods and services that are measured by nominal GDP. The base year approach (described in the text) values all goods and services in terms of the prices prevailing during an ***arbitrarily*** selected base year. As we will see, this approach is primarily used to measure changes over time in real GDP. This is quite different from the Consumer Price Index where the primary purpose is to measure changes in prices, not output.

Adjusting for price changes in GDP is one of the hardest parts of this course to fully grasp, but if you understand the following **simple** example using the base year approach, the rest of the discussion should follow easily. The text uses a somewhat different example which you should work through, but the procedures are identical.

Take two consecutive years. Say 2000 and 2001. Assume there were only two products in both years (remember, we use simple models to describe the procedures but these models also illustrate how the system as a whole operates) .

- During 2000, there were 100 dresses produced at $5 and 200 oranges at $1.
- During 2001, there were 150 dresses produced at $4.80 and 100 oranges at $1.50

Now, during 2000, the **nominal value** of output (e.g., GDP) **using 2000 prices** was $700 as measured by 100 X $5 + 200 X $1.

And the value of output in 2001, ***again using 2000 prices***, was $850 as measured by 150 X $5 + 100 X $1). The critical point is that we used 2000 prices to value output for ***both*** 2000 and 2001. Presumably, this eliminates the effect of price change in measures of GDP.

Now, using ***2000 prices***, the estimated value of ***real output*** rose from $700 to $850. Note that the nominal value of output actually rose to $870 in 2001 (150 X $4.80 + 100 X $1.50). Note the use of 2001 prices. So, prices rose, on average, 2.35%. ((870/850) -1. The $850 represents the value of output in 2001 had there been no price change, and the $870 represents the value of output given the price change. The additional $20 represents the effects of price change, ergo, $20/$850 represents the percentage increase due to price change..

But the estimated real increase in the value of ***real*** output rose a whopping 21.4% (150/700) in this silly example. The $150 is the estimated growth in real output between 2000 and

2001 **using** 2000 prices.

The sum of 1 + 2.35% is termed a price deflator. It was described in the text. It is defined as the amount by which ***nominal GDP*** in 2001 must be reduced in order to value GDP in 2001 in 2000 prices (e.g., $870/1.0235 = $850. It is simply 1 plus the percentage rise in prices from the base year to a future year. If you wished to construct a price deflator in 2002 in order to measure output in that year in 2000 prices, you would value output in 2002 in 2000 prices. Then, identify the percentage increase in nominal output due to price change, and divide nominal GDP in 2002 by 1 plus this percentage. I know this is hard to follow. You need to spend a little time studying it.[3]

The ***base year approach*** was the approach used to measure the change in real GDP ***until 1995.*** Periodically, of course, the base year would be changed to a later year.

5. What biases existed when using the base year approach to adjust GDP for inflation?

5A. Substitution bias? A consequence of a dynamic, ever changing economy.

One major problem, and one that perplexed economists for a long time, with using the base year approach to measure changes in **real GDP** over time, is **substitution bias**. Clearly, the prices of different goods do not rise at the same rate. The substitution bias occurs when people shift their purchases from goods rising more rapidly in price to goods rising less rapidly or falling in price. The result is that the rise in real GDP tends to be overstated if the prices prevailing in the base year are used. I confess, this can be confusing. A simple example will illustrate this problem.

1. Suppose that in year one, there were 100 tubes of toothpaste sold at $2 each, and 100 cans of tooth powder, each valued at $1.50. The combined value of these two products was $350. Do the math.

2. Now, suppose that the price of tubes of toothpaste fell to $1.50 in year 2, and everyone begin buying ***only*** tubes of toothpaste - note that people begin using more of the product that fell in price. This movement towards lower priced goods, as noted, is termed the substitution effect, i.e., people move to purchase more of the items that show a slower increase, or perhaps a decrease (as in this example) in price. Now, there would then be 200 tubes of toothpaste sold at $1.50. Using the base year approach, ***when tubes were valued at $2***, would indicate there was a rise in real GDP of $50 ($400 - $350}.

3. Clearly this overstates the actual real value of the rise in GDP due to sales of toothpaste. Although 100 more tubes of toothpaste were sold when their price declined to $1.50, the people who purchased these tubes of toothpaste clearly valued them at less than $2 since they declined to purchase them at that price in the base year. In consequence, valuing these additional tubes of toothpaste at the base year price of $2 clearly overstates the rise in the real value of GDP, i.e., how much they valued the purchase of 200 tubes of toothpaste..

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[3]Note that instead of dividing by 1.0235, you could the same thing by multiplying .9770. This calculated by dividing 1 by 1.0235.

Perhaps it can be stated this way. There is clearly an increase in the real value of output since tubes were valued more highly than the toothpowder, so the real value of the additional 100 tubes of toothpaste sold in the second year is ***greater*** than the $150 they sold for, but ***less*** than the $200 that they were valued at using the base year price, hence, the increase in real GDP is overstated, or perhaps I should say, the amount that people value the increase in real GDP is overstated.

4. Perhaps this will clarify the issue. The average price of toothpaste clearly fell in the second year, i.e., inflation declined. But our procedure did not take account of the lower value that people placed on the additional tubes of toothpaste produced and sold.

