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The Wholesale and Consumer Price Indexes: What's the Connection?

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The persistence and, more recently, the acceleration of inflation, have heightened public interest in economic indicators of price behavior. This attention is understandable, since rising prices reduce the purchasing power of everyone's dollars.

Accompanying the widespread interest in current price index behavior, unfortunately, are some equally widespread misconceptions regarding the meaning of these indexes and their relationships. In particular, it is frequently implied that increases in the Wholesale Price Index (WPI) will be followed more or less automatically by increases in the Consumer Price Index (CPI). This article shows that this point of view has little factual basis. The article also discusses the meaning of a price index, and gives a brief review of the content and construction of the CPI and the WPI.

MEASURING PRICE CHANGES

The idea behind a general price index covering hundreds or thousands of items can be explained with examples of one or two goods. Such examples also help show some of the difficulties and ambiguities in the construction and interpretation of price indexes.

If only one good or service is being considered, the meaning of a price index seems obvious. And so it is, as long as one remembers that isolating pure price differences requires either keeping constant, or adjusting for differences in, quality and quantity. For example, suppose a hamburger price index is to be used to report differences in the price of ground beef from store to store, or over time.

First, some quality standard for hamburger would have to be chosen, based on considerations such as fat content and freshness. Then, prices actually charged for various qualities of ground beef would have to be put in terms of equivalent prices for the selected standard. These quality-standardized prices would be used in the index so that its values would reflect price variation alone. Even in this hamburger example, one can appreciate how hard it often is to estimate the extent to which price reflects quality. This task is especially difficult when an index is designed to measure price changes in a product, such as the automobile, that has improved so much over the years.

Since the purpose of a price index is to make price comparisons, two or more prices of the same good or service are always involved. One of these serves as a point of reference, the other is compared to it. Because a ratio of the two prices is such an obvious choice for comparing their relative sizes, a price index has come to mean a price ratio. As a single, pure-number summary of price change, a price index omits information used in its calculation. For example, suppose that a pound of ground beef costs $1.20 today but $.80 a year ago. Using last year as a reference point, today's hamburger price index value is ($1.20/$.80) = 1.50 (or 150, to follow the custom of expressing an index as the price ratio x 100). This shows a one-year increase of 50 per cent in the price of ground beef over last year's index value of 100 = ($.80/$.80) x 100. The index value does not reveal the dollar price of hamburger in

either year, or show the absolute difference between the two prices—it only shows the relative change. As the number of items included in a price index increases, however, the usefulness of the index as a summary measure of price change compensates for the details it hides.

What does a price index tell us when it covers two or more goods or services? Clearly, its value must reflect some sort of an average of the price changes of the individual items included. One possibility would be a simple average. However, this choice implicitly assigns equal importance—gives equal weight—to each of the items. For example, suppose that a manufacturer uses two raw materials, copper and wood. If the price of copper rises 50 per cent, and the price of wood rises 10 per cent, the simple average of a 30 per cent increase (two-item index value = 130) does *not* likely mean that the manufacturer must spend 30 per cent more to buy the same quantities of copper and wood as before. The item he produces may require proportionally much more of one raw material than of the other—depending on these proportions, his costs may have risen by as much as 50 per cent, or by as little as 10 per cent. Because it treats components equally, simple averaging does not tell us much. Since a price index necessarily involves some weighting scheme, its usefulness is improved by choosing weights to show that, for certain purposes, some items are relatively more important than others.

The choice of appropriate weights in a price index follows directly from the purpose for which the index is intended. For example, the price index of each food in a comprehensive index of food prices in the United States would be weighted according to that food's share of total national expenditures on food during some reference, or base, period. These weights would differ from those in a food price index designed, say, to measure changes in the prices of foods bought by an average American family, because such a family would spend little or nothing on some of the most expensive as well as on some of the least palatable foods.

As just indicated, expenditures on individual items as fractions of total expenditures on a class of items are used as weights, or measures of relative importance, in a price index. However, it is easier (and quite correct) to think of a price index as a ratio comparing total expenditures on *fixed quantities* of included items, under two sets of prices.

In order to measure price changes alone, a price index covering two or more goods or services must be based on constant quantities, which means constant weights or measures of relative importance. This requirement introduces some ambiguity in its construction, however, and invites misinterpretations. For example, suppose that a pound of steak costs the same as a pound of cheese (say, $1.00), and an average family buys five pounds of steak for each one pound of cheese. Now, assume that the price of steak doubles to $2.00 a pound while the price of cheese stays the same at $1.00 a pound. Quantities of steak and cheese previously purchased for $6.00 would now cost $11.00, yielding an index value of $(11/6) \times 100 = 183.33$. That is, a steak-and-cheese price index based on the 5-to-1 weights implied by the initial quantities would show an 83 1/3 per cent price level increase.

So far, so good, *if* an average family continues to purchase five pounds of steak for every one pound of cheese. But this very important "if" is often ignored by persons interpreting price indexes. In fact, expenditures seldom rise by the amounts sometimes inferred from price index changes.

What happens when some prices rise more than others? People substitute. In this example, cheese is likely to be substituted for steak, and so are other foods whose prices have not risen as much. (To give the example a more general connotation, cheese can be thought of as all foods other than steak.)

Suppose that when the price of steak in-

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creases, the family decides to buy three pounds of steak instead of five, and three pounds of cheese instead of one. This new combination will cost $9.00, of which $6.00 is for steak and $3.00 is for cheese. This suggests an alternative price index which uses the new, or current, weights, instead of those of the initial period. Calculation of this current-weighted index would yield values of 66 2/3 and 100 (or 100 and 150) for the initial and current periods, respectively, showing that currently purchased quantities of steak and cheese cost 50 per cent more now than in the initial period.

