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INTERPRETING SHORT-RUN PRICE DEVELOPMENTS

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The subject of inflation is currently receiving a great deal of attention, particularly in view of the Administration's recent imposition of a 90-day freeze on wages and prices. In recent months, each new set of figures on wholesale or consumer prices has generated widespread press coverage, including articles in business and financial publications and remarks by public officials, government and private economists, and others. Statements concerning progress in curbing inflation, or the lack thereof, however, are not always in agreement. The reason for this somewhat confused situation is the absence of standardization in the time spans used by both economists and noneconomists for computing changes or rates of change in prices. Adding to the confusion are the differences of opinion as to which price index is the best measure of inflation. Thus, interpretation of the price picture can vary considerably, depending on which price index is used, whether changes are measured on a monthly, quarterly, semi-annual, or annual basis, and whether data are adjusted for seasonal variation or unadjusted.

IN THIS ISSUE

This article focuses on a method of measuring price changes that has been emphasized by the Bureau of Labor Statistics during the past year or so. The technique views movements in the wholesale price index (WPI), the consumer price index (CPI), and their major components in terms of percent changes in the seasonally adjusted data, at compound annual rates, over moving six-month intervals. Such data improve the reading of the price situation by identifying lead-lag relationships in certain price series and by revealing short-run patterns in rates of price change that otherwise would not be readily apparent in the index levels. Although certain price developments have been on the favorable side in recent months, this article points out that other price movements were particularly disconcerting and undoubtedly were instrumental in the Administration's decision to impose a wage-price freeze.[1]

SEASONALITY

It is important to recognize that both wholesale and consumer prices are subject to seasonal variation. For analytical purposes, the appropriate method of evaluating short-run price developments is on a seasonally adjusted basis.

In recent years, the Bureau of Labor Statistics has developed seasonal factors for a large amount of price data and has also contributed to a better understanding of the price situation by publishing seasonally adjusted changes in the WPI, CPI, and many of their components, in addition to unadjusted data. Seasonal factors for the CPI and two of its major groupings are listed in Table I. For the total CPI, seasonality is generally small—i.e., the largest monthly seasonal change called for is minus 0.19 percent from December to January (the difference between the seasonal factor of 100.06 for December and 99.87 for January). The largest seasonal variation over a six-month period calls for a 0.26 percent rise from January to July, which makes the seasonally adjusted annual rate of change in the CPI about 0.5 percent less than the unadjusted annual rate of change.[2] The opposite effect occurs from July to January, when the seasonal factor adds about 0.5 percent to the annual rate of change.

Seasonal variations for individual price groupings, on the other hand, are greater than those for the total CPI, but they tend to offset one another, at least in part. For example, during July and August, seasonal patterns call for a rise in food prices and a decline in prices of commodities less food. The reverse pattern occurs in October and November (see Table I).

As shown in Table II, there are a number of possible ways in which prices (or for that matter, any economic series subject to seasonality) can move on a seasonally adjusted basis. As an illustration, seasonal factors for the food grouping of the CPI show a 0.6 percent decline from October to November 1971. If food prices decline less than 0.6 percent, the seasonally adjusted index

[1] The analysis in this article is confined to the two most widely followed monthly price indexes. There are, of course, other broadly based price measures, available on a quarterly basis, that are useful in obtaining a supplementary reading of the price situation. See, for example, "Alternative Measures of Price Change for GNP, 1965-1971," *Survey of Current Business,* U. S. Department of Commerce, August 1971.

[2] As a case in point, between January 1971 and July 1971, the CPI rose 3.9 percent at a seasonally adjusted annual rate, but 4.4 percent at an unadjusted annual rate. The basic relationship is: the unadjusted percent change minus the percent change called for by the seasonal factors is approximately equal to the seasonally adjusted percent change. (Unless otherwise stated, all references in this article to rates of change in prices are understood to be based on seasonally adjusted data.)

