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Crop Reports: Any Effect on Prices?

(This is a report on the Houck-Pearson study. James Houck is a professor and Daniel Pearson, a former research assistant, in the Department of Agricultural and Applied Economics, University of Minnesota.)

How would you react to these statements: true or false?

1. If USDA's Crop Reporting Board reduces its crop production forecast from one month to another, market prices rise, and vice versa.

2. Prices in commodity markets are less volatile following a crop report than just before its release.

If you decided the first statement was "true" and the second one "false," you were right—according to the authors' recent study at the University of Minnesota.

As part of a research project, the effect of USDA crop reports on the prices of four major farm commodities was investigated. Using daily prices before and after Crop Production and Prospective Plantings reports over a 13-year period, an attempt was made to measure the market's reaction to the release of the USDA figures on corn, soybeans, spring wheat, and winter wheat.

Questions about the effect of crop reports on market prices arose with changing market conditions in the early 1970's. Those years were characterized by low levels of carryover stocks coupled with relatively high domestic and export demand—conditions that sharply increased price fluctuation in the commodity markets.

Before that time, large grain stocks had kept corn and wheat prices more or less at price support loan rates. Changes in supply and demand outlook caused only relatively small price changes. But when the early 1970's ushered in greater volatility in the commodity markets, farmers and grain merchants became increasingly aware of the market factors that affect prices.

Concern about one of these factors—the Statistical Reporting Service (SRS) crop reports—prompted this study. The first hypothesis—that an upwardly-adjusted crop forecast will depress prices—is basic economics. Given a level of demand, larger supplies will result in lower prices, and vice versa.

Here is a look at what happens in the commodity markets. Traders have a wealth of information from which to make their own estimates of future SRS reports. Then they take positions in the market based on these assumptions, in effect trying to guess what the SRS forecasts will say and to profit by "being there" (making a decision) before the rest of the trade.

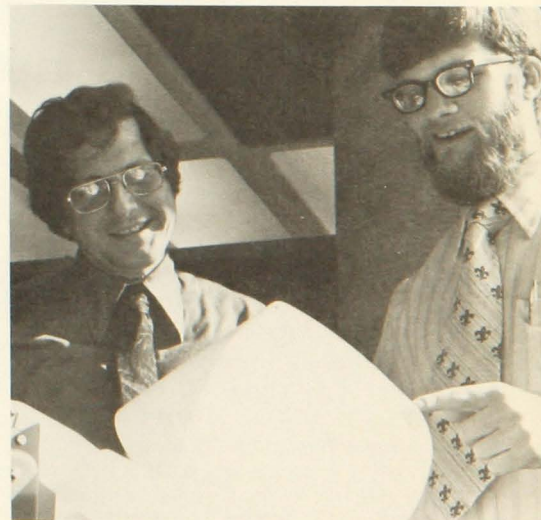
If the traders guess correctly, market prices adjust before the release data and change very little, if at all. If the trader guesses wrong, however, there will be a sizable price adjustment after the SRS report as traders scramble to correct their positions.

The authors also examined the effects of crop reports on day-to-day price fluctuations during the week before and the week after SRS re-

leases, using the following rationale. In the days before a report is released, the market is filled with uncertainty. All traders know that the SRS report represents the most comprehensive information available on the price condition of upcoming crops. Each trader has an expectation of contents of the report.

As a result, there's a wide range of opinions about the new production figures and where the new supply curve will be located. Any number of factors—a slight change of weather in the Corn Belt, for instance—can shift these expectations. Such conditions easily lead to volatile prices. However, when SRS releases its report, uncertainty decreases. Traders once again have a common point of reference and the range of expectations narrows, yet never quite shrinks to a single point.

This is because SRS releases its production forecasts between the 9th and 12th of each month, based on 1st day of the month conditions. Therefore, some doubt always exists about possible changes in grow-



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ing conditions since the data were gathered.

The USDA reports nonetheless reduce uncertainty about crop production levels, which forms the basis of the second hypothesis: improved information from USDA makes prices less volatile.

To test these two assumptions, the authors ran a number of statistical tests on daily cash market prices from 1963 to 1975 for four crops: corn, soybeans, winter wheat, and spring wheat. A commodity-by-commodity summary of the findings follows.

Corn

The 13-year period (1963 to 1975) showed a fairly strong relationship between the quantity forecast by SRS and subsequent prices—i.e., a change in expected supplies usually sent prices in the opposite direction.