Since a price index using current weights gives a different answer from one using initial-period weights, is one a "better" measure of price change? No. They just answer different questions. In practice, however, price indexes using initial period weights are more common, because they do not require re-determination of expenditures each period.

When prices rise, it is tempting to think that those who must pay these higher prices are worse off. But a rising price index is not necessarily indicative of a decline in well being for three reasons. First, a price index covering many items may increase, even though the prices of some of the items are declining. In such a case, substituting the decreasing cost items for those of increasing expense can leave the purchaser better off. Second, even if all prices are rising, well being can be rising—or at least unchanged—if incomes are increasing too. Third, the substitutability among consumer goods changes over time with changing tastes, as does the substitutability of producer inputs with changing technology.

WHOLESALE PRICE INDEX—DEVELOPMENT AND CONSTRUCTION

The Wholesale Price Index was first published in 1902 and is the oldest continuous price index in the United States. Initiated as an aid to the United States Senate in evaluating the effect of tariff laws on the U.S.

economy, the original index covered the years 1890 to 1901. Until it was revised in 1914 the index was a simple average of the price ratios of about 250 commodities.

In the years since its inception, the WPI has been revised and expanded many times, but it still measures the general price level of goods (including imports) at their *first* level of transaction in the United States. It does not measure prices received by wholesalers in the "middlemen" sense of the word. Prices of goods at later stages of distribution are included only if they have been refined or processed and marketed as new semifinished or finished goods. Goods sold by producer-owned retail stores are also excluded because they are sales to consumers rather than primary market transactions.

The WPI now includes 2,200 commodities at several stages of production. Most price information is collected from questionnaires sent directly to producers, but some published price data are used. The producing company is asked to report prices on a designated day (the 15th of the month for most items) less any discounts. When discounted prices are not available, list prices are used.

The weights for the composite indexes are derived from the value of shipments (sales) in a particular year. The major source of these data is the Census of Manufactures taken by the Bureau of the Census. The Bureau of Mines and the Department of Agriculture also provide information used in constructing weights. The WPI weights change as new value of shipments data are incorporated into the index.

Minor changes in weights occur periodically when commodities are added to or deleted from the index. As discussed in the previous section, changes of weights and the addition (or deletion) of items introduce changes in the index that are not directly related to price changes. These nonprice changes are introduced to broaden the coverage of the WPI and to make it more representative of the changing economy.

The WPI has many different uses for market analysts and businessmen. Much attention is given to the All Commodities Index, but because it includes the volatile farm products, food, and feed components, it is not a reliable indicator of long-term price trends. However, the industrial commodities index is considered a valuable indicator of underlying inflationary tendencies. Subindexes by stage-of-processing (e.g., raw materials, intermediate goods, and finished goods) are also helpful in economic analysis. Other subgroup and individual indexes are interesting to purchasing agents and sales managers who compare changes in their transaction prices to general movements of prices of similar goods. The WPI component indexes, usually at the individual product level, are sometimes used as "escalators" in long-term contracts for purchase or lease of industrial goods.

CONSUMER PRICE INDEX—DEVELOPMENT AND CONSTRUCTION

The Consumer Price Index first appeared in 1919 to meet the need of the World War I era when prices were rising rapidly. Then, as today, price changes were a factor in wage negotiations. The CPI was initiated to provide a measure of consumer prices for cities in major industrial areas.

The CPI is often incorrectly referred to as the "cost of living index," a misinterpretation of its meaning partly traceable to its inaccurate official title prior to 1964: "Index of Change in Prices of Goods and Services Purchased by City Wage Earner and Clerical Worker Families to Maintain their Level of Living." This lengthy title has since been shortened to "Consumer Price Index for Urban Wage Earners and Clerical Workers." The CPI does *not* measure the cost of maintaining a standard of living; it measures the cost of purchasing a set of goods in fixed quantities, something consumers do not actually do as prices, tastes, and incomes change over time.

If the construction of the CPI paralleled the construction of the WPI, retail sales would be used for selecting items and assigning weights. However, the concept of the CPI requires a somewhat different approach. Not all retail sales are made to urban workers so the value of retail sales is not the best basis for constructing the CPI.

The items included in the CPI and the weights given to these items are determined by a representative urban worker's "market basket" composed of the goods and services such workers buy. In order to determine the urban worker's market basket, a Consumer Expenditure Survey (CES) is conducted in major urban areas about every ten years.

From the CES in 1960-61 (the year used for weighting the current CPI), 400 items were selected to be covered by the CPI. Most of these items were chosen because of their importance relative to total expenditures and because of their frequency of purchase. A sample of less important and less frequently purchased items is also included.

The weights assigned to individual CPI items also are derived from the CES. The item weight is the ratio of expenditures for that individual item in the selected reference period, to total expenditures in that period. Some items are assigned weights on a class-of-item, rather than on an individual, basis.

The CPI is constructed with prices from 56 urban areas that must be combined to arrive at a national index. Each of the 56 cities is assigned a weight so that its price changes are included in the national index in proportion to the size of its working population. The city weights are constructed from data collected in the decennial Census of the Population.