TABLE I

Consumer Price Index Seasonal Adjustment Factors
1971

	January	February	March	April	May	June	July	August	September	October	November	December
All items	99.87	99.82	99.96	100.02	99.96	100.08	100.13	100.04	100.01	100.04	100.03	100.06
Food	100.0	99.8	99.8	99.7	99.8	100.2	100.6	100.7	100.2	100.0	99.4	99.8
Commodities less food	99.7	99.8	99.9	100.0	100.0	100.1	99.9	99.7	99.9	100.4	100.5	100.2

Source: U. S. Department of Labor, Bureau of Labor Statistics

TABLE II

Examples of How Prices Can Rise, Decline, or Show No Change, On a Seasonally Adjusted Basis
(Hypothetical Combinations)

Seasonally Adjusted Increases	Unadjusted Percent Change	Seasonal Factor	Seasonally Adjusted Percent Change
Prices decline less than seasonally	–0.5%	–0.6%	+0.1%
Prices rise more than seasonally	+0.5	+0.3	+0.2
Prices rise counterseasonally	+0.5	–0.3	+0.8
Prices fail to register normal seasonal decline	–0–	–0.3	+0.3
Seasonally Adjusted Declines			
Prices rise less than seasonally	+0.5	+0.6	–0.1
Prices decline more than seasonally	–0.5	–0.3	–0.2
Prices decline counterseasonally	–0.5	+0.3	–0.8
Prices fail to register normal seasonal increase	–0–	+0.3	–0.3
Seasonally Adjusted No Changes			
Prices decline in line with normal seasonal pattern	–0.5	–0.5	–0–
Prices rise in line with normal seasonal pattern	+0.5	+0.5	–0–
No seasonal change	–0–	–0–	–0–

Source: Federal Reserve Bank of Cleveland

would increase. If unadjusted food prices are unchanged or actually rise, the seasonally adjusted increase would, of course, be all the greater.

RATES OF CHANGE

For purposes of evaluating the price situation, business analysts would agree that rates of change are more significant than index levels. The question then is: What is the appropriate interval that is meaningful for analysis? There seems to be general agreement that a change in prices over one month is too short an interval and that one year is too long an interval. The choice of an appropriate time span for observing price movements, there-

fore, is something longer than one month, but less than a year. Seasonally adjusted compound annual rates of change over three-month periods is one way of viewing price developments.[3] An alternative method, however, is preferred by Geoffrey H. Moore, Commissioner of Labor Statistics and a professional economist who has made significant contributions to the analysis of the business cycle:

> After some experimentation I have concluded that the rate of change over a 6-month span meets reasonably well such criteria as smoothness, simplicity, and limited distorting effects, for the CPI and most other price and wages series.[4]

WHOLESALE PRICES IN GENERAL

Although the total WPI is occasionally used as a general purpose price index, it has some limitations in the analysis of price developments. One major shortcoming is that the WPI does not relate to any particular sector of the economy or to any special group of buyers or sellers. The composite WPI is designed to measure prices at the first significant commercial transaction (not necessarily at wholesale) for commodities such as farm products, processed foods, crude industrial materials, and finished goods for producers, consumers, and government[5]. Despite the heterogeneous composition of goods included in the WPI, which are at various stages of the productive process and destined for different groups of end users, the WPI is still useful. Specific needs of businessmen and price analysts are served by price data for particular market sectors, industry groupings, subgroups and product classes, and individual items in the WPI. In addition, various components of the WPI provide some indication of forthcoming changes in consumer prices and are used to convert certain portions of current dollar gross national product (GNP) into constant dollars.

A problem in evaluating the WPI stems from difficulties in accurately measuring true price changes.[6] Small month-to-month changes in the

[3] In the monthly publication, *Business Conditions Digest,* the U. S. Department of Commerce recently began publishing such data in graphic form for the CPI and the WPI of industrial commodities.