A simple way to understand what is happening is to note the following rule**.** ***If you overstate inflation, you understate the change in real output (and vice versa).***

Optional: In the above example, the real value of the output of tooth paste and tooth power was $350 in year 1 and $400 in year 2, if we use year 1 prices in both cases. Since the nominal value of this output in year 2 (using year 2 prices) was only $300, this implies price deflation of 12.5% ($400/$300 -1). However, we know that consumers who purchased 100 of the 200 tubes of toothpaste in year 2 did not value them at the $2 ascribed to them using the base year approach (instead they valued them somewhere between $1.50 and $2.00), then the substitution bias causes an overstatement of the real value of sales of toothpaste in year two. Instead of calculating $400 for the real value of toothpaste in year 2, it should have been lower, say $375. Thus, the base year approach overstated the growth of real GDP. On the other hand, the higher real value for tubes of toothpaste, $375, implies price deflation of only 6,.25% ($375/$400 -1). This is consistent with our rule that higher inflation will lead to lower estimate of real GDP. Or in this case, lower deflation led to a higher value of real GDP which amounts to the same thin.

The text has a ***much easier*** to understand example.

Optional: For those mathematically inclined, this may help to understand the substitution effect. We can represent the percentage growth of real GDP using the base year approach by the equation:

O_cP_b/O_bP_b

O_cP_b represents the current year's output valued in base year prices and
O_bP_b represents output in the base year valued at base year prices.

Note that prices, P_b, are held constant so the only change, in principle, is in output, O_c for the current year and O_b for the base year. If there is inflation, some prices should be reduced in the second year to adjust for the fact that not all people value the some items at the base year prices. This causes an understatement of the value of the growth of real GDP since the current year's measure of real GDP is higher than it should be. The problem is that some goods are undervalued by using base year prices in the current year. This assumes some increase in prices causing the substitution effect, the opposite of our toothpaste example.

5B. Quality change: Many commodities improve in quality over time. Consider the

enormous improvements in computers, telephones, automobiles, stereos, etc., that has taken place in the last few years. Thus your dollars are purchasing a superior product.

To value future products at the value of a similar but lower quality product sold in the base year ***understates*** the actual value of the growth in output. Think of it this way. A price higher than the base year price should be used to ***value*** the improved product which would result in a greater growth in real GDP and a lower increase in prices.

In consequence, failure to fully adjust for quality change causes the base year approach to understate the real growth in GDP. This, I believe, is a major problem in the way we measure real GDP.

Example: Suppose computers cost $1,000 in year one and $1,100 in year two. Of the $100 increase in price, suppose $50 was due to inflation, and $50 to quality improvement. Superficially it might appear as if there is a 10% rise in price. But if $50 is due to quality change, then 5% of the price change should be ascribed to an increase in the value of real output and 5% to price change .

The Department of Labor has a talented staff who spend a great deal of time developing methods of adjusting for quality change but it is a difficult and imperfectly done activity.

It is clear that failure to fully adjust for quality change causes an overstatement of inflation. The problem is that the base year approach should not value the good or service by the same price as in the base year in the current year when part of the increase in price is due to quality change and should be considered as a slightly different product. Because of this, it is improper to ascribe the total increase in price as due to inflationary pressures (repetitious).

5C. New products: In this era of rapid technological changes, new products are constantly being introduced. This creates two issues when using the base year approach:

- there is the obvious problem of how to evaluate new products when the products did not exist in the base year for purposes of assessing real growth;
- in addition, the text makes the point that the value of a given amount of income is enhanced if people have a greater variety of products to choose from. Failure to consider the beneficial effects of a wider variety of goods and services will cause the measure of inflation to be overstated since some people will gain more real value for a given amount of spending due to a greater number of options, and the increase in real GDP to be understated. This is not intuitively obvious, but the more you think about it, the more sense it makes. I suspect that it is a minor issue.

5D. Services : Teaching is a service. In principle, given modern technology, the effectiveness of teachers should have improved as compared to previous years, for example, the ability to duplicate materials or use the internet. But in the absence of a direct measure of productivity, we often assume that productivity has not increased since the base year and we value the output of some services by actual wages paid in the base year. So if these service workers are actually more productive, then we understate the increase in real GDP when using the base year approach, and overstate inflation. For many types of services, it is difficult to identify a

measurable output by which we can measure improved or increased productivity. Remember, services comprise 75-80 percent of the U.S. output.

Concluding comment: The net affect of these biases in the base year approach is not obvious, but economists generally assume that it causes inflation to be overstated, the growth of real GDP to be understated.

6**. How do we construct measures of Real Gross Domestic Production using a chain type approach and how does this reduce the above biases.**

Because of the above problems, the Department of Commerce replaced the old system of a base year approach to measure changes in real GDP with a ***chain*** type index ***in 1995***, ***24*** years ago. This was a major change in our measure of GDP that deserves a much more substantial treatment than given in the text. In fact, the text does not mention the way changes in real GDP are measured today.

Conceptually it is a simple procedure, but looks complicated when you first see it. But if you followed the simple example used above to describe the base year approach, what follows has more steps but is basically the **same** procedure with some modifications.

We begin by using the same example as was used when describing the base year approach.

- During 2000, there were 100 dresses at $5 and 200 oranges at $1.
- During 2001, there were 150 dresses at $4.80 and 100 oranges at $1.50

Now, to develop a chain index, we value the output in 2000 using the prices prevailing in 2000 *and* 2001 and then we do the same for output in 2001 ***using, as before, both sets of prices*** as shown in the following table.