Representatives of the Bureau of Labor Statistics collect most of the price data for the CPI. They visit 18,000 retail stores and source outlets where urban wage earners buy goods and services. Each trained Bureau representative is equipped with detailed descriptions of the goods and services to be priced. These items must meet fixed specifica-

tions in order to insure that no price changes are due to changes in the type or quality of the product. New items are substituted for old ones only when the old ones are no longer available, or no longer sold in volume. Rental rates are obtained from questionnaires sent to 40,000 tenants. The prices of some items such as college tuition and home purchases are obtained from other government and private agencies.

WPI AND CPI DIFFERENCES

Since the purposes of the two price indexes differ, their constructions are not parallel. Each is designed to do its particular measurement job effectively. Producers buy things that consumers do not, and vice versa. Consequently, each of the indexes includes items not covered by the other. Unlike the WPI, the CPI does not include raw materials and capital goods. On the other hand, the WPI excludes services, while services such as those received from doctors, lawyers, dry cleaners, insurance companies, etc., are included in the CPI because they command a sizable share of urban workers' budgets.

The WPI and CPI do cover one set of similar items. The WPI "Consumer Finished Goods" group is roughly comparable to the CPI "Commodities" group. However, the CPI includes goods only in the quality and quantity purchased by the average worker. Thus, although the price of a luxury automobile enters the WPI Consumer Finished Goods group, it does not count in the CPI Commodities group because few urban workers buy expensive cars. Used car prices are included in CPI Commodities but not in WPI Consumer Finished Goods (the sale of a used car is not a primary market transaction). Home purchases are included in the CPI but not in the WPI. Sales and excise taxes associated with the purchase of a good are included in the CPI Commodities index because they are a cost to the consumer. The WPI leaves out taxes. Finally, Consumer Finished Goods

are weighted only half as heavily (weight = .33) in the WPI as Commodities (weight = .66) are in the CPI, and the relative importance of individual items within these groups differs between indexes.

The geographic coverage of the two indexes differs. The WPI is essentially national in scope. The CPI, however, is a composite of 56 separate urban areas. The price and quality of the goods are not necessarily the same from city to city, nor are they necessarily representative of the whole country.

WPI AND CPI OVER THE YEARS

Considering all the differences between the wholesale and consumer price indexes, it is not surprising that they have behaved dissimilarly. For example, compare their trends and cycles since World War II: During the inflation following the end of wartime price controls, the WPI rose 52 per cent in three years while the CPI rose 34 per cent. Both dipped in 1949, recovered in 1950, and jumped in 1951. From 1951 to 1956, however, the WPI stayed fairly constant, while the CPI rose 5 per cent. Both rose between 1956 and 1958, but the WPI again leveled off through 1964, while the CPI kept on creeping up at a rate averaging slightly over 1 per cent a year from 1958 through 1964. By May 1973, the CPI had risen 40 per cent since 1964, an increase almost matched by the WPI. However, only in the seventh of the last 7 years did the WPI rise faster than the CPI. To sum up, annual data for the two price indexes over the past 27 years show no close correspondence between percentage changes of the CPI and the WPI.

The paths of the comparable components of the CPI and the WPI are more nearly parallel than the paths of the two indexes. Chart 1 indicates that, on an annual basis at least, retail price levels of particular types of commodities do move with the prices of these same commodities at the producer level.

Chart 1
SELECTED PRICE INDEXES
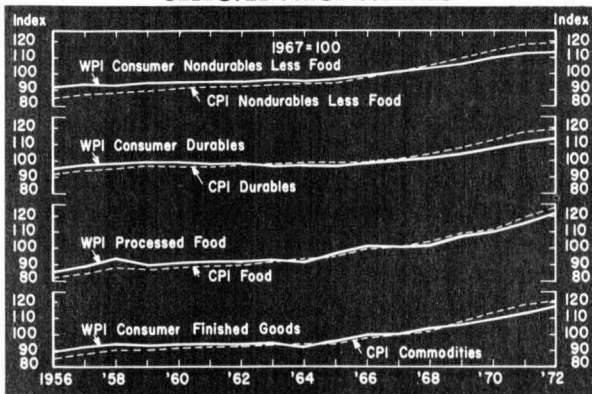
SOURCE: Bureau of Labor Statistics.

DOES THE WPI LEAD THE CPI?

Statistical techniques can be used to test the notion that current changes in the CPI depend, in some regular, predictable way, on recent changes in the WPI. Previous sections have emphasized the different composition and construction of the two indexes, and their dissimilar behavioral histories. None of this provides any scientific basis or empirical evidence to anticipate a close correspondence between CPI and WPI changes, but the frequently encountered view that such a correspondence exists prompted a check of its validity.

Monthly price index data from 1956 through 1972 were employed in an effort to determine if monthly percentage changes in the All Items CPI were explained by percentage changes in the All Commodities WPI for preceding months. No consistent relationship (one regular enough to permit confident monthly forecasts of CPI behavior based on past WPI behavior) could be found.

This result does not mean that retail prices on specific commodities do not depend on producer prices for these same goods. They do, of course. To test the closeness of this relationship, however, comparable-item components of the CPI and WPI should be used, not the aggregative indexes themselves.

Interestingly, the WPI's ability to explain monthly percentage changes in the Commodities component of the CPI was found to be just as poor as its ability to explain CPI behavior with Services left in. Some improvement in explanatory power was achieved, however, by associating CPI Commodities with WPI Consumer Finished Goods. The fitted relationship can be expressed as follows:

$$Y = .11 + .53\,X,$$

where Y is the monthly percentage change in the CPI Commodities Index, 1956-72, and X is a weighted average of percentage changes in the WPI Consumer Finished Goods Index over the previous 6 months. According to this relationship, prices of commodities covered by the CPI have trended upward .11 per cent per month, apart from WPI influences, in the past 16 years. And, on the average, .53 of a given change in the WPI's Consumer Finished Goods Index is reflected in the CPI's Commodities Index within 6 months. Declining weights, with nine-tenths of the 6 months' total impact felt within 2 months, gave the best fit. However, the coefficient of explanation (R^2) for this relationship was just .25, indicating that changes in the WPI Consumer Finished Goods Index could still explain only one-fourth of the monthly variations in the CPI Commodities Index.