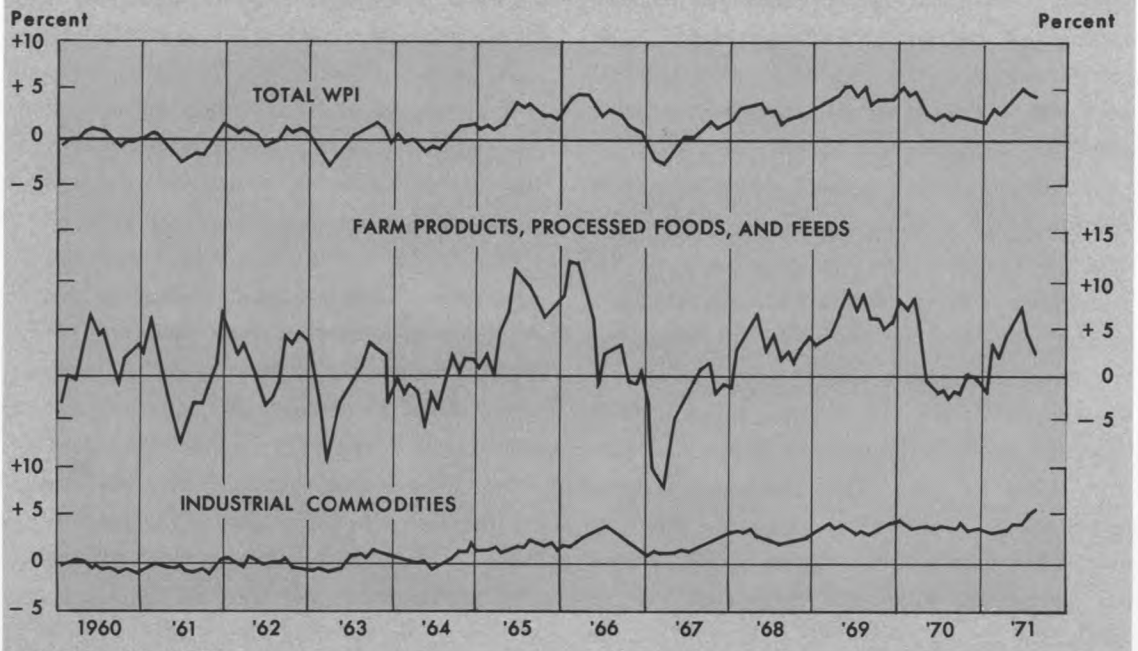
[4] Geoffrey H. Moore, "The Cyclical Behavior of Prices," Report 384, U. S. Department of Labor, Bureau of Labor Statistics, 1971. The six-month changes referred to are based on seasonally adjusted data, at compound annual rates. This method of analysis also has been emphasized during the past year or so in the monthly BLS press releases on wholesale and consumer prices. Some mention of the effects of compounding may be of interest. Compounding six-month changes to annual rates yields the same results as simple annual rates when the changes are small—i.e., less than plus 2.3 percent over a six-month period. For example, a gain of 2.2 percent over six months is both a simple and compound annual rate of 4.4 percent; a gain of 4.0 percent over six months is a simple annual rate of 8.0 percent, but a compound annual rate of 8.2 percent.

[5] Although services (other than general government compensation) account for over 30 percent of total spending in the economy, prices of services purchased by businesses, consumers, and government are excluded from the WPI.

[6] There is evidence that more variation exists in price movements than is revealed by the WPI and the individual groupings. Studies have indicated that effective transactions prices are often at variance with published price indexes. Although official attempts are made to collect transactions prices, many sellers allegedly report prices (not necessarily list prices) that are unchanged over considerable periods of time. With discounts, rebates, and other concessions from list prices frequently not reported, a number of undetected price movements, both on the up and down side, may not be included in the WPI of industrial commodities. See, for example, George J. Stigler and James K. Kindahl, *The Behavior of Industrial Prices,* (New York: National Bureau of Economic Research, 1970).

Chart 1.

RATES OF CHANGE IN THE WHOLESALE PRICE INDEX AND MAJOR GROUPS



Last entry: August 1971

NOTE: Six-month percent changes, seasonally adjusted compound annual rate, plotted on terminal month span.

Source: U. S. Department of Labor, Bureau of Labor Statistics

WPI and even moderate upward or downward drifts over longer spans often have uncertain or misleading implications. When small changes or drifts in wholesale prices give way to widespread and cumulative upward movements, however, disruptions or imbalances in economic activity usually result—and there is little doubt that inflation is underway. In general, periods of stability in the WPI have tended to coincide with periods of stability or only moderate increases in the other general price measures, such as the CPI or the implicit price deflator for GNP. Sharply rising wholesale prices have usually either preceded or accompanied sharp increases in the other major price indexes.

