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Inflation: Causes, Costs, and Current Status

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Gail Makinen
Specialist in Economic Policy
Government and Finance Division

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Summary

Since the end of World War II, the United States has experienced more or less continuous inflation. It would be difficult to find a similar period in American history before that war. Indeed, prior to World War II, the United States often experienced long periods of deflation. It is worth noting that the Consumer Price Index in 1941 was virtually at the same level as in 1807.

During the last economic expansion, March 1991-March 2001, the inflation rate remained low by historic standards. This is true regardless of which of the indexes is used to calculate the rate at which the price of goods and services rose. A low inflation rate is especially significant since the U.S. economy was fully employed, if not over fully employed, according to many estimates for the 3 years of that expansion. Yet, contrary to expectations, the inflation rate showed little tendency to accelerate. Keeping an economy moving along a full employment path without igniting a burst of inflation is a difficult policy task.

Because labor costs make up nearly two-thirds of total production costs, the rate at which they rise is often regarded as an indication of future inflation at the retail level. They tended to rise in the latter stage of the 1991-2001 expansion.

Rather than measure inflation by using the actual rate at which prices are rising, some economists prefer a measure of inflation that reflects primarily only the systematic factors that act to raise prices. This is the so-called underlying or core rate of inflation. Three measures of this rate show that inflation was in the 4% to 6% range during 1989-1990, with some tendency to accelerate. Evidence for the end of the 1991-2001 expansion also shows little tendency for the underlying rate to accelerate. It was then in the 2.5% to 3% range.

Why should the United States be concerned about inflation? This study reports the distilled knowledge of economists on the real cost to an economy from inflation. These are remarkably more varied than the outlays for "shoe leather," long reported to be the major cost of inflation.

The costs of inflation are related to its rate, the uncertainty it engenders, whether it is anticipated, and the degree to which contracts and the tax system are indexed. A possible major cost, that related to the inefficient utilization of resources because economic agents mistake changes in nominal variables for changes in real variables and act accordingly (the so-called "signal problem"), may not have been experienced in the United States during the post-World War II era ("shoe leather" being a shorthand term for the resources that have to be expended on less efficient methods of exchanges).

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Inflation is one of the differentiating characteristics of the U.S. economy in the post-World War II era. Except for 1949 and 1955, prices, on average, have risen each year since 1945. The cumulative effect of this inflation is staggering: the price level has risen nearly 900% since the end of World War II.[1]

This was not true in the pre-World War II period. On the eve of that war, 1941, the U.S. price level was virtually the same as in 1807. During the periods from 1846 to 1861 and 1884 to 1909, the United States experienced a near constant price level. And in the 15 years from 1865 through 1879, the price level either remained constant or declined. The principal periods of inflation between 1800 and 1941 were associated with wars and the discoveries of gold and silver both here and abroad (and with increased efficiencies in extracting both metals).

The experience with inflation during the 1991-2001 economic expansion has been reassuring in the sense that even as the economy has been brought to full employment and held there for about 4 years, the inflation rate showed little tendency to accelerate.[2]

In the final year of the previous expansion, 1990, the Consumer Price Index (CPI) rose 6.1% followed by a 3.1% increase in 1991. During the first 10 full years of the 1991-2001 expansion, the CPI rose, respectively, 2.9%, 2.7%, 2.7%, 2.5%, 3.3%, 1.7%, 1.6%, 2.7%, 3.4%, and 1.6%.[3]

Inflation Defined

Inflation can be defined as a sustained or continuous rise in the general price level or, alternatively, as a sustained or continuous fall in the value of money. Several things should be noted about this definition. First, inflation refers to the movement in the general level of prices. It does not refer to changes in one price relative to other prices. These changes are common even when the overall level of

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[1] In this and the following paragraph, all changes in the price level are as measured by the Consumer Price Index.

[2] Full employment in this context means an unemployment rate of about 5%. During the current expansion, a 5% rate was reached in April 1997.

[3] The rate of rise in the CPI per year is measured on a December over December basis rather than a year over year basis.

prices is stable.[4] Second, the rise in the price level must be somewhat substantial and continue over a period longer than a day, week, or month.[5]

Causes of Inflation

There has been practically no period in American history in which a significant change in the price level has occurred that was not simultaneously accompanied by a corresponding change in the supply of money.[6] This has led to a widely held view that "inflation is always and everywhere a monetary phenomenon resulting from and accompanied by a rise in the quantity of money relative to output."[7]

Although this view is generally accepted, it is, in fact, consistent with two quite different views as to the cause of inflation.