	Value of output	
	2000 prices	2001 prices
Year of output		
2000	700	780
2001	850	870
Growth	*150*	90
Percent real growth	21.4% (150/700)	11.5% (90/780)

These calculations were carried out exactly as in the base year approach, except we make two estimates of real GDP growth, one using prices in the first year, and the other using prices in the second year. Note how much they differ in their measure of real growth depending upon which year is used as the base year. Which one should we use? Enter chaining.

In the chaining calculation, we take the ***average*** of the two growth rates that used 2000 and 2001 prices to ***estimate*** the real increase in GDP from 2000 to 2001, i.e., (21.4 + 11.5)/2 =

16.45. [4] Under the old system, if we used prices in 2000 as the base year, we would estimate a real growth of GDP of 21.4% but only 11.5% if we used 2001 as the base year. Under a chain index approach, we estimate real growth at 16.45% regardless of which year is used as the base (see below) by taking an average for the two years. What is the justification? There is none, except that it provides a way of ***partly*** dealing with the problems posed by the biases created by measuring the growth of real GDP using the base year approach.

The Department of Commerce makes these chain calculations each year using the current and preceding year. We end up with an annual calculation of a chained measure of economic growth from year to year as I s currently used.

We illustrate this process by extending our simple example. Suppose:

- During 2000, there were 100 dresses at $5 and 200 oranges at $1.
- During 2001, there were 150 dresses at $4.80 and 100 oranges at $1.50
- During 2002, there were 160 dresses at 5.20 and 150 oranges at $1.60
- During 2003, there were 180 dresses at 5.40 and 250 oranges at $1.50

We can now calculate a chain measure for the growth of real output beginning with real growth between 2000 and 2001 just as we did above.

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	Value of output	
	2000 prices	2001 prices
Year of output		
2000	700	780
2001	850	870
Growth	*150*	90
Percent real growth	21.4%	11.5%

The chain index between 2000 and 2001 - (21.4 + 11.5)/2 = **16.45** percent as we initially calculated. Now, let us go to subsequent years.

	Value of output	
	2001 prices	2002 prices
Year of output		
2001	870	940
2002	993	1072
Growth	123	132
Percent real growth	14.1%	14.0%

The Chain link between 2001 and 2002 is: (14.1 + 14.0)/2 = **14.05** percent

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[4] Actually, the Department of Commerce uses a geometric mean, but it doesn't make much difference in practice. The Geometric mean is the square root of the product of the two averages, in this case, **21.4**% X 11.5%. The square root of this product is about **15.7%**.

	Value of output	
	2002 prices	2003 prices
Year of output		
2002	1072	1089
2003	1336	1347
Growth	264	258
Percent real growth	24.6%	23.7%

Chain index between 2002 and 2003: - (24.6 + 23.7)/2 = **24.15** percent

If we use 2000 as the **base** year, (the year in which all yearly measures of GDP are calculated) Using the chain index approach, we estimate that real GDP grew by 16.45% from 2000 to 2001, by 14.05% from 2001 to 2002, and by 24.15% from 2002 to 2003. With this approach the annual percent change in GDP never changes.

		Est. Value of Real Value of GDP (Base year 2000)
2000		700
2001	700 X 1.1645 =	815.15
2002	815.14 X 1.1405 =	929.67
2003	929.67 X 1.2415 =	1154.20

Suppose, we decide to use 2001 as the base year. Then we must divide monetary GDP in 2001 by 1.1645 to measure real GDP for the year 2000 since GDP, in real terms, was assumed to grow by this amount between the two years. This estimates real GDP in 2000 based on prices in 2001. We need to emphasize that in the base year, real GDP and nominal GDP are identical.

		Est. Real Value of GDP (Base year 2001)
2000	870/1.1645	747
2001		870
2002	870 X 1.1405 =	992
2003	992 X 1.2415 =	1231

You can see that you can select any base year that you desire to estimate the growth in real GDP, once you have calculated the chain links.

Note that we have not used the chain index to calculate an inflation index. This is because most of you will never have occasion to use a price index for GDP although they exist on the internet. **Nor have we developed implicit price deflators.**

We could, however, easily construct a gross domestic production price index from the estimates of the rates of growth of real income that we have calculated and construct implicit price deflators, e.g., the percentage that current nominal GDP would have to be discounted so that it is

valued at the prices prevailing in a base year.[5] We will leave those topics to an intermediate course. It involves a significant, but not overwhelming, amount of number manipulation which you are unlikely to ever do. I do expect you, however, to understand how measures of real GDP are calculated so that you will understand what is meant when you see a table showing the ***chained growth of real GDP*** over time as any of you who do any statistical research in this area will unquestionably encounter.

When we discuss, economic growth (Notes 13), we will show estimates of the growth of U.S. GDP using 2009 chained dollars. When I was recording this data, I was struck by how substantially estimates of changes of real GDP changed from year to year when using the chain index as compared to previous estimates using the base year approach.

7. Are there still biases in the chain index approach?

Sure, the same biases that existed in the base year approach, described above, also exist in the chain link approach, but they are greatly reduced. Well, maybe they are reduced. In my opinion, we do not come close to adjusting for the great increase in the quality of products, and the increase in the quality of life they engender. Nor do we adjust for changes in the productivity of services. But I am sure that some other economists would argue these points.