However, compared with prices a week after the report, the day after showed a much stronger effect, inferring that corn prices tend to react to reports immediately following their release, and then settle back toward original levels over the rest of the week.

Other tests showed that day-to-day corn prices became more volatile following crop reports. Surprisingly, this happened during the first 10 years (1963-72)—a time when large stocks and government programs kept prices relatively sta-

ble. These findings run counter to the hypothesis that price fluctuation should decline following a crop report.

The same tendency did not surface during the last 3 years of the study period—an era when one would expect free market policies to increase volatility.

Corn prices proved more volatile in October than any other month—which may be because this is its primary harvest month. Test results also indicate that if corn prices moved higher after a crop report, greater fluctuation followed.

Soybeans

Month-to-month adjustments in the size of soybean forecasts showed a significant opposite effect on price changes from a day before to the day after crop reports. But this is only when forecast changes of less than .8 percent were dropped from the analysis.

As with corn, price fluctuation increased during the week following SRS releases for the most recent 3-year period, the first 10 years, and the 13 years combined. Unlike corn, however, soybean prices did not tend to be more volatile in any single month.

Spring Wheat

The relationship between price and quantity changes for spring

wheat was the strongest of all crops studied. Like corn, spring wheat prices appeared to react immediately to a change in expected production levels.

The most recent 3 years saw some reduction in price fluctuation following spring wheat forecasts. While these results were not found in corn or soybeans, they offer some evidence that crop reports do reduce uncertainty in the marketplace.

But like corn and soybeans, prices during the first 10 years tended to be more volatile following SRS releases. One discovery was made about spring wheat: price changes around report time tended to decrease as the crop year progressed.

Winter Wheat

Overall results showed no significant relationship between changes in anticipated production levels and prices the day following SRS releases.

Similarly, no pattern of increased price fluctuation emerged... leaving the conclusion that the crop reports have no noticeable impact on price stability on the Kansas City wheat market where the data were gathered.

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Changes in Food Prices Affect Households Unevenly

Jerome W. Hammond
and
Jean D. Kinsey*

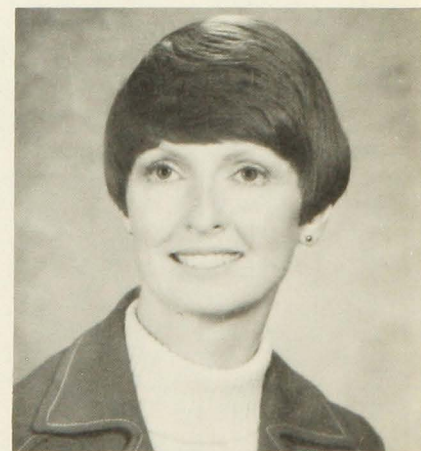
Rising food prices displease consumers; falling farm prices displease farmers. Understandably, both groups call for government action because their economic well-being is at stake. However, the

frequently reported data used to measure these changes and subsequent reactions may be misleading because they don't show the total picture.

Three questions on U.S. retail food prices and consumer food expenditures are addressed here:

(1) How have retail food prices changed with respect to prices in other sectors of the economy?

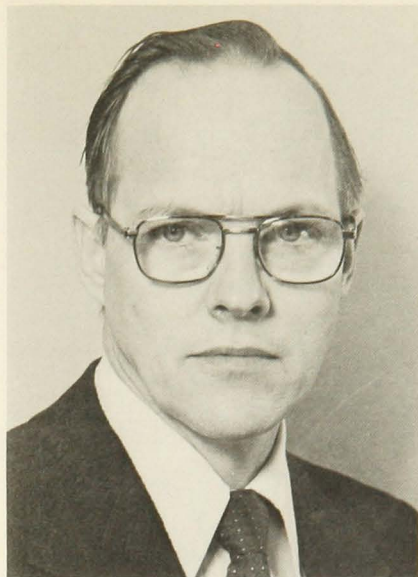
(2) What impact have price changes had on household food expenditures over time?



Jean D. Kinsey

(3) How do household food expenditures vary by income, family size, and place of residence?

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Jerome W. Hammond

Retail Food Prices and the Consumer Price Index

The Consumer Price Index (CPI) is the most widely reported and used measure of retail prices and the basic indicator of the economy's inflation. The CPI includes major categories such as food, shelter, clothing, medical services, other services, and transportation. Figure 1 shows that the index has increased annually since 1950. From 1950 to 1967, the increase was rather moderate at an average annual increase

of about 1.7 percent a year. From 1967, the rate jumped to an annual average 7.6 percent, reaching a high of 18.5 percent between 1975 and 1976.