In one view a more rapid rate of money growth plays an active role in inflation and results either from mistaken policies of the Federal Reserve or the Federal Reserve subordinates itself to the fiscal requirements of the federal government and finances budget deficits through money creation.[8] According to this view, the control of inflation rests with the Federal Reserve and depends upon its willingness to limit the growth in the money supply.

An alternative view comes in several versions. They have in common a belief that the major upward pressure on prices comes from activities which would produce a fall in real output. A favorite candidate is the attempt by organized labor to obtain increases in real wages. Other activities include the monopolistic pricing behavior of OPEC, major crop failures or changes in the terms of international trade produced by a decline in the foreign exchange value of the dollar. The decline in real output that these activities produce will, in general, lead to rises in unemployment. To

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[4] Especially troublesome for the definition of inflation is how to define a rise in the price of an important commodity such as oil. Since it enters as an important input into the production process as well as being a final product, it may cause many other individual prices to rise. Is this a rise in relative prices or is it more appropriately defined as inflation? Economists differ on how to describe this phenomenon. Some blame OPEC for the inflation of the 1970s and early 1980s. Others treat this as a rise in relative prices and attribute the inflation of the period to misplaced policies of the Federal Reserve.

[5] The words "somewhat substantial" cannot be defined precisely. All of the major price indexes are only imperfectly corrected for changes in the quality of the goods and services contained in the index. For that reason, relatively low rates for inflation (e.g., plus or minus 2% or less) are often taken to be equivalent to price level stability.

[6] Perhaps the only exception to this statement is the inflation during the Korean War of 1950-53.

[7] Friedman, Milton, *What Price Guideposts in Guidelines: Formal Controls of the Marketplace*, Aliber, Robert and George Schultz, ed. (University of Chicago Press, 1966). p. 18.

[8] Examples of Federal Reserve policies that are likely to produce inflation are those that fix rates of interest too low or that support unrealistic foreign exchange values of the dollar.

prevent unemployment from increasing, in one version of this alternative, the Federal Reserve is seen to pump up demand by easing the growth of the money supply. In the process it ratifies the rise in the price level. Thus, in this version, while a growth in the money supply is necessary to ratify the upward movement in the price level, it is not the cause of the rise in prices.

It is interesting to speculate what would happen if the Federal Reserve refused to expand demand in the face of the rise in unemployment. Presumably, after a protracted period, the additional unemployment would lead to a fall in wages, costs, and other prices. Over the longer run, output would return to its previous level or growth path, the price level would fall back to its previous level and only relative prices and wages would be different. Thus, while the Federal Reserve has the power to curb inflation, it is unlikely to exercise this power in the face of a large runup in unemployment.

In another extreme variant, what the Federal Reserve does is really irrelevant. Should it refuse to expand what is conventionally called money to pump up demand in the presence of these developments that reduce output, money substitutes under the guise of credit will emerge that will allow demand to grow and the price increases to be ratified. This variation, interestingly, precludes excessive money growth from causing inflation for it also holds that the Federal Reserve cannot force too much money on the economy. Inflation, then, cannot be a case in which too much money is chasing too few goods.[9]

The first two explanations for inflation find many adherents among American economists, whereas the third is more common among some British economists.

The Economic Costs of Inflation

Economists often discuss jointly the costs to an economy from unemployment and inflation since for much of the period since the late 1950s it was generally believed that a long run tradeoff existed between the two.[10] While the cost of unemployment was well articulated the cost of inflation was relegated to "shoe leather."[11]

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[9] This view is commonly held by economists associated with the late Nicholas Kaldor and systematically explained by him in "Monetarism and U.K. Monetary Policy," *Cambridge Journal of Economics*, vol. 4 (1980), pp. 293-318.

[10] A comprehensive discussion of the costs of inflation can be found in Fischer, Stanley, and Franco Modigliani, "Towards an Understanding of the Real Effects and Costs of Inflation," *Weltwirtschaftliches Archiv*, vol. 114, no. 4 (1978), pp. 736-787.