The above results were only slightly improved when used cars and home purchases were taken out of the CPI Commodities index. Several other index pairs, representing finer breakdowns of the CPI and WPI, were tried with monthly data. Of those component relationships tested statistically, retail and wholesale price indexes of Household Furnishings showed the closest relationship. In their case, nine-tenths of a given change in producer prices was reflected in consumer prices within 6 months, on the average. Still, only 43 per cent of the monthly variation in the CPI Home Furnishings subindex was explained by changes in the WPI Household Furnishings subindex.

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The next closest relationship was between the CPI Food At Home, and WPI Processed Food subindexes. As was to be expected, this result showed a very quick response of retail food prices to price changes at wholesale. However, once again this response was not consistent and complete enough to explain more than 37 per cent of the month-to-month variations in retail food prices. The weakest relationship was between the "Non-Durable Commodities Except Food" components of the CPI and the WPI.

There are several possible reasons why monthly changes in consumer price indexes do not depend in a close and regular way on changes in wholesale price indexes. The differences in CPI and WPI coverage and weighting of items, even for "comparable" components, have already been noted. Also mentioned, but deserving of emphasis, is the fact that retailers do not always pay the prices that go into the figuring of the WPI. Between the prices at the first "wholesale lot" level of transaction and the prices retailers face are middlemen, who may buffer price changes sometimes, and magnify them other times. Moreover, the prices that producers list, rather than the prices they actually charge, frequently are the ones that enter the WPI.

Even if retailers were experiencing cost changes directly proportional to changes in producer list prices, they might choose to hold back on changing their selling prices. Why? Because it takes time to keep abreast of prices and to make frequent adjustments, especially when many commodities are involved and on display with "price as marked." In short, the assumption that retailers price their items according to a fixed, markup-over-cost rule may require a longer-run and more general interpretation of cost. In support of this are results obtained by correlating annual, rather than monthly, percentage changes in CPI subindexes with those of comparable WPI components. For example, 80 per cent of the annual variation of the price index for CPI Commodities is explained by a weighted average of the coincident and previous year's variation in the price index for WPI Consumer Finished Goods.

SUMMARY AND CONCLUSIONS

The Consumer Price Index and the Wholesale Price Index are valuable indicators of general price behavior. In various ways, however, their meanings often are misinterpreted and their relationships to each other overstated. The construction of the CPI does require the measurement of the cost of living of the representative urban worker for some initial period of time. Over time, the composition of the urban worker's market basket must be kept constant to insure that the CPI measures price change alone. This means that the cost of living is no longer being measured, for as incomes, tastes, and selections change over time, and as the prices of the items they buy change, consumers spend differently. The WPI, which measures list prices of commodities at their first transaction level, sometimes may not measure the prices actually charged by producers, because of discounts. The WPI may, therefore, give a false picture of what is happening to true transaction prices if list prices are artificially increased to hedge against the possibility of price ceilings, for example. Finally, the differences between the WPI and the CPI are too great, and their historical behaviors too inconsistent, to allow accurate forecasts of CPI changes based on WPI changes. Even when comparable components of the two indexes are examined, the relationship of monthly percentage changes of CPI subindexes to monthly percentage changes of WPI subindexes is not strong enough to permit confident forecasts of month-to-month changes in retail prices, given monthly changes in producer list prices.

World Wheat Production and Trade

By Richard D. Rees

Wheat is an important food commodity in many parts of the world, though not all nations produce it in sufficient quantities to satisfy their total demand. As a result, international trade becomes necessary. Traditionally, four countries—the United States, Canada, Australia, and Argentina—have been large net exporters of wheat. In addition, France exports large quantities, mainly within the European Economic Community (EEC), while Russia—despite its poor crop in 1972—frequently exports large amounts, primarily to Eastern European countries and Cuba. Many other nations also export relatively minor amounts of wheat whenever excess supplies are available. In the United States, wheat has made a positive contribution to the balance of trade for many years. Furthermore, it is an important source of farm income in the Tenth Federal Reserve District, where a large proportion of the total U. S. wheat crop is produced.

Recently, attention has been focused on U. S. wheat sales to Russia. To fit those sales into the pattern of world wheat production and trade, this article will show the trend since 1950 of wheat production by major producing nations and will discuss the major world markets. It will also outline the various international trade agreements that have regulated many wheat sales. Finally, the importance of wheat to the United States and the Tenth District will be discussed.

WORLD WHEAT PRODUCTION

The actual beginning of wheat production is hidden in history. However, with the discovery of carbonized remains of wheat kernels at the site of an ancient settlement in northern Iraq, scientists have been able to trace the existence of wheat to the period 6700 B.C.

Today wheat is grown in a wide range of geographic locations, thriving in a variety of soil conditions, altitudes, climates, and rainfall areas. Wheat varieties vary in protein content and thus in their usage. Soft white wheat, at the low end of the protein scale, is used primarily in cakes, cookies, and crackers. Winter wheat, in the intermediate-to-high protein range, is used in all-purpose flours, breads, and rolls. Spring wheat, including durum—which is relatively high in protein—is used in macaroni, spaghetti, noodles, breads, and is blended with lower protein wheat for bread flour. All classes are grown in the United States with winter wheat being predominant. Winter wheat varieties are widely grown in the world while white wheat is grown mainly in Western Europe, Australia, and the Pacific region of the United States. Spring wheat is grown primarily in the Dakotas, Montana, Minnesota, Canada, Russia, China, and Europe.