Over the longrun, the retail food component of the CPI has paralleled the aggregate CPI (figure 1). However, in the early 1950's the retail food price index declined while the CPI moved steadily upward. With some variation, retail food prices changed in a manner parallel to changes in the CPI between 1955 and 1972. Beginning in 1972, retail food prices began to accelerate faster than the CPI. Thus, in 1976 retail food prices were at 181 percent of the 1967 level while the CPI was at 171 percent. The retail food price increases continued to lead the CPI in the last quarter of 1977.

The importance of increases in retail food prices goes beyond a household's shortrun budget adjustments. Food purchases are essential and frequent. Consequently, food price increases are very visible and tend to affect expectations about inflation. Expecting future inflation, consumers tend to intensify buying activity and decrease savings both of which aggravates an inflationary trend.

Food products comprise approximately 24 percent of the representative market basket of goods —

prices in the market basket determine the CPI. Compared to transportation, which comprises 13.5 percent of the market basket of goods, food prices moved up more slowly from 1950 to 1967 (figure 2). Food and transportation moved similarly between 1967 and 1972. Compared to shelter, which comprises 21 percent of the market basket of goods, food prices also moved up more slowly until 1972. Between 1968 and 1972 the price index for shelter was noticeably above that for food. Beginning with 1972, food price increases began to outstrip all other categories in the CPI except coal and fuel oil (not shown). Not until 1976 did food price increases moderate in comparison with other items. Since then, medical service and other service prices have moved ahead of food. It is significant that price increases for transportation, which would be expected to increase rapidly because of rising energy prices, have been below most other components of the CPI since 1967.

Retail Food Prices and Farm Prices

Movements of farm level and retail level prices for food are often compared. The annual data on levels of these prices show that farm prices are more variable than retail food prices. Figure 3 shows that

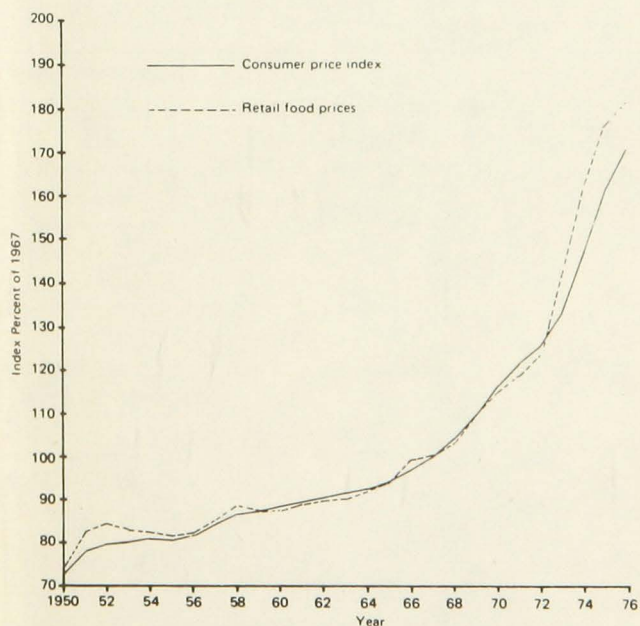


Figure 1. Retail food prices and the Consumer Price Index (CPI), biennial figures, 1950-1976 (1967 = 100%)