[11] Before financial institutions could pay explicit interest on deposits that function as money, economists believed that individuals and businesses would shift their wealth into savings-type deposits on which interest was paid. Because of this, they would have to make more frequent trips to banks to obtain money. This involved primarily a cost of shoe leather, as shoes wore out more frequently because of the increased number of trips. Hence the often

(continued...)

The high U.S. inflation rate of the late 1960s, 1970s and early 1980s, caused economists to rethink the costs of inflation to an economy. What follows is a distillation of those efforts.

Describing the costs to an economy from inflation can be confusing for several reasons. First and foremost there is the confusion over the cost to the economy versus the cost to specific individuals. Costs to individuals may not impose a burden on the economy because they are in the nature of a redistribution of either income and/or wealth. What is lost by some is gained by others. Nevertheless, some of these redistributions can have real effects.

Second, some of the costs of inflation are permanent in the sense that so long as the inflation continues the costs will be incurred. Others are only transitory and arise as the economy moves from one inflation rate to another or because the rate of inflation itself is variable.

Third, some costs are incurred only because the inflation is unanticipated while other costs arise even when the inflation is fully anticipated. Finally, some costs occur only because of the absence for one reason or another of appropriate safeguards, for example, the absence of indexed contracts.

Inflation Costs in a Fully Indexed Economy

As an introduction to understanding the costs imposed on an economy by inflation, consider first an economy that is completely indexed for inflation. Thus every conceivable contract is adjusted for changes in the price level including those for debt (bonds and mortgages) and wages and salaries; where taxes are imposed only on real returns to assets, where tax brackets, fines and all payments imposed by law are indexed, where the exchange rate is free to vary and there are no legal restrictions imposed on interest rates, etc.

In this economy the distinction between anticipated and unanticipated inflation is unimportant except if the inflation rate is high and the indexed adjustments are not continuous. Then real costs can occur. However, for analytical purposes, assume that all individuals perfectly anticipated the inflation and that the indexed adjustments are continuous.

In this economy inflation can impose only two real costs: the less efficient arrangement of transactions that result from holding smaller money balances and the necessity to change posted prices more frequently (the so-called menu costs).

The first of these, entailing the rearrangement of transactions due to the higher costs of holding money, is the one cost uniformly identified in the text books as “the cost of inflation.” It is worth considering what is involved.

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[11] (...continued)
expressed view that the primary cost of inflation to an economy was “shoe leather.”

Both individuals and businesses hold money balances because it allows each to arrange transactions in an optimum or least cost way (e.g., for business this involves paying employees, holding inventories, billing customers, maintaining working balances, etc.) and to provide security against an uncertain future. Holding wealth or assets in a money form, however, is not costless. A measure of the so-called "opportunity cost" is the expected rate of inflation, a cost that rises because wealth can be held in alternative forms whose price or value rises with inflation.

When inflation occurs or when the rate of inflation rises, holding money becomes more costly. Individuals and businesses then attempt to get by with less money (for businesses this may mean billing customers more frequently, paying employees more frequently, etc.). This means that least cost transactions patterns are no longer least cost. The new patterns are less efficient — they use more time or more resources to effect a given transaction. In addition, holding smaller real money balances also reduces the security money provides against an uncertain future.

The magnitude of this cost has been reduced in the United States in recent years because financial institutions can now pay interest on a variety of deposits that function as money. Thus, the primary cost of inflation on money holding applies to currency on which no interest is paid. To the extent, however, that financial institutions are slow to raise interest rates in tandem with inflation, deposit holders will economize on holding deposits and arrange transactions less efficiently, thereby imposing a short-run cost on the economy.

The other cost imposed by inflation in a fully indexed economy is the so-called "menu cost" which involves the extra time and resources that are used in adjusting prices more frequently in an environment where prices are rising. These additional costs are incurred mainly with goods and services that are sold in nonauction markets. It does not apply to auction markets where prices change more or less continuously in response to shifts in supply and demand.