Annual wheat production tends to fluctuate widely within individual countries because of varying weather conditions and different governmental policies that are used to limit production during periods of surpluses. Table 1 outlines world production by major producer countries since 1950—the start of the first International Wheat Agreement.

World wheat production has increased more than 80 per cent since 1950, from 6 billion bushels to 11 billion bushels estimated for 1972. This 5 billion bushel increase in total production is largely attributable to a 2 1/4 billion bushel

Table 1
WORLD WHEAT PRODUCTION*
(millions of bushels)

	1950-54 Average	1955-59 Average	1960-64 Average	1965-69 Average	1970	1971	1972†
United States	1,094	1,095	1,222	1,425	1,352	1,618	1,560
Canada	536	466	538	681	332	530	507
Argentina	216	226	263	238	181	209	239
Australia	181	167	305	387	290	318	250
Total Major Exporters	2,027	1,954	2,328	2,731	2,155	2,675	2,556
Japan	53	50	51	37	17	16	11
EEC[1]	743	867	957	1,113	1,084	1,250	1,232
United Kingdom	95	102	121	135	156	177	163
Other Western Europe	294	338	351	400	367	431	407
Republic of South Africa	24	28	32	36	51	61	N.A.
Total Developed Importers	1,209	1,385	1,512	1,721	1,675	1,935	1,813
U.S.S.R.	1,240	1,911	1,842	2,458	3,039	3,009	2,289
Eastern Europe	503	556	630	883	838	1,105	1,098
People's Republic of China	672	880	779	856	900	882	896
Total Central Plan Countries	2,415	3,347	3,251	4,197	4,777	4,996	4,283
Remaining Latin America and Caribbean	114	143	138	163	222	198	194
Remaining Africa	158	171	185	204	235	262	328
Remaining Asia and Pacific	824	951	1,071	1,341	1,633	1,804	1,867
Total Less Developed	1,096	1,265	1,394	1,708	2,090	2,264	2,389
Total World	6,747	7,951	8,485	10,357	10,697	11,870	11,041

*Years shown refer to year of harvest in the Northern Hemisphere.
†Preliminary.
[1]European Economic Community consists of Belgium, France, Italy, Luxembourg, Netherlands, and West Germany.
N.A. - Not available.
SOURCE: U. S. Department of Agriculture.

increase in the Central Plan countries of Russia, Eastern Europe, and Communist Asia, and a 1 1/4 billion bushel increase in the less developed nations. A part of the increase in the less developed nations can be attributed to the so-called "Green Revolution" which introduced high yielding, semi-dwarf wheat varieties into Asian and North African countries in the 1960's. Over this same period, the developed importing nations and the major exporting nations each increased output about 700 million bushels. With production that recently reached 3 billion bushels per year, Russia is by far the largest producer of wheat in the world, with the United States second. In fact, despite Russia's well publicized crop failure in 1972, when output declined by one-fourth relative to a year earlier, Russian production of an estimated 2.3 billion bushels was 700 million bushels more than the largest U. S. crop on record.

INTERNATIONAL TRADE AGREEMENTS

Trade agreements[1] between countries exist primarily to facilitate the sale of a given commodity at an equitable and somewhat stable price and to avoid overproduction in the world. Today, a large share of internationally traded wheat is contracted for under a wheat agreement. But this has not always been the case.

Efforts to establish the first international wheat agreement were begun in 1931. Negotiations were unsuccessful until the 1933 International Wheat Conference was convened with wheat prices at a record low. That year, an export quota arrangement was agreed upon that established quotas for each country stating the quantities that could be exported within a range of negotiated world prices. Obviously, for the system to be workable, the full co-

1/ The discussion in this section is based largely on information in *Commodity Policy Studies*, Number 20 of the Food and Agriculture Organization, United Nations.

operation of all the major exporting countries was imperative. However, record production led one major exporting country to exceed its export quota, thus dooming the Agreement during its first year.

Efforts to arrive at a new agreement were interrupted by war in 1939. In 1942 a new group was formed—the International Wheat Council (IWC)—consisting of Argentina, Australia, Canada, and the United States as exporters and the United Kingdom as an importer. The efforts of this group resulted in the eventual ratification of the 1949 International Wheat Agreement (IWA) by 38 countries. It was a multilateral contract agreement in which member exporting nations agreed to provide definite quantities of wheat at a price no higher than the stated maximum, while the member importing nations agreed to purchase a definite quantity or proportion of their imports from member exporters. The agreement set price limits of $1.50 and $1.80 per bushel, based on Canadian No. 1 Manitoba Northern, for the first year of the four-year term, with the minimum declining 10 cents during each succeeding year. Conspicuously absent from the list of exporting nations was Argentina, which felt that the maximum price was too low; and the U.S.S.R., which objected to its proposed quota.

The basic provisions of the 1949 IWA were not changed when it was renewed for three-year terms in 1953 and again in 1956. However, the 1953 Agreement raised the price range to $1.55 and $2.05 per bushel since market prices generally were above the Agreement prices during the term of the previous IWA. By the time the 1953 IWA was adopted, however, world wheat supplies were beginning to expand, resulting in lower market prices. Consequently the United Kingdom recognized the possibility of having to pay higher prices under the IWA and withdrew from the Agreement. The 1956 IWA lowered prices 5 cents per bushel and added Argentina and Sweden to the list of exporting nations.