8. How do we construct the consumer price index (CPI) using the base-year approach and fixed weights (i.e., a standard market basket of goods)? What is a representative market basket of goods and services?

The consumer price index (CPI-U) is used primarily to estimate the ***change in prices, faced by consumers***, like you, for the goods that they are likely to purchase. Unlike measures of the real growth of GDP, which considers all produced goods and services the CPI measures price changes ***only for those goods and services*** most likely to be purchased by consumers.

Important repetition: The primary purpose of the CPI is to estimate changes in average price levels of goods purchased by the average consumer and the primary purpose of the chain link approach described above is to estimate changes in ***real GDP***. The CPI in the U. S. is primarily constructed using the ***base year*** approach (but this may be changing).

Representative market basket of goods and services: The CPI that you usually see reported in the daily newspaper is actually measured by using a ***representative market basket of goods and services, i.e.,*** one that is assumed to be purchased by an average household year after year. This market basket includes almost all purchases that an average household might make, e.g., food, clothing, housing, medical care, transportation, recreation, etc. The *proportion* of this average market basket that is devoted to each type of item is called the ***weight*** of that item.

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[5] To illustrate using our simple model, the nominal value of GDP in 2003 was $1347 in our example, but only $1154 when measured in terms of 2000 prices. To calculate the implicit price deflator in 2003 so that nominal 2003 GDP is adjusted to reflect 2000 prices, we divide $1347 by $1154 and obtain 1.1674. When nominal GDP in 2003 is divided by 1.1674, we arrive at $1154., i.e., GDP in 2003 expressed in the prices estimated to prevail in 2000. This may seem complicated, but becomes easy once you do it a few times,

Relative importance of items included in the representative market basket of goods and service used for the CPI - U.

December 2016

Total (All items)	100.0
Food and beverages	14.6
Housing	41.0
Apparel	3.2
Transportation	16.6
Medical care	8.5
Recreation	5.9
Education and communication	7.0
Other goods and services	3.2

The CPI market basket is developed from detailed expenditure information provided by families and individuals on what they actually bought. For the current CPI, this information was collected from the Consumer Expenditure Surveys for 2013 and 2014. In each of those years, about 7,000 families from around the country provided information each quarter on their spending habits in the interview survey. To collect information on frequently purchased items, such as food and personal care products, another 7,000 families in each of these years kept diaries listing everything they bought during a 2-week period.

Over the 2 year period, then, expenditure information came from approximately 28,000 weekly diaries and 60,000 quarterly interviews used to determine the importance, or weight, of the more than 200 item categories in the CPI index structure. **(Italicized information cited from the U.S. Department of Labor Website).**

How is Data Collected on Prices: Each month, BLS data collectors called economic assistants visit or call thousands of retail stores, service establishments, rental units, and doctors' offices, all over the United States, to obtain information on the prices of the thousands of items used to track and measure price changes in the CPI. These economic assistants record the prices of about 80,000 items each month, representing a scientifically selected sample of the prices paid by consumers for goods and services purchased.

What population does the CPI-U represent: The CPI-U reflects spending patterns for almost all residents of *urban or metropolitan* areas, (about 87 percent of the population) including professionals, the self-employed, the poor, the unemployed and retired persons as well as urban wage earners and clerical workers. Not included in the CPI-U are the spending patterns of persons living in rural nonmetropolitan areas, farm families, persons in the Armed Forces, and those in institutions, such as prisons and mental hospitals. Although there are many CPI's representing different populations and different products, the most common measure of price change is the CPI - U, the U indicating that it is valid for urban areas only. The CPI and the somewhat more narrowly defined CPI-U are typically used interchangeably, although there is a difference.

A simple model: There are **two** ways in which we can illustrate the calculation of the most common (not chained) CPI.

Method 1 - representative market basket of goods: Suppose in the year 2017, sales and prices for the following goods were recorded:

Bread: 100 loaves at $1 each
Milk: 150 cartons at $1.50 each
Diet sodas: 100 bottles at $2.00 each

and that in the year 2018,

Bread: 120 loaves at $1.05 each - a 20% increase in quantity and 5% increase in price
Milk: 155 at $1.60 each - a 3.3% increase in quantity and a 6.7% increase in price
Diet sodas: 90 bottles at $2.25 each

Now, Use the year 2017 as the ***base*** year and **use the consumption of 100 loaves of bread and 150 cartons of milk** in 2018 as a hypothetical **representative market basket of goods.** We do not include diet sodas to emphasize the fact that the representative market basket does **not** include all goods produced. Then:

1. Calculate the costs of the representative market basket using *2017* prices. This comes to $100 on Bread and $225 on milk, a total of $325.

2. Calculate the costs of the ***same*** representative market basket ***using 2018 prices***.
   100 Bread @ 1.05 = $105
   150 milk @ 1.60 = $240
   Total = $345

Note: We used a chain link index approach to measure ***changes in real GDP***, i.e., the level of output is variable while prices are held constant - (approximately). To calculate the consumer price index, we hold quantities (the representative market basket) constant, and ***let prices vary***.

If the year 2017 is used as the base year, then the percentage rise in the CPI would be calculated as ($337.50/$325) -1, or 1.038 about 6.15% percent between 2017 and 2018 (alternatively, $20/$3250. This is the percentage increase in the dollar amount that would be required to **purchase the identical quantities of items in the representative market basket in 2018 as compared to 2017.** The $325 is the amount required to purchase the market basket in 2017, and the $337.50 is the amount that the same goods would cost in 2018 - the difference represents the increase in the cost of the market basket caused by inflation.