Inflation Costs in a Partially Indexed Economy

Inflation Anticipated

Very few economies are fully indexed, even those in which inflation is severe. In the United States, indexation is incomplete. As such, inflation can impose costs even if it is fully anticipated. A case in point involves the arrangements for levying taxes. Taxes are levied in several instances on nominal as opposed to real income. As a result, the interaction of inflation and taxation can impose real effects on an economy by altering the incentives to work, save, and invest. Several examples should suffice to explain what is involved.

Consider first an individual who, in a non-inflationary period, earns a real rate of interest of 5% and who pays taxes of 30% on this income. The aftertax real rate of interest is 3.5% — i.e., 5% - 30% x 5 %). Now, assume that a 10% rate of inflation is expected over the one year term of the loan. As a result, the market rate of interest rises to 15% (composed of a real rate of 5% and an expected inflation

rate of 10%). At a tax rate of 30%, the aftertax rate of return falls to 0.5%.[12] To the extent that saving is responsive to the real aftertax rate of return, taxing nominal yields as is done in the United States, discourages individual savings.[13] (The existing empirical evidence for the United States suggests that private sector saving is quite insensitive to the aftertax rate of return.)

Next, consider what happens to the real aftertax rate of return on business capital during an inflation. For tax purposes, the depreciation of business plant and equipment is based on actual or historic costs. During an inflation, charging depreciation based on historic cost raises the nominal profits of businesses and the basis on which corporate profits taxes are levied. As a result, the aftertax real rate of return falls and this discourages businesses from adding to their stock of plant, equipment, and structures — the bases for future economic growth.[14] [15]

Third, to the extent that income tax brackets are not indexed or not indexed completely, inflation in a progressive income tax system can reduce the real aftertax income for wage and salary earners creating a disincentive to work.

During the 1980s, the U.S. tax code was rewritten to adjust the tax brackets for inflation as well as to reduce the level and progressivity of the federal income tax. As a result, inflation has a much reduced interaction with federal taxes in reducing aftertax real income.

Several private sector practices also interact with inflation to produce real economic effects. The first is the continuation of level payment nominal mortgages for financing housing. This practice front loads the real cost of a mortgage during an inflation and, as a result, it discourages the purchase of homes, especially by younger first-time buyers.

Second, business firms continue to record all data in terms of the dollar even though the real purchasing power of this important unit of measure varies

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[12] The aftertax real rate is equal to: 15% - 4.5% (which is 30% of 15%) = Aftertax nominal yield of 10.5% - 10.0% inflation = 0.5% real aftertax yield.

[13] The possibility arises that the interaction of inflation and the taxation of nominal rates of return will produce negative aftertax real rates of return.

[14] The taxation of nominal profits may also encourage business to opt for shorter-lived capital during an inflation. In addition, since interest expenses are deductible for tax purposes, inflation encourages businesses to finance expansion by the use of debt as opposed to equity. This can impart an element of instability to the financial structure of the economy.

[15] Inflation can also influence some public decision-making because it leads to a misrepresentation of the reported statistics on which these decisions are made. Specifically, the Federal budget deficit tends to be overstated because the inflation premium in interest rates that represents the repayment of principal, is reported as interest expense in both the federal budget accounts and the GNP accounts. To the extent that public concern centers on the current operating outlays of the federal government, true interest outlays are considerably less than currently reported in the budget and, thus, the current operating deficit is much smaller than reported in the federal budget document.

considerably over time. This practice has the potential for distorting the real profitability of business over time as well as the valuation of other relevant magnitudes. Since these nominal magnitudes are frequently used as the basis for borrowing and lending decisions, they have the potential for seriously distorting resource allocations.[16]

Inflation Unanticipated

In this section the real effects of inflation are analyzed in an environment where it is unanticipated and where the economy relies on nominal or unindexed contracts. In this situation, an important effect of inflation is to redistribute both income and wealth. It would be a mistake, however, to conclude that because gainers and losers cancel, there can be no real effects from inflation.

To see one such real effect, consider what happens to the interest bearing public debt. Inflation reduces the real value of the public debt and with it the real value of the wealth of the private sector, the ultimate owners of most of that debt. Thus, inflation redistributes wealth from the private to the public sector. But who constitutes the public sector? These are the taxpayers who also happen to be the members of the private sector, some of whom own the debt.