Rates of change in the WPI and its two major groupings—foodstuffs and industrial commodities—are shown in Chart 1. Analysts generally attach more significance to industrial prices than agricultural prices in evaluating the WPI. Industrial prices account for roughly three-fourths of the weight of the total WPI and have traditionally been thought to be more responsive to the business cycle and to monetary and fiscal policies than agricultural prices. This is not to imply that wholesale prices of farm and food products are unimportant; they are of much importance in determining factors such as farm income, the balance of international trade in agricultural commodities, and retail food prices, which in turn

greatly influence the cost of living.

The chart clearly reveals the erratic behavior of farm and food prices and also shows that much of the short-run variation in the total WPI is attributable to swings in agricultural prices. During the early 1960's, frequently there were periods when prices of foodstuffs and industrial commodities moved in opposite directions, which tended to keep the total WPI at a virtually stable level. Between 1960 and 1964, the rate of change in the total WPI was as low as minus 2.9 percent and as high as 1.8 percent over any six-month period. For the most part, the rate of change hovered around the zero level; and, on balance, the total WPI registered an insignificant decline of 0.2 percent from 1960 to 1964. This development seems remarkable in view of the wide fluctuations that occurred in farm and food prices—a range of plus 6.5 percent to minus 9.5 percent—during the 1960-1964 period. Meanwhile, the rate of change in industrial prices stayed within a very narrow range that rarely exceeded plus or minus one percent.

In late 1964, the economy began to emerge from its phase of relative price stability. During the following year and a half, there was an intensification of upward price pressures as economic activity rapidly expanded and labor markets significantly tightened. In 1965, the rate of increase in industrial prices began to edge above the one percent level, while farm and food prices rose dramatically in response to supply shortages caused by poor weather conditions and reductions in livestock marketings. This is mentioned because the sharp rise in agricultural prices during 1965, coinciding as it did with upward pressures on industrial prices, certainly aggravated the price situation. (During the year ending December 1965, prices of farm and food products rose 9.5 percent, thereby accounting for more than three-fourths of the 3.4 percent rise in the total WPI.) However, the rise in agricultural prices had little to do with the escalation of military activities in Vietnam, the acceleration in the money supply beginning in early 1965, or the sharp upswing in Federal Government expenditures in connection with Vietnam (factors commonly cited as being sources of the inflationary wave beginning in 1965).

During the first half of 1966, the economy experienced the most serious period of inflation in almost a decade, with farm and food prices reaching their peak rate of increase (13.0 percent) in the winter and industrial prices rising at their peak rate (3.7 percent) in mid-summer. Partly in response to a slowdown in business activity (resulting from restrictive monetary and fiscal policies), a phase of price relief began in the latter half of 1966 and extended well into the following year. (It may be recalled that the economy experienced a moderate decline in constant dollar GNP in the first quarter of 1967—a period commonly referred to as a mini-recession.) Throughout the last half of 1966, the rate of increase in industrial prices began to subside; and during the first half of 1967, the rate of gain averaged slightly less than one percent. Farm and food prices declined at a rate large enough in early 1967 to cause the total WPI to decline for some months.

As the economic expansion gathered momentum around mid-1967, inflationary pressures were renewed. Industrial prices began to rise rapidly once again—this time for a sustained period. For the most recent two and a half years, the rise in industrial prices has continued at a fairly steady and relatively high rate. It was particularly disconcerting that the increase in industrial prices showed no sign of abatement in 1970, despite a moderate economic contraction. As economic

recovery unfolded in 1971, it was even more disconcerting that for the six-month period ending in August 1971, industrial prices were rising at their fastest rate of the entire post-1965 inflationary episode (5.7 percent).

The behavior of farm and food prices in recent years has done little to alleviate the inflationary situation. A temporary lessening of upward pressures on the total WPI did occur in 1970, reflecting a sharp drop in the rate of increase in farm and food prices (including a brief period of outright declines). Between January 1970 and January 1971, the six-month rates of change in the total WPI declined from 5.1 percent to 2.0 percent. As of mid-1971, however, the total WPI was again rising at a 5.0 percent rate—not significantly less than the peak rate of 5.2 percent two years earlier.