This is the approach often used to illustrate the calculation of the CPI. The examples uses the actual quantities of each good purchased. But the representative market basket we presented earlier is based on the percentage that each type of good, i.e., its weight, represents in the representative market basket. This leads to the second, and more useful of showing the calculation of the CPI, and that is one based explicitly on these percentage weights.

Method 2 - using weights: We calculate the weights of the items in our hypothetical representative market basket as follows:

	Weights in 2017
Bread	30.77% (100/325)_
Milk	69.23% (225/325)

Although we are basing the weights on the initial year in this illustration. Remember that in the standard approach to measuring the CPI, they are unchanged for several years. Now let us estimate the percentage rise in price for bread and milk between 2017 and 2018 in our hypothetical example.

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	Percent rise in prices
bread	5.0%
milk	6.667%

Now the standard CPI can be easily calculated by multiplying the percentage rise is price for each item times its weight in the representative market basket in 2017.

bread	5.0% X 30.77%	= 1.539%
milk	6.667%X 69.23%	=4.615%
Total rise in CPI		=6.154%

The total is exactly what we originally computed for the rise in the CPI between 2017 and 2018 when we compared the cost of a purchasing actual quantities in the representative market basket in the two years rather than using the weights. Note that the weights are assumed to not change.

This base year (fixed weights) approach to measuring the CPI - U is the measure of inflation that is most often cited in the newspaper stories and editorials, and is the measure most frequently used for adjustments such as annual cost of living adjustments (COLAs) that are made for Social Security payments, wages for workers with COLAs in their contracts, and for other purposes.

Rise in CPI: During, 2018, the CPI in the U.S. rose 2.1%. During 2018, the consumer price index, on average, was 242 which means that it would cost you almost 2.5 times as much to buy the representative market basket of goods 2018 as it did during the period, 1982-1984 (the base year). This may help explain why some of you may be wondering why your money will not buy as much as before. A 3.0% inflation over 5 years would result in a 16% rise in prices. Check the rise in prices in 2018 and ask yourselves if you actually earned 2.5 % more income.

Does the CPI-U reflect the increase in the cost of living for all people: No. It represents the average change in the cost of living in urban areas. Also, remember, the importance of **variance.** The amounts that people will spend on different components of the CPI will vary widely so that the rise in expenditures due to price increases will be much greater for some people than others.

Consider housing: The percentage of a person's income devoted to housing varies widely,

especially for homeowners , some of whom own their homes, some of who purchased homes in the past when housing prices, and mortgage payments, were much lower. If the price of housing dramatically increases, as it did prior to the great recession, then people who bought homes during the housing bubble (when housing prices rose) are locked into paying a larger percentage of their income for housing than people who benefitted from lower housing costs who purchased a home before ***or*** after the housing bubble. In addition, the CPI probably understates the actual rise in the cost of living for young people who do not own homes and must pay a substantial portion of their income in rent. In consequence, the CPI-U may overstate the actual rise in the cost of living for people who have small mortgages or own their homes outright. It has been argued that the annual cost of living increases for older people on Social Security should be reduced on this account. The problem, of course, is that not all older citizens own homes, and many are just as negatively impacted by increases in apartment rents as anyone else. And their medical bills are much higher.

It should be emphasized that the actual calculation of the CPI is much more complicated than the illustrative example given above, e.g., the CPI's market basket is made up of over two-hundred categories in eight general groups: food and beverages, housing, apparel, transportation, medical care, recreation, education and communication, and other goods and services (shown above). In addition to goods and services purchased through the consumer market, government charges such as water fees, vehicle tolls, and registration fees are also included in the CPI-U.

The Department of Labor maintains an extensive discussion of the various aspects of the CPI at its website:

9. Does the CPI -U serve a different purpose than the base year or chain link approach for adjusting for price change in real GDP over time?

To repeat (because it is important):

The base year approach when measuring GDP is primarily used to adjust for changes in prices for ***all*** goods and services in GDP, primarily in order to estimate the ***change in real GDP from year to year***. In measuring the **real value** of changes in **GDP**, the quantity of goods and services is allowed to rise, but the prices valuing those goods and services are adjusted by a chain index to eliminate/adjust for the effects of price change.

In contrast, the CPI -U is used to measure **changes in the average prices of consumer items from year to year.** The composition (amount of goods and service) of the representative market basket of goods is held constant.

10. If a chain index is an improvement over the base year approach for valuing GDP, why isn't it also used for the CPI? Doesn't the substitution effect of people moving to lower priced goods and the other biases previously mentioned also affect measures of the CPI?

Yes. The biases exist. And in fact, the text refers to these biases when discussing the CPI. And in fact, the Department of Labor has developed and began publishing a ***chained*** CPI-U index in 2002 (C-CPI-U).

The following is quoted from the BLS website:

BLS began publishing the Chained Consumer Price Index for All Urban Consumers effective with the release of July 2002 CPI data. Designated the C-CPI-U, the index supplements the existing indexes already produced by the BLS: the CPI for All Urban Consumers (CPI-U) and the CPI for Urban Wage Earners and Clerical Workers (CPI-W).