Thus, redistribution reduces the real value of the taxes needed to service this debt and the reduction is most beneficial for the younger workers in the current population and for future generations. As a result of the fall in real tax burden, their real disposable income rises, both today and in the future. They are thus able to save more while older workers and retirees will, no doubt, have to reduce their consumption for while they are faced with a large wealth loss, they gain very little from the reduced tax burden. Thus, the redistribution of wealth between the private and the public sectors is really a redistribution between generations that could have an effect on the rate of capital formation.

Perhaps the most serious effect of unanticipated inflation in a market economy is its potential to make the price system malfunction and misallocate resources. Those who live in market economies are apt to take its functioning for granted. They may fail to appreciate or understand the vital role that prices perform in such a system. As standard textbooks in economics teach, the price system determines what is produced, how it is produced, and to whom the output is distributed.

For the price system to perform these functions efficiently, producers must be able to discern a change in real or relative prices from a change in nominal prices which essentially leaves all relative prices unchanged. Only with the former will it be profitable to alter production. A similar phenomenon holds for workers. A rise

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[16] These distortions could be minimized if the dollar was defined as a real unit of account (e.g., defined in terms of a standard basket of commodities). Several proposals for doing so have been put forth. See Warren L. Coats Jr., *In Search of Monetary Anchor: A "New" Monetary Standard*, IMF Working Paper, 1989.

in money wages may bring forth a greater quantity of labor time if workers are convinced that this is a rise in real wages, that is, money wages relative to prices.[17]

It is easier for producers and workers to discern these changes in real prices and wages if the price level is stable or if the inflation rate is constant. It is more difficult when the rate of inflation is rising and/or more variable. Under these circumstances market economies are apt to have "signal" problems. That is, producers and workers mistake changes in nominal prices and wages for changes in corresponding real magnitudes and act accordingly. The resulting changes in output and labor time are inefficient and would not have occurred but for the mistakes in perception. A "signal extraction" problem may not have arisen in the United States. The evidence available is insufficient to come to such a conclusion.[18]

Inflation and Uncertainty

Empirical studies completed in the 1970s support the view that inflation is associated with greater uncertainty about future prices and that the degree of uncertainty rises with the rate of inflation.[19]

Rising uncertainty about future prices is believed to produce several possible "real" effects. First, individuals appear to shift from buying assets denominated in nominal terms (e.g., bonds) to so-called real assets such as residential structures, land, precious metals, art work, etc. Because some of these assets are in fairly fixed supply, the resulting capital gain produced by the shift could conceivably raise private sector wealth by a sufficient amount to cause a fall in the saving rate. Second, to compensate for the perceived greater uncertainty, lenders appear to require a greater real reward for supplying funds for investment. Third, contracts tend to be shortened.

The first two developments lead to rising real interest rates which tend to reduce the rate of investment and capital formation. The third development leads businessmen to prefer shorter lived assets.

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[17] The key word in this explanation is "may," for a rise in real wages has both a substitution and an income effect. The substitution effect will cause workers to substitute work for leisure while the rise in real income will make leisure a more attractive option to working. Whether the quantity of labor time increases or decreases as the real wage rises will depend on which effect is stronger.

[18] For a more complete discussion of this issue and the available evidence, see CRS Report RL30102, *Would Committing the Federal Reserve to a Goal of Price Stability Promote Economic Efficiency?,* by William Bomberger and Gail Makinen.

[19] There are numerous studies that provide support for this view. Some are cited in the references in the Fischer and Modigliani study on which this section is based.

Economic Costs of Inflation: Summary

What is the cost of inflation? It is customary in text books to answer this question in terms of a situation where the rate of inflation is anticipated by all market participants who can either continuously re-contract or in which everyone is protected from inflation through indexation. In this world the cost to an economy from inflation is the increased resource cost from conducting transactions with reduced holdings of money — popularly termed "shoe leather" costs. If the inflation is serious, this cost is by no means trivial.[20]

However, inflations are seldom perfectly anticipated. In this situation, perhaps the most serious real effect comes from the ability of rising prices to jam the price signals that are so important to the smooth and efficient functioning of a market economy. Evidence suggests that this may not have been a problem for the United States in post-World War II era.

In general, the cost of inflation to an economy will be larger the higher the rate of inflation, the more variable the rate, the less it is anticipated, the greater is the uncertainty it causes, and the less indexed is the economy.