WHOLESALE PRICES BY STAGE OF PROCESS

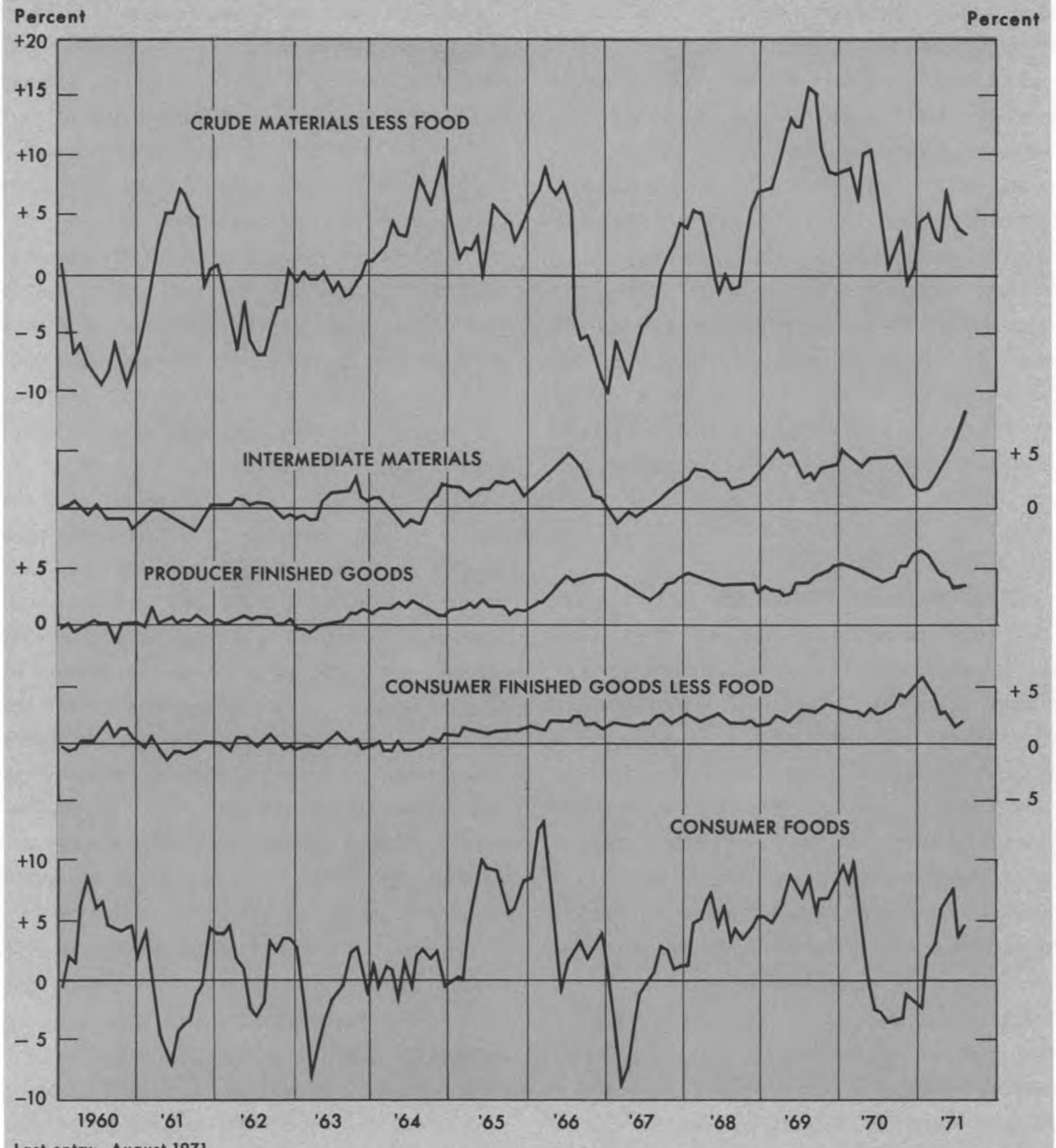
Another perspective on short-run fluctuations in wholesale prices, grouped according to stage of process, is provided in Chart 2. At the primary stages of processing are crude materials less food and consumer foods, which are both extremely volatile in their rates of change. In general, prices of these groupings are highly sensitive to temporary changes in market conditions of supply and demand. Somewhat less responsive to market forces, but still relatively volatile, are prices of intermediate (or semi-finished) materials. At the final stages of processing, and even less volatile than prices of intermediate materials, are prices of producer finished goods and consumer finished goods less food. Price swings in these two groupings are buffered to some extent because short-run changes in demand for finished goods other than food usually have more of an immediate impact on inventories, new orders, and backlogs than on prices. Generally, only after firms view changes in demand as something more than temporary do they change prices of finished goods. With some time lag, changes in materials prices, together with the behavior of unit labor cost (among others), eventually influence prices of finished goods.