In 1959, a modified multilateral contract agreement was adopted. Exporting countries were expected to supply all the commercial requirements of the importing countries at prices within the designated range of $1.50-$1.90 per bushel. Importers were committed to buy a specified percentage of their total commercial purchases from member countries during each crop year when prices were below the Agreement maximum price. If the market price should reach or exceed the maximum, exporting nations were obligated to supply only a base quantity that would be determined by the importing nations' commercial purchases from the exporting member nations in a representative average period. At the same time, importers were allowed to purchase their commercial requirements from any source including nonmembers. Italy, Mexico, and Spain joined the 1959 IWA as exporters and the United Kingdom rejoined as an importing nation.

The IWA was renewed in 1962 for another three-year term and the basic prices were raised 12.5 cents per bushel. The U.S.S.R. joined as an exporting member. The Agreement was renewed for one-year terms in 1965 and 1966.

In 1968 a new three-year plan—the International Grains Arrangement (IGA)—went into effect. The IGA consisted of two legal branches—the Wheat Trade Convention (WTC), which controlled international trade of wheat, and the Food Aid Convention (FAC), which governed international shipments of food grains under aid programs. The WTC replaced the basic Manitoba No. 1 price range with a schedule of prices that were significantly higher than the 1962 IWA. The plan took effect, however, at a time of record world wheat production and declining import requirements. Since the WTC provided no assurances of access to world markets, and with the supply-demand situation then forcing wheat prices down, the WTC price minimums were violated almost immediately. It became apparent that the new IGA could not cope with world wheat surpluses and, at the same time, maintain stable prices within the stated range of the WTC.

The inherent weakness of the 1968 IGA pricing policy resulted in the deletion of price and quantity provisions from the IGA when it was renewed for another three years in 1971. The new IGA maintained the WTC and FAC structure and set up a Market Conditions Advisory Subcommittee authorized to continuously review the world situation, and to inform the International Wheat Council of any threat of market instability. The Executive Committee of the Council will then assess the situation and attempt to find a solution acceptable to the participating nations. In addition the Council has the duty of examining prices and trade quantities in order to expedite the negotiations for a new agreement. This effectively keeps the door open for wheat trading nations to continue seeking a workable wheat agreement in the future.

One final point concerning export subsidies should be made. While subsidies lie outside the domain of trade agreements, many countries have subsidized their shipments in order to comply with the terms of the agreement.

UTILIZATION FACTORS

Among factors directly affecting world utilization of wheat are trends in population and income, production of other cereal grains, substitution of wheat for other cereals in human diets, increased reliance on wheat as a cattle feed, and larger world cattle numbers. Although it is outside the scope of this article to analyze these factors in detail, some attention should be focused on a few determinants of utilization.

A change in world population is probably the major factor affecting total wheat consumption. World population in 1972 was estimated at 3.8 billion, as shown in Table 2, an increase of 52 per cent since 1950. About two-thirds of the world's people live in the less developed countries of Latin America, Africa, and Asia. These low income countries experienced a 64 per cent increase in population since 1950. Where per capita incomes are low, cereal grains such as rice and wheat provide a major pro-

Table 2
WORLD POPULATION BY SELECTED COUNTRIES
(Population at midyear in millions)

	1950	1960	1970	1972
North America	218.0	268.0	319.0	330.0
United States	152.3	180.7	205.4	209.2
Canada	13.7	17.9	21.4	22.2
South America	110.0	144.0	192.0	201.0
Brazil	52.0	69.7	95.3	98.4
Venezuela	5.0	7.4	10.4	11.5
Western Europe	286.0	308.0	336.0	340.0
EEC	155.3	169.5	187.1	189.1
United Kingdom	50.3	52.4	55.7	56.6
Eastern Europe	106.0	117.0	126.0	129.0
Czechoslovakia	12.4	13.6	14.5	14.9
German Dem. Republic	17.2	16.2	16.2	16.3
Poland	24.8	29.6	32.8	33.7
U.S.S.R.	180.0	214.0	243.0	248.0
Asia	1,355.0	1,645.0	2,056.0	2,154.0
China, People's Republic	532.9	636.0	746.5	786.1
India	358.3	429.0	550.4	584.8
Japan	82.9	93.2	103.5	106.0
Pakistan	79.7	100.2	130.0	146.6
Republic of Korea	20.4	24.7	31.8	33.7
South Vietnam	11.6	14.1	18.3	18.7
Africa	217.0	270.0	344.0	364.0
United Arab Republic	20.5	25.9	33.3	35.9
Oceania	13.0	16.0	19.0	20.0
Total World	2,485.0	2,982.0	3,635.0	3,786.0

SOURCE: United Nations.

portion of the per capita calorie intake.

Income change is another important determinant of wheat utilization. The income elasticities for wheat in the less developed countries are generally higher than in the more developed countries. Hence, as incomes rise in the developing regions of the world, some increase in wheat consumption can be expected. In addition, in those areas where rice traditionally has been a major part of the diet, rising incomes have induced some substitution of higher protein wheat for rice. And when such countries experience a poor rice production year, demand is frequently shifted to wheat. Wheat consumption in less developed nations also has been directly influenced by concessional wheat sales—sales other than those for cash dollars.

