

## DAIRY PRODUCT CONSUMPTION AND DEMAND

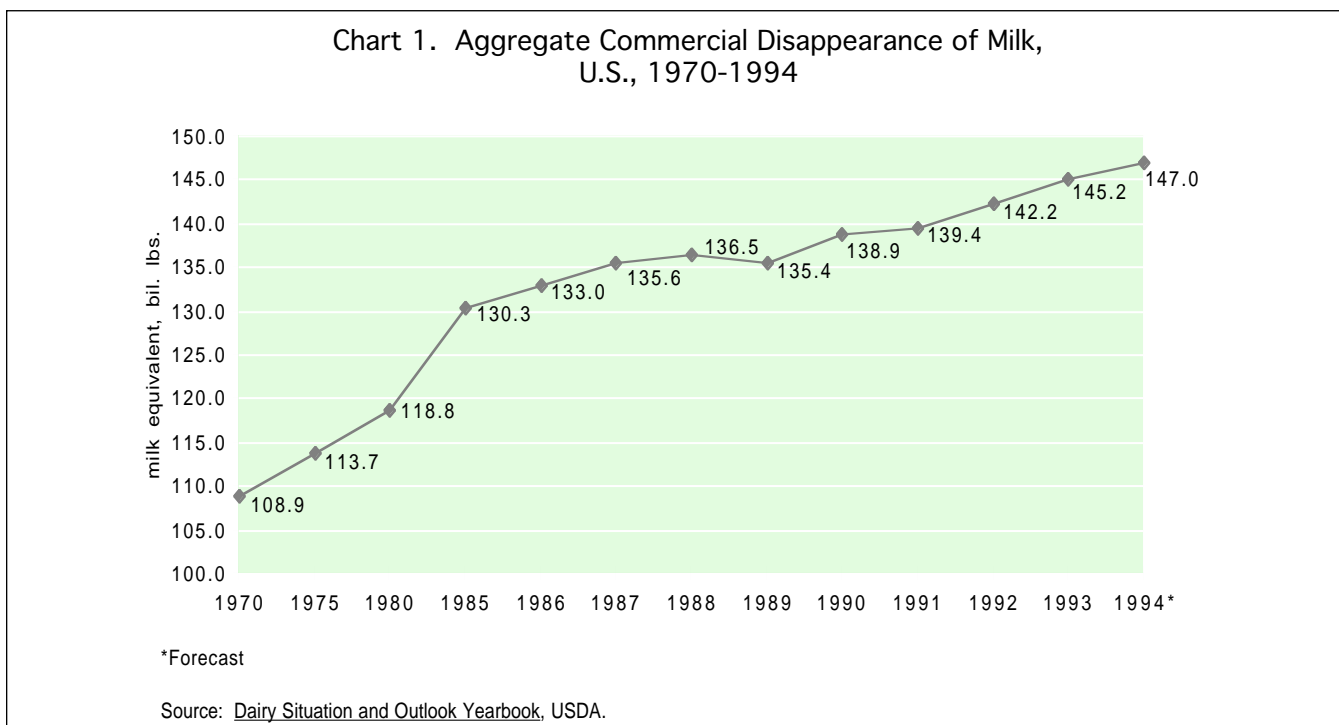
*Robert E. Jacobson and Joe L. Outlaw\**

The 153 billion pounds of milk produced in 1994 marks the United States as the largest milk producing country on the planet. The ability to market its production through commercial channels continues to be a major industry concern. Trends in the consumption and sales of dairy products and factors affecting demand are the subjects of this paper. Other leaflets in this series focusing on different dimensions of consumption and demand include dairy promotion programs (Leaflet P-12); use of government stocks in export and domestic markets (Leaflet P-4); and export market potential (Leaflet P-11).

### *Aggregate Commercial Demand*

As the data in Chart 1 indicate, commercial demand for milk and dairy products increased by 22 percent, from 118.8 billion pounds to 145.2 billion pounds, from 1980 to 1993. Part of the growth was due to population, but per capita increases in dairy product consumption have also been notable.

Demand data are reported on a milk equivalent (m.e.) basis. Milk equivalent refers to the amount of cow's milk required in the processing of the many dairy products reflected in the per capita consumption series. For example, the milk equivalent factor for one pound



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of butter is 21.8—it requires the fat from 21.8 pounds of milk to produce one pound of butter. Milk equivalent data are sometimes criticized because they over-emphasize the impact of changes in demand for higher fat products. An alternative demand measure that is often used, especially for fluid milk products, is product pounds. Product pounds is the specific measure used for individual dairy products.

Aggregate annual demand is a function of population change and per capita consumption change. On July 1, 1993, the population of the United States was an estimated 258.8 million people. Over the last decade, U.S. resident population has been increasing by about 2 1/4 million persons per year, or by about 1 percent per year. It is therefore expected that aggregate commercial demand should increase by nearly 1 percent annually simply due to population growth. Obviously, any time annual increases in demand are over 1 percent, it means that per capita consumption has also been increasing.

Factors affecting per capita consumption in the 1980-1994 period include declining real retail prices, growing disposable family income, low unemployment, and effective promotion programs. Increased consumption has occurred despite reduced demand for

full fat formulations of dairy products; so the milkfat based milk equivalent disappearance figure is biased downward. Cheese sales continue to be strong. Fluid sales were up slightly. Substantial decreases in butter prices have brought some strength to the butter market in 1993 and 1994.