In its final form, the C-CPI-U is a monthly chained price index with the expenditure weights varying each month. The CPI-U and CPI-W, on the other hand, are biennial chained price indexes where their expenditure weights are updated every two years. Within the two-year span, these indexes are fixed-weight series, where the changes in these indexes reflect only changes in prices, and not expenditure shares, which are held constant.[6]

Generally, the chained CPI - U shows a slightly lower increase in price levels, as would be expected as people replace higher priced goods and services with lower priced goods and services.. The C-CPI-U (chained consumer price index for urban residents), has for the first time, been introduced into Federal legislation. The 2017 tax bill will use the C-CPI-U to adjust tax brackets in the new tax bill which will take effect in 2018. Perhaps the C-CPI-U will someday soon be used to make COLA adjustments for public employees, Social Security beneficiaries, and others as was proposed by President Obama and undoubtedly will be an issue in the near future. There is increasing support for using the chained CPI to adjust monthly Social Security and Supplemental Security Income payments in an effort to find ways to reduce the costs of these programs .

10. Is the chained CPI s better measure of the increase in price level than the regular CPI?

This is a more difficult question than it appears. In the chained version of the CPI the weights change (monthly). We begin by recalculating the weights for 2018 using our original simple example showing how the unchained CPI is measured..

You will recall that we utilized only bread and milk for our representative market basket of goods. In making our calculation, we assumed that the amount purchased of bread and milk was constant over time so that the only variable was price changes. Now, instead of using the absolute amounts, we converted milk and bread to their actual weight in a average consumer's budget in 2018, i.e., the percentage of overall expenditures used for each of these two items.

We must recalculate new weights based on peoples actual expenditures in 2018. Consumers spent an average of $374 on the market basket items (Bread and mild) in 2018. Weights were calculated by measuring the percentage of this expenditure that was made for each market basket item as follows.

	Weights in 2018
Bread	33.69% ($126/$374)
Milk	66.3156($248/$374)

[6] For example, the importance attached to housing costs might vary slightly from month to month.

Using the new weights we can now calculate the rise in prices based on a chained method of calculating the CPI by multiplying the percentage rise is price for each item times its chained weight in the representative market basket. Note that in out contrived model, the product that had the smallest percentage rise in price, bread, had the greatest percentage rise in the amount sold, exactly as assumed by the substitution effect.

bread	5.0% X 33.69	= 1.52%
milk	6.667%X66.31	4.42%
Total rise in CPI		= 5.94%

Using the chained approach calculated a rate of inflation slightly less than that calculated by the use of fixed weights. Actually, this result is **inevitable** since it inherently ascribes more importance to those items with the slowest rise in prices.

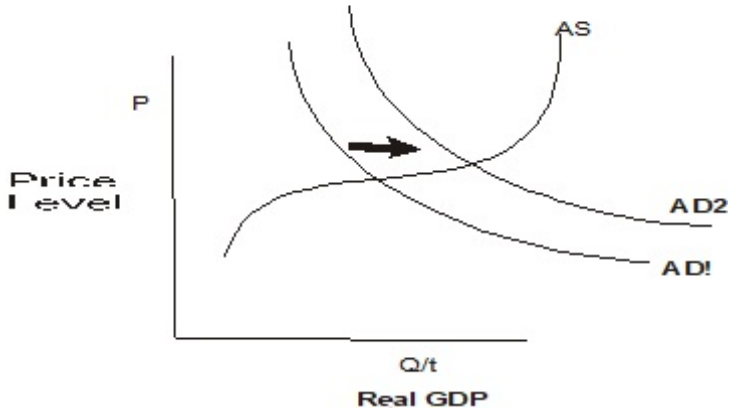
Whether this is a better measure that the standard CPI is unclear. The purpose of a cost of living adjustment is usually to maintain buying power. The main criticism of the C-CPI is that it reduces COLA increases to individuals by an amount which initially seems small, but becomes significantly large over time due to compounding.

If switching to lower priced goods can be done without an adverse effect on peoples standard of living, then the C-CPI would seem appropriate. However, I am not convinced that switching to lower priced goods can be done with negatively affecting living standards as seems to be assumed by advocates of using the chained CPI to adjust wages and pensions. It is unlikely that lower priced goods that people will buy in response to price changes will always contribute as much to well being as the higher priced goods that they were previously consuming. We (i.e., you) need to think about this some more, especially with an election coming up..

11. What are different types of inflation?

There are two main causes of inflation. Study these carefully.

Figure 21
Aggregate Demand and Supply Curves



1. Demand-pull inflation.
Demand-pull inflation occurs when the demand for goods/services that people wish to buy at existing prices exceeds the ability of the nation to supply at existing prices. If the demand for goods and services is high, most producers will happily raise prices. In addition, they will seek to increase output and often will pay higher prices for the resources they need to do so, e.g., higher wages to lure workers from other firms, higher prices for equipment, etc. They can do this because higher prices enable them to pay more. Typically, this is described as too

much money chasing too few goods.