Finally, as national incomes continue to increase, many nations begin to increase their meat consumption, requiring an expansion of livestock numbers and feed production. With-

Table 3
WORLD WHEAT AND FLOUR* IMPORTS
FROM ALL SOURCES BY AREA OF DESTINATION
(millions of bushels)
Year Beginning July 1

	1950-54 Average	1955-59 Average	1960-64 Average	1965-69 Average	1970	1971†
North America	48.8	38.2	49.7	63.6	62.5	77.2
South America	90.9	100.3	131.9	178.5	150.6	180.0
EEC[1]	202.2	189.2	165.3	144.5	165.3	132.3
Other Western Europe	266.9	260.2	243.3	224.0	260.9	187.4
Eastern Europe	78.2	184.5	229.6	194.3	246.2	180.0
U.S.S.R.	4.3	11.1	95.8	106.6	11.0	124.9
Asia[2]	151.1	236.1	541.1	662.1	654.0	598.9
Japan	67.2	89.1	115.6	150.1	176.4	183.7
Africa	57.6	81.9	131.4	199.1	257.2	257.2
Oceania	7.8	9.7	7.9	4.7	3.7	3.7
Total World	975.0	1,200.3	1,711.6	1,927.5	1,987.8	1,925.3

*Flour in wheat grain equivalent.
†Preliminary.
1 Excludes intra-EEC shipments.
2 Excludes Japan.
SOURCE: U.S. Department of Agriculture.

in a given price range, wheat often becomes an important feed ingredient.

MAJOR WHEAT MARKETS AND EXPORTING COUNTRIES

A number of dramatic increases in world wheat import requirements are evident in Table 3. The large population areas of Asia, Africa, and South America represent a large potential for wheat consumption, and—as measured by wheat imports—these areas have dramatically increased wheat consumption in recent years. African imports during the most recent year for which data are available were about 4½ times greater than the average during 1950-54. Asian wheat imports were 4 times larger while South America doubled its wheat imports.

The largest single-country markets in recent years have been India, People's Republic of China, United Kingdom, Japan, Brazil, United Arab Republic, and West Germany. During the 1965-69 period, for example, these countries accounted for almost one-half of world wheat imports.

The "Big Four" exporting nations—the United States, Canada, Australia, and Argentina—account for a major share of world

wheat exports. Historically, these countries have supplied approximately three-fourths of the wheat sold internationally. With France and Russia included, the six nations account for about 90 per cent of world exports. Chart 1 depicts the trend since 1950 for each of the principal exporting countries.

The United States traditionally commands the largest share of the world export market. Since 1950 the U.S. share has been fairly consistently in the low to upper 30 per cent range with some annual fluctuations in the 20's and several over 40 per cent. U.S. wheat exports go to many parts of the world (Table 4). Japan, at almost 81 million bushels, was the largest market for U.S. wheat in 1971. The Republic of Korea, the EEC, Pakistan, India, the United Kingdom, and Venezuela also are large markets. Although Russia is the most important buyer during the current fiscal year, this market traditionally has not been a major outlet for U.S. wheat.
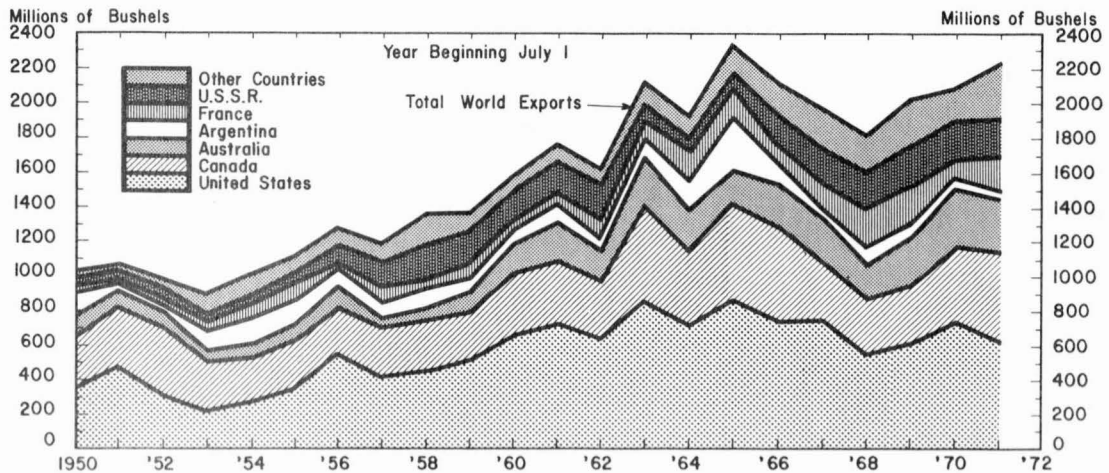
Table 4
U.S. WHEAT AND FLOUR* EXPORTS
BY DESTINATION
(millions of bushels)
Year Beginning July 1

	1960-64 Average	1965-69 Average	1970	1971
Western Hemisphere	94.0	109.5	107.4	120.6
Brazil	46.1	37.5	29.8	17.0
Venezuela	9.5	20.6	21.0	23.8
Others	38.4	51.4	56.6	79.8
Western Europe	105.9	93.6	147.8	80.2
EEC	57.5	62.5	74.7	39.6
United Kingdom	14.9	16.6	44.8	25.5
Others	33.5	14.5	28.3	15.1
Eastern Europe	70.2	17.6	32.1	1.3
Asia	346.1	408.1	381.9	348.8
India	145.4	157.7	53.2	27.9
Japan	48.4	77.3	105.7	80.6
Republic of Korea	19.1	36.2	61.9	64.5
Pakistan	48.2	41.4	24.0	32.9
South Vietnam	3.3	6.3	10.2	10.1
Others	81.7	89.2	126.9	132.8
Africa	99.5	67.4	59.0	70.2
Oceania	0.1	0.1	0.1	0.1
Total	715.8	696.3	728.3	621.2

*Flour in wheat grain equivalent.
SOURCE: U.S. Department of Agriculture.