The tendency of materials prices to lead finished goods prices is evident in Chart 2. With respect to timing and magnitude, however, the relationships are by no means systematic and uniform. For example, the rate of increase in intermediate materials prices turned down in August 1966, and the rate of increase in producers' finished goods prices turned down in February 1967. More recently, gains in intermediate materials prices eased for a brief period beginning in October 1970, and an easing in the rate of increase in producers' finished goods prices began in February 1971. Except for brief periods of outright decline in 1964 and 1967, prices of intermediate materials have been rising (at varying rates) since early 1963. Rates of change in producer finished goods prices, above the zero level since mid-1963, have tended to move in the same direction as intermediate materials prices after about three to six months. Prices of consumer finished goods less food, which display less volatility than producer finished goods, have been rising since late 1964.

The six-month rates of increase in prices of both producer finished goods and consumer finished goods less food reached their peaks in January 1971, and since then the rates of increase have moderated. By contrast, the rate of increase in prices of crude materials less food has trended irregularly upward since late last year, while price increases in intermediate materials have accelerated since early this year. In the six-month period

Chart 2.

RATES OF CHANGE IN WHOLESALE PRICE INDEXES, BY STAGE OF PROCESS



Last entry: August 1971

NOTE: Six-month percent changes, seasonally adjusted compound annual rate, plotted on terminal month span.

Source: U. S. Department of Labor, Bureau of Labor Statistics

ending August 1971, prices of intermediate materials (accounting for more than 40 percent of the WPI) experienced their fastest rate of increase (8.0 percent) since 1950. In the absence of the current wage-price freeze, it was likely that the recently renewed upward pressures on materials prices would have precipitated a reacceleration of price increases for finished goods.

Wholesale prices of consumer foods, like those of the farm products and processed foods grouping previously discussed, are largely independent of price swings in the materials and products groupings. The behavior of consumer food prices at the wholesale level, of course, determines in large part the behavior of food prices in retail markets. It can be observed in Chart 3 that the contours of short-run rates of change in wholesale prices of consumer foods are similar to those traced by the food component of the CPI, except that the amplitudes of the swings are much greater at the wholesale level than at the retail level.

CONSUMER PRICES

The CPI, unlike the overall WPI, does relate to a certain sector of the economy. Specifically, the CPI is designed to measure prices of goods and services purchased by urban wage earners and clerical workers with about average incomes. (The CPI is not necessarily representative of price changes in the market baskets of items typically purchased by those who live in rural areas, retired persons, and high or low income groups.)

Just as the WPI has some shortcomings, so also does the CPI have limitations. The most important of these is that spending patterns change over time. As a result, the fixed market basket on which the CPI is based tends to become outdated, depending on when the BLS conducted the last household expenditure survey.[7] The effect of this factor, apart from other possible shortcomings of the CPI, is that during a period of sharply rising prices, increases in the true cost-of-living tend to be overstated somewhat by the CPI. Another criticism of the CPI is that the Bureau of Labor Statistics does not take completely into account the effects of quality improvement and quality deterioration for many types of items, particularly services.[8]

Despite such limitations, a great deal of attention is focused on the behavior of the CPI because it is a major factor in the determination of wage and salary increases. Among other things, the CPI also influences Congressional legislation regarding social security benefits (although not yet in any formal, systematic way).

Chart 3 depicts rates of change in the CPI and its major components since 1960. Stability in the total CPI has been a rare phenomenon during the past decade or so. In fact, the last six-month period in which the CPI did not register an increase was June 1961. During the early 1960's, when the WPI was fluctuating around a zero rate of change, the CPI was drifting upward at an undisturbing and tolerable rate of a little more than one percent per year. This upward drift largely reflected a fairly steady and moderate rate of increase in prices of services. Rates of changes in prices of both food and commodities less food frequently moved in opposite directions and occasionally were negative.

[7] Currently, the weights of the CPI are based on spending patterns as of 1960-1961.