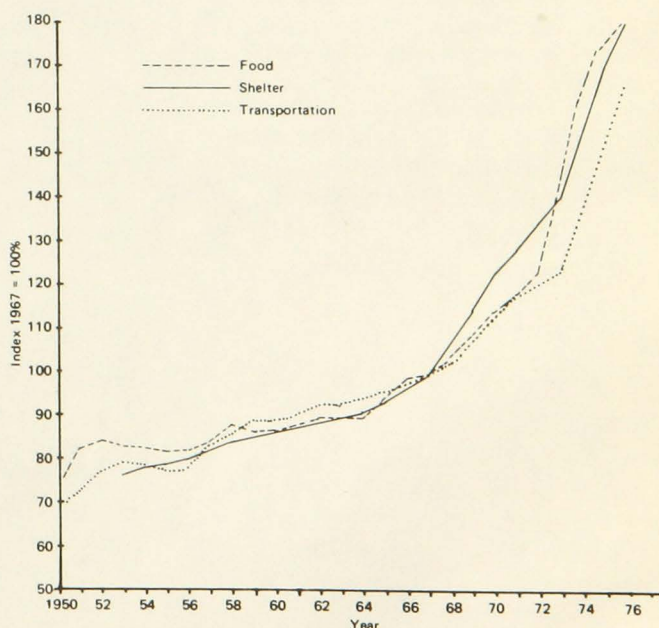
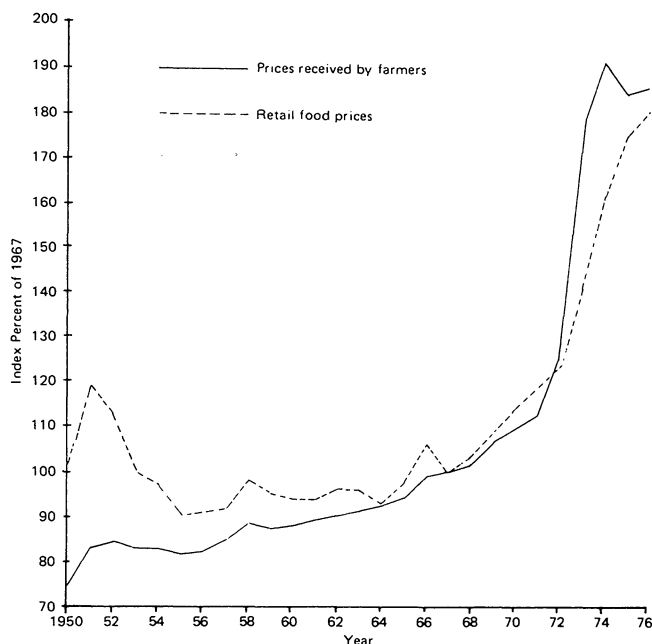


Figure 2. Components of the Consumer Price Index, biennial, 1950-1976 (1967=100%)

Figure 3. Retail food prices and prices received by farmers, biennial, 1950-1976 (1967=100%)



farm food prices declined even more than retail food prices, in the early 50's, remained rather stable from 1954 through 1964, then began to rise, but less rapidly than retail prices, through 1971. In 1972, both farm and retail food prices took off, with farm prices in the lead. In 1974, retail food prices were at 161 percent of the 1967 level, while prices received by farmers were at 192 percent of the 1967 level. There was a major farm price decline in 1974, some recovery in 1976, then a further decline in 1977. This decline is of considerable concern to farmers and everyone representing their interests.

The greater variability of farm food prices relative to retail food prices is the basis for the common assertion that when farm prices rise, retail prices rise; but, when farm prices fall, retail prices do not. Annual retail prices, except for a few years in the 1950's, have shown continuous increases, while farm prices frequently fall as well as rise. However, the trend in farm prices over the longrun is very similar to the retail price trend. A separate examination of monthly data on retail and farm level food prices shows that retail prices both increase and

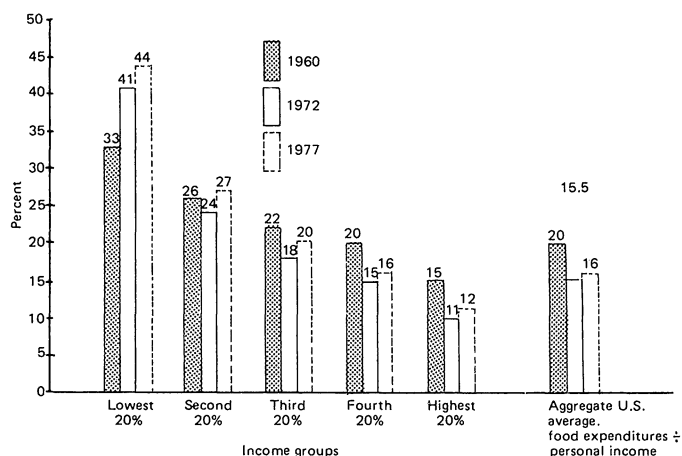
decrease and that the changes closely resemble farm level movements. However, retail price changes lag a few months behind farm level changes.