Chart 1
WORLD WHEAT AND FLOUR* EXPORTS BY PRINCIPAL EXPORTING COUNTRIES

Millions of Bushels

Year Beginning July 1

Other Countries
U.S.S.R.
France
Argentina
Australia
Canada
United States

Total World Exports →

*Flour in wheat grain equivalent.
SOURCE: U.S. Department of Agriculture.

CONTRIBUTION OF WHEAT EXPORTS TO U.S. BALANCE OF TRADE

Wheat and wheat flour exports, including shipments under Government programs, account for a significant portion of U.S. agricultural export value. Since 1960, the value of wheat and flour exports has averaged well over $1 billion a year (Table 5). After reaching a peak in 1963, the total value of shipments dropped in the ensuing years, reflecting a decline in U.S. wheat prices. However, shipments in the current year will establish a record high.

In earlier years, U.S. wheat shipments under Government aid programs made up a substantial portion of the total. Since the mid-1960's, however, concessional wheat sales have dropped in value and now are primarily long-term credit sales rather than sales for soft currencies or outright contributions. During this time, wheat sales for dollars have increased while the overall U.S. trade balance has deteriorated sharply. From a surplus balance of $6.9 billion in 1963, the trade balance fell each succeeding year before rebounding modestly in 1969, only to drop into a deficit

position in 1971. Since the United States imports very little wheat each year, wheat sales represent a net addition to the U.S. balance of trade position. Therefore, without wheat exports, the U.S. trade deficit in 1971 would have been more pronounced.

WHEAT IN THE TENTH DISTRICT

The Great Plains area, centered in the Tenth District, long has been recognized as the Nation's breadbasket. In 1972, the District produced 50 per cent of the Nation's winter wheat crop, nearly the same proportion as in 1950 when the District's share was 51 per cent. In terms of total wheat production, which includes spring wheat and durum, the District produced 39 per cent of the Nation's crop last year.

Wheat production also represents a relatively important share of the District's farm income. In 1971, wheat contributed about 8 per cent of the District's cash receipts from farm marketings—$792 million vs. $572 million in 1950. Though this is still a significant portion of total income, it is a substantial reduction from earlier years when it reached 23 per cent in 1954 and was 15 per cent as re-

Table 5
CONTRIBUTION OF WHEAT EXPORTS
TO U.S. BALANCE OF TRADE
(millions of dollars)
Year Beginning July 1

| | Wheat and Wheat Flour Exports | | | | | | |
	Under Government Programs	Commercial Sales	Total	Agricultural Exports	Merchandise Exports	Merchandise Imports	Trade Balance
1960	792.1	359.0	1,151.1	4,946	20,507	14,161	+6,346
1961	847.1	438.9	1,286.0	5,142	21,447	15,687	+5,760
1962	840.3	317.6	1,157.9	5,078	21,638	16,398	+5,240
1963	834.0	683.8	1,517.8	6,068	24,718	17,776	+6,942
1964	973.5	266.8	1,240.3	6,097	26,331	19,731	+6,600
1965	852.9	549.4	1,402.3	6,676	28,886	23,295	+5,591
1966	529.7	782.1	1,311.8	6,771	30,819	26,427	+4,392
1967	634.3	643.1	1,277.4	6,311	32,195	29,613	+2,582
1968	403.6	489.6	893.2	5,741	35,221	34,175	+1,046
1969	390.5	551.1	941.6	6,721	41,059	38,219	+2,840
1970	383.1	817.6	1,200.7	7,758	43,663	42,724	+939
1971	371.7	675.3	1,047.0	8,051	44,864	50,055	-5,191

SOURCE: U.S. Department of Agriculture.

cently as 1962. Lower wheat prices—$2.12 in 1954 and $2.04 in 1962 vs. $1.31 in 1971—and increased cattle production in the District have contributed to the declining ratio of wheat marketings to total farm marketings. However, wheat contributed more than 28 cents of every *crop* marketing dollar in 1971. This ratio is even more dramatic in certain District states—in 1971 wheat represented 53 cents of each Kansas crop marketing dollar and 45 cents in Oklahoma. Colorado at 26 cents, Nebraska and Wyoming about 20 cents each, Missouri 6 cents, and New Mexico about 5 cents complete the District. For the Nation in 1971, wheat accounted for 9 per cent of crop cash marketings and 4 per cent of total cash receipts from farm marketings.

Prior to the massive 1972 wheat sale to Russia, approximately one-half of the U.S. wheat production, on an average, moved into international trade channels. Considering the importance of wheat to the District, U.S.

wheat sales in the world market truly are important to the District's farm economy.

CONCLUDING REMARKS

Since data by country for the current year are not available, the effect of the recent U.S. wheat sale to Russia is not stressed in this analysis. It is known that Russia purchased approximately 400 million bushels of wheat from the United States after mid-1972. To put the size of this sale in better perspective, this represents one-fourth of the U.S. crop in 1972 and is an amount equal to two-thirds of the wheat exported by the United States a year earlier. This emphasizes the point that not all nations produce enough wheat to satisfy domestic demand and that new situations or emergencies can alter traditional patterns. In this case, Russia experienced abnormal weather that severely curtailed production and required purchases in the international market.