Of course, if producers start paying more for labor and other resources this will cause the AS cost to rise, a factor which will be considered shortly. There can be any number of reasons why consumers, investors, and the government might try to spend beyond the capacity of producers to supply goods and services causing an increase in prices. One reason why demand-pull inflation might occur is if we try to fight a war ***without*** increasing taxes (Viet Nam, Iraq) or if we reduce taxes without reducing government spending, as seems to be popular with politicians around the world, including the United States. In effect, as we spend on a war effort or other public services, but do not curtail consumer spending, the result *sometimes* is that there are not enough workers and other resources to produce all of the sought after goods. Other reasons for inflation might be excessive optimism about the economy among investors and consumers and a burgeoning desire for current goods and services leading to borrowing and spending, as occurred not too many years ago in the lead-up to the great recession. Remember the production possibility frontier

The origins of demand-pull inflation generally start with a shift of the AD curve to the right. Any shift of the Aggregate Demand curve rightward will usually lead to some price increases, unless there is substantial cyclical unemployment in the economy (see figure 21). In fact, it can lead to hyperinflation if the AD curve moves into the range of the AS curve that begins to slope rapidly upward.

Note that one can even have substantial unemployment even if there is significant inflation. Two possibilities:

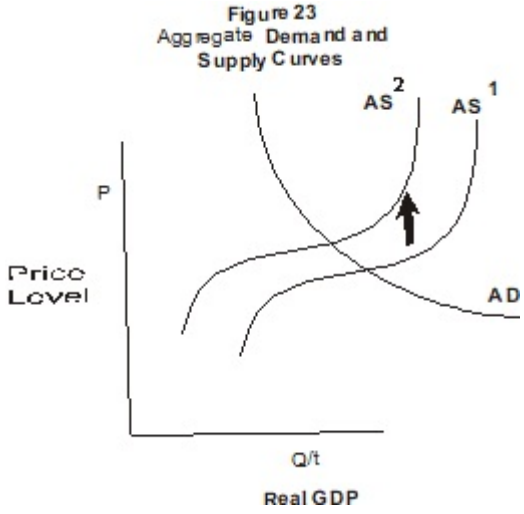
First, the rightward shift of the Aggregate Demand curve could lead to a substantial rise in the demand of employers for skilled labor which may be scarce. Wages for these workers will be bid up, and prices must rise to cover these increased costs, even though there are substantial numbers of unskilled unemployed workers who need work, but lack the necessary skills.

Second, in a situation (such as we were recently in) where unemployment has been high for a substantial period and, inventories have usually been reduced, producers might not be able to ramp up production fast enough to meet the increased demand for goods and services causing some to raise prices when the economy begins to recover, but is still facing significant unemployment.

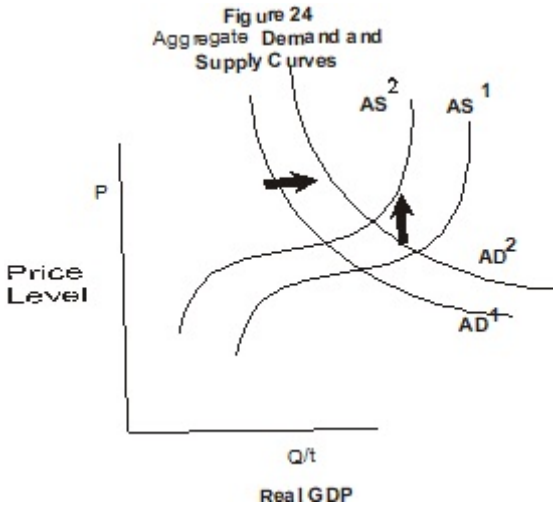
The obvious way of containing demand-pull inflation is to constrain aggregate demand for the purchase of goods/services, i.e., shift the AD curve to the left. Of course, this may also have the effect of reducing employment, particularly among the hard-to-employ, a dilemma which confronts congress and the Federal Reserve constantly (notes 12). We will discuss methods of manipulating AD, and the difficulties thereof, in the next segment of this course.

2. Cost-push inflation. Inflation can also be caused by pressures which raise costs to producers irrespective of the demand for their products. In earlier years, this was closely associated with ongoing union demands for higher wages and cost of living wage increases, which increased costs to producers and which led to higher prices as eventually all costs must be covered if the business is to survive. During the last 75 years, reductions in wage scales hardly ever happened, which is one reason why we have had a long run tendency for ever increasing inflation. However, the ability of unions to compel increasing wages in recent years has been constrained as the

companies they worked for began facing competition from companies in other countries with lower wage scales. In particular, consider automobile manufacturing which might have ceased altogether in the U.S. if not for unions finally agreeing to lower wages.



In our AD and AS curve graph(figure 23), cost-push inflation can be shown by visualizing a shift *upward* in the AS curve, perhaps caused by wage increases in excess of productivity increases, increases in interest rates, and/or *increases in the price of oil or other needed resources*. ***It will shift upward reflecting the fact that it will cost more to produce a given level of GDP***. You can also think of this as a shift leftward reflecting the fact that at a given price level, less will be produced.



Note that in demand pull inflation, prices rise along with increases in output, while in cost push inflation, prices often rise along with ***diminishing output***. This creates a conflict between the goals of minimizing unemployment and minimizing inflation., particularly if we try to increase employment by shifting the AD curve to the right, or to control inflation by shafting the AD curve to the left.

The popularity of escalator clauses (COLAs) in many wage arrangements, e.g., government civil service pay scales, union contracts, etc., is sometimes considered a major cause of, and obstacle to reducing inflation. If a worker received a COLA (Cost of Living Adjustment), raising the AS curve, this would **also** raise increase aggregate demand as workers have more disposable income, causing the AD curve to shift rightward causing a double whammy (figure 24). This would further increase inflation and the COLA driven wage increases, a process that might continue for some time.