The Measurement of Inflation

Changes in the Prices of Goods and Services

The rise in the general level of prices, the essence of inflation, is measured by using a price index. Ideally, the price index used should be broad based and one in which the individual prices are weighted to indicate their importance to the economy.

For purposes of this study, three separate price indexes are used. The first two are very broad based and derived from the measurement of the Nation's gross domestic product (GDP). They differ in the quantities that are used to weight the prices. The first uses side-by-side year quantities (that move every year) and is called, the chain weight deflator. The second uses current year quantity weights and is called the implicit price deflator.

The third index is the Consumer Price Index (CPI), which prices a "market basket" of goods and services purchased by an urban family, a market basket whose individual items are weighted by how much the urban family spent on them in a base year period — currently 1982-1984.

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[20] It should be noted that these are not "once-and-for-all" costs. They will be incurred as long as the inflation continues. Thus, a correct measure of these costs is their present discounted value.

In **Table 1**, the inflation rate given by each index is shown for the past 15 years.

Table 1. Alternative Measures of the Rate of Inflation, 1987-2002

(in percentages)

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
GDP-Chain Weight	3.2	3.7	3.6	4.2	3.1	2.3	2.4	2.1	2.1	1.9	1.8	1.2	1.6	2.3	2.0	1.2
Implicit	3.2	3.7	3.6	4.2	3.1	2.3	2.4	2.1	2.1	1.9	1.8	1.2	1.6	2.3	2.0	1.2
CPI	4.4	4.4	4.6	6.1	3.1	2.9	2.7	2.7	2.5	3.3	1.7	1.6	2.7	3.4	1.6	2.7

Source: U.S. Departments of Commerce and Labor.

Notes: CPI is on a December over December basis. GDP deflators are on a 4th quarter over 4th quarter basis. For 2002 it is the annualized rate for the first half year.

The average annual compound rate of inflation over the period 1987-2001 was, according to both the chain weighted and implicit price deflator for GDP, 2.5%, and the CPI, 3.2%.

The data in **Table 1** also show that the low point for the inflation rate during this 15-year period as measured by the CPI occurred in 1998 and 2000 (a year dominated by a recession).

The data on **Table 1** also reveal that over this 15-year period, the inflation rate has never fallen to zero, even during the economic downturns of 1990-91 and 2001.[21] Why? A simple answer from mainline economic theory is that the unemployment rate was never held high enough for long enough. This requires some elaboration.

The key to understanding the theory is to see what happens to the inflation rate when the actual unemployment rate differs from the full employment rate. Whenever the actual unemployment rate is above the full employment rate, the resultant slack will cause the inflation rate to fall. As the inflation rate falls, the expected rate of inflation should also fall if economic agents believe the government is sincere in its efforts to end inflation (i.e., that the government will not reverse its policy in the face of rising unemployment). As inflation expectations fall so will wage demands and falling wage demands will bring about a lower unemployment rate. Ultimately, the economy will move back to full employment at a zero inflation rate or a stable price level. Thus, the important steps in the sequence are (1) a convincing government policy to reduce the inflation rate to zero; (2) toleration of an above normal rate of unemployment; and (3) the adjustment of inflation expectations and wage demands to the lower rate of inflation. Obviously this did not happen during the 1990-91 downturn. The Federal Reserve reversed policy and expanded demand before the

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[21] Given that the CPI imperfectly measures the "true" rate of inflation, a stable price level or a "true" zero rate of inflation is thought to prevail when the inflation rate as measured by the CPI falls within a range of from 0.5% to 2.0% - this being the possible range of error in the current CPI.

inflation rate fell to zero. How long and by how much the Fed would have had to tolerate the U.S. unemployment rate above its full employment level is uncertain. In light of actual experience, a number of economists believe the Fed reversed course too soon.

Since annual estimates of the change in the price level can conceal some rather large quarterly variations, the annualized quarterly rates of inflation according to the chain weighted GDP index and the CPI are given for the most recent 40 quarters in **Table 2**.