[8] Recent studies conclude that evidence thus far is insufficient to judge the direction of probable bias—whether up or down—on the overall CPI. See Jack E. Triplett, "Determining the Effects of Quality on the CPI," *Monthly Labor Review*, U. S. Department of Labor, May 1971.

Inflationary pressures began to accumulate in 1965, as food prices rose rapidly and prices of services began to move toward higher rates of increase. By contrast, prices of commodities less food, following a temporary spurt during the first half of 1965, had settled back to a zero rate of change during the latter half of the year. By early 1966, however, all three major components of consumer prices were contributing to accelerated increases in the total CPI. The rate of increase in the CPI reached an interim peak of 4.1 percent in April 1966 and then subsided to a rate of 1.6 percent 12 months later. The relief stemmed in large part from a dramatic swing in food prices, which moved from a peak 9.0 percent rate of increase in March 1966 to a 2.7 percent rate of decrease in April 1967. The slower rise in the CPI between early 1966 and early 1967 was reinforced by brief intervals of declining rates of increase in prices of both commodities less food and services. By mid-1967, the decline in food prices had run its course, and the CPI began a renewed phase of accelerated rises culminating in a peak 6.7 percent rate of increase in April 1970. Since then, the rise in the CPI has slowed markedly—to a 4.3 percent rate of increase as of August 1971.

The recent slowdown in consumer prices partly reflects the lower rate of increase in food prices during the latter half of 1970 and the lower rate of increase in prices of commodities less food during the first half of 1971. The trend of services prices throughout the past year or so has also helped to moderate increases in the CPI, but this trend reflects one special factor—the behavior of home mortgage interest rates. In the early months of last year, mortgage interest rates rose rapidly and were largely responsible for the services component of the CPI reaching a peak rate of increase of 9.6 percent in May 1970. When mortgage interest rates stabilized during the latter half of 1970, the rate of increase in services prices began to subside. In January 1971, mortgage interest rates began to fall rapidly, thus reinforcing the declining rate of increase in services prices. As of August 1971, the rate of increase in services prices had begun to move upward once again.