Another cause of cost-push inflation, and one which you will probably face in the near future, would be an increase in the costs of imported goods (e.g., computers, televisions) if the value the dollar declines (discussed in notes 14), or tariffs on imported goods are increased, as is currently happening, This is equivalent to moving the AS curve upward, or to the left, since it costs more to import goods, costs which Walmart and other importers must eventually pass on to buyers.

Sometimes, events can affect both the AD and AS curves. Witness the effects of Hurricanes. There is inevitably a great increase in demand for the reconstruction of homes and

business driving up prices for almost all construction goods (demand-pull inflation). At the same time, there was a big increase in factor prices, oil, lumber, and even labor,(often due to shortages of the resources) creating cost-push inflation (as illustrated in figure 24). In fact, unlike supply and demand curves for individual products, where one can reasonably assume *ceteris paribus*, it is more often than not the case that ceteris paribus will be violated when dealing with macroeconomic changes that affect AS and AD curves. We will discuss this further in notes 7.

12. Who is hurt and who is helped by inflation?

Inflation can hurt people. If they have large amounts of cash, or assets that are fixed in price, such as bonds or mortgages, they will see the real value of their assets decline as prices rise. That is, their cash, or the interest they receive, or the value of assets that have with a fixed money price (such as bonds or cash), will buy less than it would when they first earned the money, or purchased the bonds, or lent money since interest rates on existing bonds and the value of the bonds do not normally increase as inflation goes up. Another group hurt by inflation are people on fixed incomes, e.g. pensions which do not increase with inflation. This does not affect recipients of Social Security, however, (but this may change) which is adjusted for changes in consumer prices in the U.S., but it can badly hurt people who depend upon private pension plans that are not adjusted for inflation, or who depend upon an annuity, or their own cash savings. This can also have an effect on our foreign trade. If countries that loan us a large amount of money, often by buying U.S. government bonds, see their buying power significantly reduced, they may refuse to continue to buy these bonds unless interest rates rise.

On the other hand, people who owe money, e.g., mortgages, are *usually helped* as the real value of these debts decline. If their wages rise with inflation, as usually eventually occurs, they are repaying their debts with money with lower purchasing power than the money they originally borrowed. Many people have greatly benefitted during an inflationary period because the real value to creditors of their home mortgages declined as inflation occurred.

In effect, inflation causes a transfer of real income (buying power) from creditors to debtors, bankers to people who have large home mortgages.

Many economists believe that inflation (at least excessive price rises) leads to a capricious redistribution of ***real*** income and assets and should be avoided if possible. Value is transferred away from assets fixed in terms of money, and wealth is diminished for people on fixed incomes and creditors (a fixed amount of money will buy less than before). The wealth (e.g., real wealth) is shifted to debtors, people whose incomes rise with inflation, and people with assets, such as homes and stocks whose value is likely to move in concert with inflation.

How much inflation is acceptable is a major political issue, and peoples' individual viewpoints are undoubtedly skewed by the effect of inflation on the buying power of their personal assets. If you owe a large mortgage, you may hope for inflation. If you hold the mortgage, you will probably have an opposite view (now do you wonder why bankers generally favor policies that restrain inflation).

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Is it possible that some lenders consider inflation likely and adjust their interest rates upward accordingly when making loans so that they are not actually hurt? Some economists believe this

happens. This makes nice theory, but does it operate that way in practice? I doubt it.

13. What is the "real" interest rate

Many economists define the "real" interest rate as **the nominal rate (the rate at which loans are actually made) minus the rate of inflation.** For example, if you have a C.D. paying 3% interest, and inflation for the year is 2%, then your C.D. has actually only gained you only 1% in purchasing power for the year. This is a measure of the "real interest" rate.

Suppose inflation is at 4%. Should you bother purchasing a C.D. paying 3% interest. It may surprise you to learn that you should. Consider the following example. With the C.D., you only lost 1% of your buying power. But if you keep the cash, you will lose 4%, unless, of course, you spend the money before it loses value.

Review Questions

1. What does the consumer price index seek to measure? What is meant by the base year approach in measuring price changes?
2. What is meant by the term "real GDP." What problems does the Chain index reduce when measuring real GDP.
3. What is meant by "substitution bias" in our measures of price indices?
4. Distinguish demand-pull from cost-push inflation.
5. What effect does inflation from any cause have on people who receive fixed incomes? What is the effect of inflation on people who owe large mortgages? What is the effect on the people to whom those large mortgages are owed?
6.. What are the two main reasons why the nominal value of GDP rises?
7. Do you think that cost of living adjustments (COLAs) should be curtailed in times of serious cost-push inflation? How about in times of demand-pull inflation?
8. What is the difference between nominal and real changes in GDP?
9. Are changes in the nominal measure of GDP more indicative of increases in peoples' well being than changes in real GDP?
10. What is meant by a *representative basket of goods and services.*(In calculating the CPI?
14. What is the chain link method for calculating real GDP over time?
15. If your wages increase at the same rate as the CPI, does this guarantee you that you are no worse off as a result of inflation?
16. What is meant by the nominal rate of interest and what is meant by the"real" rate of interest?
17. What effect do quality changes in products have on the accuracy of measures of the CPI or real GDP?
18. Can some prices fall during a period of inflation?