Table 2. Recent Quarterly Rates of Inflation

(in percentages at annual rates)

	1993				1994				1995			
	1	2	3	4	1	2	3	4	1	2	3	4
GDP-Chain Weight	2.4	2.2	1.8	2.3	2.1	1.8	2.4	1.9	3.0	1.7	1.8	2.0
CPI	3.7	2.8	2.0	2.8	2.5	2.8	3.6	2.2	3.2	3.2	2.1	2.2

	1996				1997				1998				1999				2000				2001				2002			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
GDP-Chain Weight	2.5	1.4	2.0	1.6	2.9	1.9	1.2	1.4	1.1	1.0	1.4	1.1	1.7	1.5	1.2	1.7	3.1	2.3	1.7	2.1	3.7	2.5	2.2	-0.5	1.3	1.2		
CPI	3.4	3.4	2.8	3.3	2.4	1.1	2.8	2.3	0.5	2.0	1.7	1.6	1.4	3.4	2.7	2.6	1.4	3.4	2.7	2.6	4.2	2.8	0.7	-0.2	1.4	3.6		

Source: U.S. Departments of Commerce and Labor.

Changes in Labor Costs

Since labor costs comprise nearly two–thirds of the value of final output, some economists believe that they are an important determinant of the rate of inflation. In **Table 3**, the two major measures of labor cost, per unit labor costs in the nonfarm business sector and the more comprehensive total employment cost index, are shown.

Both these measures of labor cost showed a tendency to accelerate during the expansion of the 1980s as labor markets tightened. Per unit labor costs rose most rapidly in the final year of that expansion, 1990. Initially, the recession and growing unemployment had a depressing effect on the rise in per-unit labor costs. The recession and the relatively slow pace of the economic expansion also slowed the rate of increase in the Employment Cost Index. It slowly declined over the period 1989-1995. During the last 5 years of the 1991-2001 expansion it rose. This rise was initially productivity driven. However, in the last full year of the expansion, 2000, the increase appears to be due to tight labor markets as labor cost rose 5%.

Table 3. The Rise in Labor Costs, 1988–2001
(in percentages)

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Per Unit Labor Cost[a]	3.1	2.3	5.3	1.7	0.4	1.5	1.1	1.5	0.9	1.1	2.4	1.4	5.0	-0.5	-2.4
Employment Cost Index[b]	4.8	4.8	4.6	4.4	3.5	3.6	3.1	2.6	3.1	3.4	3.5	3.4	4.4	4.2	4.0

Source: U.S. Department of Labor.

a. In the nonfarm business sector.
b. For private industry on a December over December basis. For 2002, ULC is the annualized rate for the first half year while ECI is for the year ended in June.

Some Component Parts of the CPI

Not all prices rise at the same rate over time. In fact, a characteristic of market economies is frequent changes in relative prices. These changes would occur even in the absence of inflation and are due to such factors as changes in tastes and the introduction of new production technologies. In **Table 4**, the rise in the prices of the major component parts of the CPI are contrasted with the rise in the overall CPI. A noticeable development over the course of the decade shown in the table has been the fall in the relative price of energy and the rise in the relative price of medical services.

Table 4. The Change in the CPI and its Major Components
(in percentages)

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
CPI	4.4	4.4	4.6	6.1	3.1	2.9	2.7	2.7	2.5	3.3	1.7	1.6	2.7	3.4	1.6	2.7
Food	3.5	4.5	5.6	5.3	1.9	1.5	2.9	2.9	2.1	4.3	1.6	2.3	1.9	2.6	2.8	0.7
Shelter	4.9	4.4	4.9	5.4	3.9	3.0	3.0	3.0	3.4	3.0	3.4	3.3	2.5	3.5	4.1	3.8
Medical	5.9	7.0	8.5	9.6	7.9	6.6	5.4	4.9	3.9	3.0	2.8	3.4	3.7	4.2	4.7	4.5
Energy	8.1	0.1	5.2	17.8	-7.1	1.9	-1.5	2.2	-1.3	8.6	-3.4	-8.8	13.4	14.2	-13.0	16.2

Source: U.S. Department of Labor.

Note: Measured on a December over December basis. 2002 is the annualized rate for the first half year.