Food Expenditures by Household Type

Though retail food prices have increased almost continuously for several decades, the increase in per capita income has been even greater. Thus, the story is often told that over the past 20-30 years food has taken proportionately less of income. This is usually based on the percentage of total U.S. personal income spent for food. This aggregate statistic shows that, on the average, U.S. households spent 20 percent of their incomes for food in 1960, 15.5 percent in 1972, and 16 percent in 1977.¹ These percentages, while useful for illustrating national trends and making international comparisons, hide as much as they reveal. They say nothing about how actual U.S. households allocate food expenditures. There are few

¹If food expenditure is divided by personal disposable income (i.e., income after taxes) the percentages are 23 for 1960, 18.2 for 1972, and 18.6 for 1977. In this article gross income is used for all calculations.

Figure 4. Comparison of total food expenditures as a percent of total dollar income for sampled U.S. households by income groups for 1960, 1972, and estimated for 1977



“average” households. In fact, 60 percent spent more than 15.5 percent of their incomes for food in 1972. The percentage of income each U.S. household spends on food depends on income, size, place of residence, and food prices. In a given household, special diets, cultural values, and preferences may play an important role.

Here food expenditures in 1960 and 1972 with estimates for 1977 for households in five income groups are compared. Data are from the 1960 and 1972-73 Consumer Expenditure Surveys of the Bureau of Labor Statistics. To make comparisons over this 17-year period, households in each survey were considered in five income groups. The first group contains the 20 percent of households with the lowest incomes in 1960 and 1972; the fifth group contains the 20 percent with the highest incomes in each year. This procedure avoids the need to adjust the data for inflation. In addition, it reveals how the levels of income in each group have changed over the years (table 1).

Table 1 and figure 4 show that as incomes rise, the portion spent on food falls. Notice that most U.S. households spent less of their incomes for food in 1972 than in 1960. The poorest 20 percent of households were an exception. These households spent 24 percent more for food in 1972 than in 1960. Only

the households in the fourth group, those with upper middle incomes, reflect the “average” U.S. household suggested by national income figures. To see this, compare the last set of bars in figure 4 with the bars for the fourth group.

The data revealed that a 10 percent increase in real incomes for low income households would lead to a 5 percent increase in food expenditures. A 10 percent increase in income for high income households would generate less than a 3 percent increase in food expenditures. If a household’s real income grows faster than food prices, it follows that the proportion of income spent on food will decline. However, between 1972 and 1977 incomes increased more slowly than food prices.² Under these circumstances the estimated percentage of incomes spent on food in 1977 increased for all household groups, the greater increases being in the poorer households. According to the study’s estimates for 1977, the poorest 20 percent of the population spent 44 percent of its income for food.

Place of Residence and Family Size

Expenditures for food vary by household characteristics other than income. Figure 5 illustrates how food expenditures varied in 1972 between rural and urban residents.³ At most income levels, urban households spend a larger percentage of their incomes for food than do rural households which usually have more opportunities to produce some of their own food. At very low and low-middle incomes, rural households tend to outspend their urban counterparts for food.

²The change in the consumer price index for food between 1972 and 1977 was 52 percent. The change in total U.S. personal income between 1972 and 1977 was 41.7 percent. Therefore, the expenditure data from 1972 were inflated by 52 percent and incomes were inflated by 41.7 percent. Remember, the expenditure figures presented for 1977 assume that all of those households interviewed in 1972 experienced the average increase in income and food prices and further assume that the food buying behavior did not change.

³Rural includes both farm and rural non-farm households.

Table 1. Weighted average food expenditures as a percent of weighted average money income for U.S. households sampled in 1960 and 1972 by five income groups¹

Groups:	1	2	3	4	5
	Low incomes	Low-middle incomes	Middle incomes	Upper middle incomes	Upper incomes
1960					
Income range	less than \$2,680	\$2,681–\$3,840	\$3,841–\$5,962	\$5,963–\$9,100	more than \$9,100
Percent of income spent on food	33	26	22	20	15
1972					
Income range	less than \$3,670	\$3,671–\$6,999	\$7,000–\$10,460	\$10,461–\$16,229	more than \$16,229
Percent of income spent on food	41	24	18	15	11
1977 (estimated)					
Income range	less than \$4,888	\$4,889–\$9,999	\$10,000–\$15,337	\$15,338–\$24,168	more than \$24,168
Percent of income spent on food	44	27	20	16	12

¹Data are from the 1960 and 1972-73 Consumer Expenditure Surveys of the Bureau of Labor Statistics. Each income group is 20 percent of the population of households surveyed. The income distribution is based on the sample, not on total U.S. population.