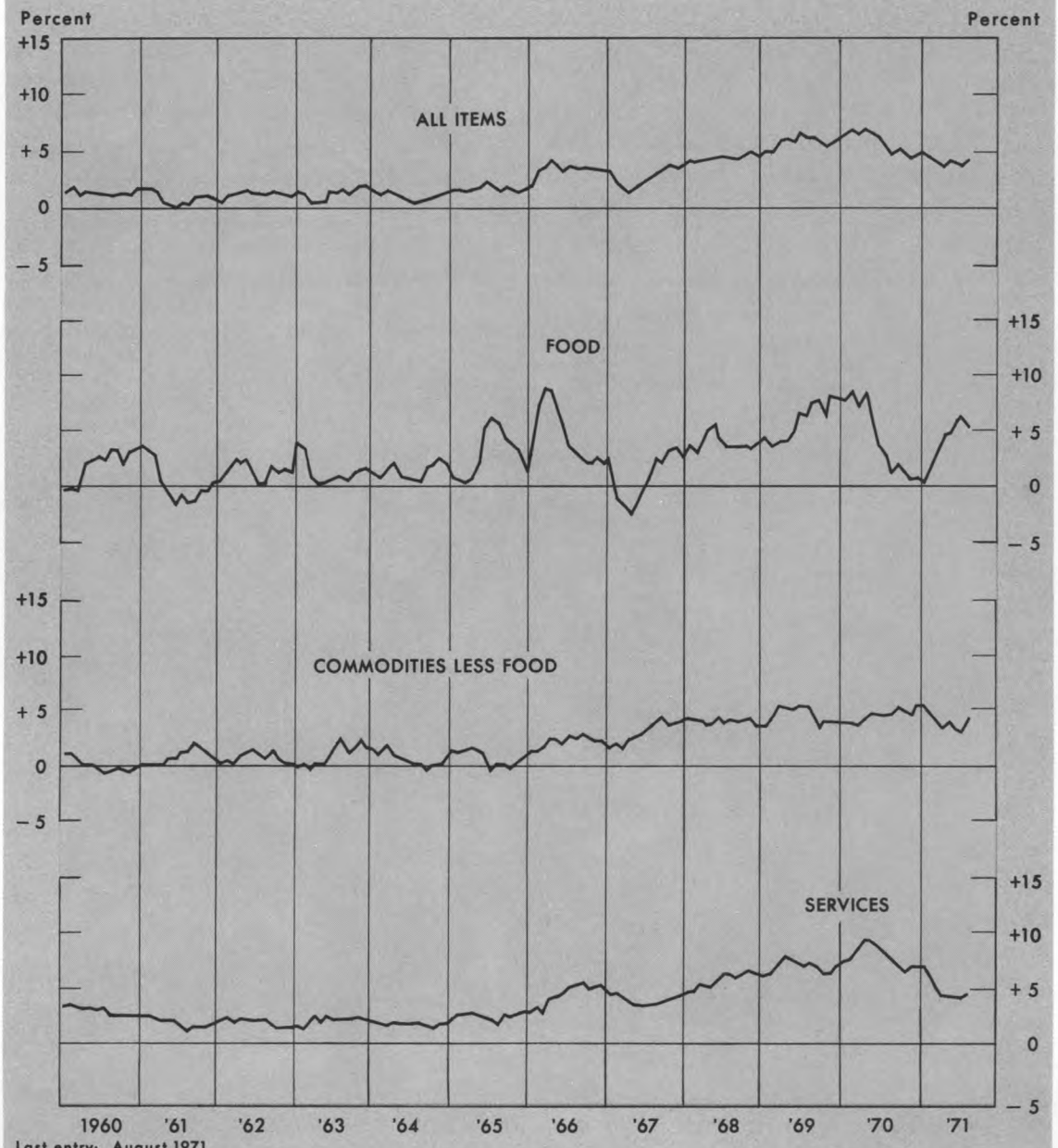
Despite some favorable developments on the consumer price front during the past year or so, there have been other recent and somewhat disturbing developments that pointed toward a renewed phase of acceleration in the overall CPI—until the wage-price freeze occurred. By early summer 1971, there were signs that the decline in mortgage interest rates had bottomed out and would no longer sustain a further slowdown in services prices. Price indexes for many important services, such as property insurance rates, home maintenance and repair, gas and electricity, and residential telephone, have posted accelerated rates of increase thus far in 1971. The rate of increase in food prices turned up sharply beginning in February 1971, and over the following six months, food prices rose at a rate of 6.3 percent. Adding to the unfavorable price picture with respect to consumer prices was the previously mentioned sharp rate of increase in wholesale prices of materials, which undoubtedly would have contributed to a renewed phase of upward pressures on retail prices of commodities less food.

THE NEAR TERM

President Nixon's new economic program is designed to break the momentum of inflation and inflationary expectations, improve the balance of trade and the international financial position of the United States, create more jobs, and raise the nation's rate of real economic growth. The program's ultimate degree of success in achieving

Chart 3.

RATES OF CHANGE IN THE CONSUMER PRICE INDEX AND MAJOR COMPONENTS



Last entry: August 1971

NOTE: Six-month percent changes, seasonally adjusted compound annual rate, plotted on terminal month span. Services are unadjusted, no seasonal pattern.

Source: U. S. Department of Labor, Bureau of Labor Statistics

those goals is, of course, a matter of conjecture at this stage. What can be said with some certainty is that the 90-day freeze on wages, rents, and most prices will result in much smaller price increases than would otherwise have occurred. (A slight upward drift in the price indexes seems likely.) Regardless of what follows the 90-day freeze, price movements will be distorted for a few months, beginning with the CPI for August and the WPI for September 1971.[9] In other words, the economy is now in a state of suppressed inflation, and the official price indexes will provide little indication of the extent of underlying inflationary pressures. In view of the new economic program, it is probable that there will be an extraordinary amount of attention given to the behavior of prices after the freeze ends. As has been emphasized in this article, there are key components in the wholesale and consumer price indexes that should be examined closely to determine significant price movements that are sometimes concealed by the behavior of the overall indexes.

[9]The WPI is based predominantly on prices in effect on the Tuesday of the week in which the 13th falls. Thus the August 1971 WPI was computed on the basis of August 10th prices, too early to be affected by the freeze effective August 15. The CPI is based on prices collected throughout the month, and therefore the August CPI was influenced to some extent by the freeze.

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