The Underlying or Core Rate of Inflation

Although the actual rate of inflation can provide much useful information to policymakers on the state of the economy, it can also be misleading since it responds to both systematic and random forces. The latter can best be understood by reference to the food component of the CPI. An unusual cold spell in Florida in January that damages a substantial part of the fresh produce crop can send food prices and the CPI soaring. A similar effect can be produced by an unusually wet summer in the midwest. Alternatively, an unusually good combination of rain and sunshine

can produce a bountiful harvest and lower prices. Energy prices are also susceptible to such random effects associated, for example, with the invasion of Kuwait by Iraq.

To minimize the confusing signals that could arise from the use of the actual rate of inflation, some economists prefer to use a price index to measure inflation that reflects basically only systematic forces. For some economists this can be achieved by using the CPI less its food and energy components. (It should be noted that food and energy represent about 25% of the current CPI.) Others want to use a moving average either of the CPI itself or of the current CPI less its food and energy components. The use of a moving average is based on the belief that if there are random factors that influence the actual inflation rate, they have an average value of zero. Hence, the use of a moving average should minimize their influence.

In **Table 5**, three measures of the so–called trend, underlying, or core rate of inflation are presented. The first (CPI,4QMA) is simply a four-quarter moving average of the CPI. The second (CPI-F+E) is the actual rate of inflation from the CPI stripped of its food and energy components. The third (CPI-F+E,4QMA) is the rate of inflation calculated from a four-quarter moving average of the second index.

Table 5. The Underlying Rate of Inflation

(annualized quarterly rates of change)

	1992				1993				1994			
	1	2	3	4	1	2	3	4	1	2	3	4
CPI,4QMA	2.9	3.2	3.2	2.9	3.5	2.9	2.8	2.8	2.2	2.5	2.8	2.7
CPI-F+E	3.9	3.9	2.5	3.5	4.2	3.4	1.9	2.8	2.6	3.4	2.8	2.3
CPI-F+E,4QMA	3.8	3.8	3.6	3.3	3.6	3.5	3.1	2.9	2.9	2.9	2.9	2.7

	1995				1996				1997				1998				1999				2000				2001				2002			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
CPI,4QMA	3.0	3.0	2.7	2.7	2.6	2.9	2.9	3.4	2.8	2.3	2.3	1.8	1.5	1.7	1.5	1.5	1.7	2.2	2.2	2.7	3.2	3.3	3.3	3.6	3.5	3.3	2.8	1.6	1.1	1.4		
CPI-F+E	3.4	3.6	2.5	2.2	3.3	2.6	2.5	2.7	2.2	2.8	1.6	2.1	2.4	2.7	2.3	2.1	1.6	2.4	0.9	2.5	2.9	2.9	2.5	2.4	2.9	2.6	2.6	2.6	2.4	2.1		
CPI-F+E,4QMA	2.8	3.0	3.1	3.0	2.8	2.7	2.7	2.7	2.4	2.6	2.3	2.1	2.2	2.2	2.2	2.2	2.0	2.1	1.8	1.8	2.3	2.3	2.7	2.7	2.2	2.7	2.6	2.6	2.6	2.4		

Source: Computations by author based on Bureau of Labor Statistics data.

The underlying rate of inflation has declined from the 4.5% to 6.5% range in 1991 to a much more moderate 1.0 to 2.5% rate during the past several years.

Conclusion

Inflation can impose a real cost on society in terms of the efficiency with which the exchange mechanism works, by distorting the incentives to save, invest, and work, and by providing incorrect signals that needlessly alter production and work effort. Because of this, policymakers should be concerned with the ongoing rate of inflation and any tendency for it to accelerate. An additional reason for concern

arises because efforts to reduce the rate of inflation have often been associated with economic downturns. It should not be forgotten that the double–digit inflation of the early 1980s was reduced only through an economic downturn during which the unemployment rate rose to its highest level since the depression of the 1930s. It is argued that the tendency for the inflation rate to accelerate in the late 1980s was a major reason why the Federal Reserve tightened monetary policy, which was an important factor causing the recession of 1990-91. Inflationary developments subsequent to that recession have been encouraging. The inflation rate has shown either no or only a modest tendency to rise as unemployment came down. Using various measures, the inflation rate for the period 1993-2000 was low by standards of the preceding decade. Much of the upward pressure on prices during 1999-2000 and 2002 has come from energy prices. Likewise, the decline in the inflation rate during 2001 is due to a large fall in energy prices. We are now seeing the best inflation performance by the U.S. economy since the 1960s.