Figure 5. 1972 total food expenditures as a percent of total income for sampled U.S. households: urban and rural

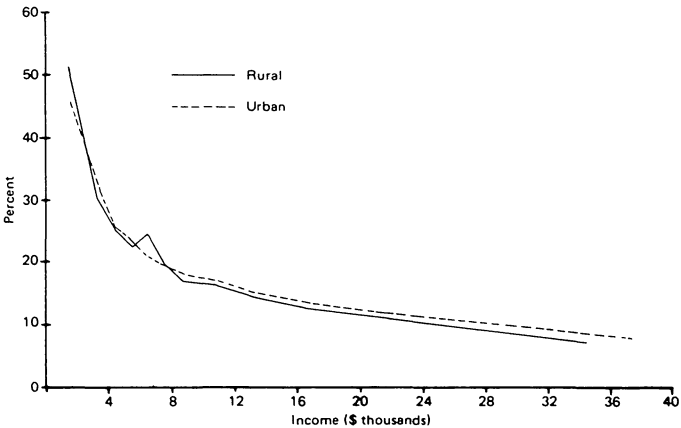
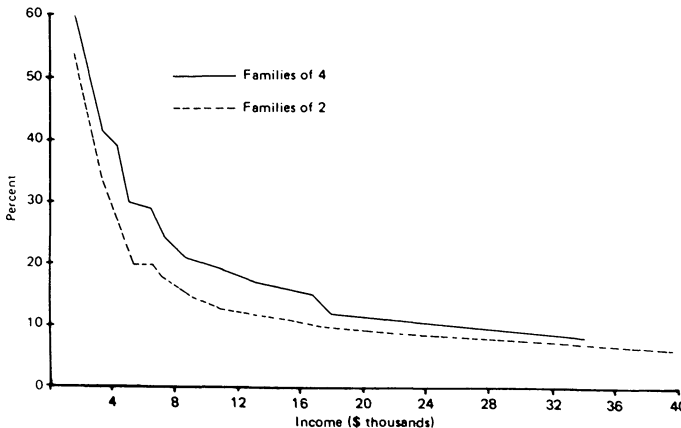


Figure 6. 1972 total food expenditures as a percent of total income for sampled U.S. households: families of four persons, and families of two persons



Family size influences food expenditures. Figure 6 shows the percentage of income spent on food for households of four persons and households of two persons in 1972. As expected, households of four spent a larger portion of their incomes for food at all income levels than households of two. Currently, over 50 percent of all U.S. households contain two or fewer persons. If the trend towards smaller households continues, more U.S. households will be spending a smaller proportion of their income for food.

Other factors that affect the proportion of family income spent on food are the types of foods and food services included in the market basket. Certainly the extent to which a household purchases convenience foods will increase food expenditures. Food eaten away from home comprised 25 percent of total food expenditures for a family of four earning between \$12,000 and \$15,000 in 1972, 31 percent for a family of two. The increasing trend towards eating out is somewhat offset by another trend towards purchasing simpler, less processed food in the grocery store. It is not clear whether the convenience and service component of food will continue to increase.

Summary and Conclusions

Over the longrun, food prices have changed similarly to the prices

of other goods and services in the Consumer Price Index (CPI) and not substantially different from farm prices. There are, of course, short-term fluctuations in price movements, which pose problems. The fact that retail food prices have increased more rapidly than other retail prices and faster than personal incomes over the past 5 years has increased concern of households whose budgets are being squeezed.

Real incomes increased more rapidly than food prices between 1950 and 1972, and as this occurred, the average percentage of income necessary to purchase food declined. However, the average covers up some important information. Since 1960, the share of income necessary to purchase food has expanded for the poorest 20 percent of the population to over 41 percent. Furthermore, 60 percent of the population spends more than the much quoted "average" of 15 percent of income on food.

Besides income, the size of a family, living location, and how often family members eat out affect the proportion of family income spent on food. Smaller families spend a smaller share on food than larger families. Rural families spend a smaller share than urban families. The more meals eaten out, the larger the percentage of income spent on food. Trends in the U.S. towards smaller families and higher incomes have offset, somewhat, the influences of a shift from rural to urban living and the trend towards eating out.

The main focus of this article has been to dig beneath the commonly quoted food price and expenditure statistics to reveal some of the lesser known relationships. Aggregate data can be very misleading for formulating policies which affect individual household's opportunities to purchase a nutritious and acceptable market basket of food. Interpreting figures in the proper context and perspective is vital for drawing sound conclusions.

Jerome W. Hammond Editor
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