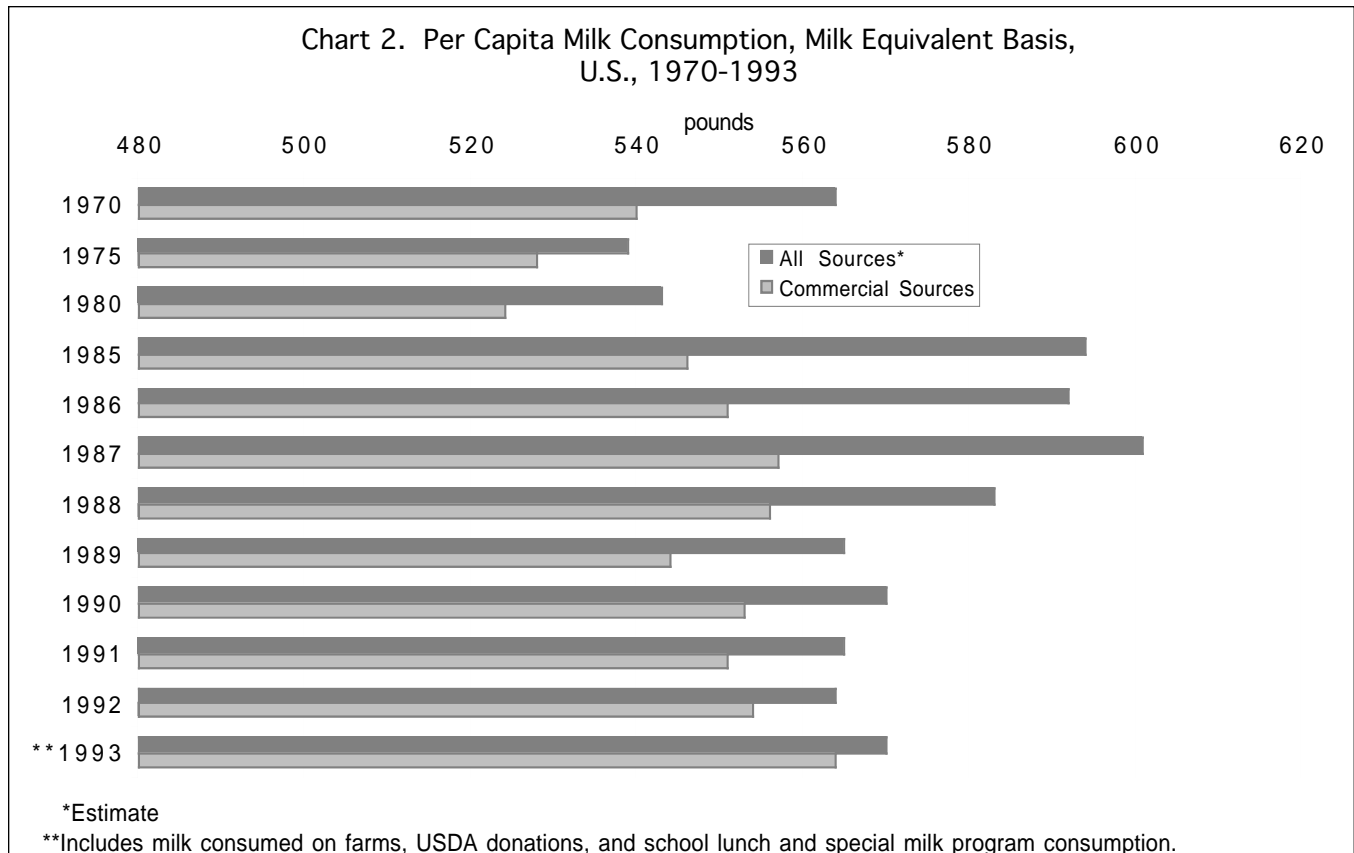
**Per Capita Consumption Versus Demand**

Chart 2 shows per capita consumption of milk and dairy products on a milk equivalent basis from 1970 to 1993. The All Sources value includes milk consumed on farms, USDA donations, and School Lunch and Special Milk Program (i.e., subsidized) consumption.

As the data indicate, per capita consumption has made a remarkable recovery in the 1980 through 1993 period from barely over 500 pounds milk equivalent (commercial sources) in the early 1980s to about 570 pounds at the present time. Two obvious questions occur from inspecting these data:

- What factors explain the increase?
- Will per capita consumption continue to increase in the future?

The differences in per capita commercial demand and per capita consumption show up almost exclusively in butter data and cheese data. For example, in 1990, per



capita consumption of butter was 4.4 pounds while per capita commercial demand was 3.7 pounds. Similarly, per capita consumption of “hard” cheese was 24.7 pounds while per capita commercial demand was 24.9 pounds. This means that donations programs apply primarily to butter (see Leaflet P-4).

Per capita commercial demand estimates for sixteen different dairy products for seven separate years during the 1975-1992 period are shown in Table 1. The individual product data reflect different situations, with the most notable increases recorded in the lowfat and skim fluid product and cheese categories.

Table 1. Per Capita Consumption of Milk and Dairy Products, Product Pounds Unless Indicated, United States, 1975 to 1992

Product	1975	1978	1981	1984	1987	1990	1992
Whole Milk	181.3	161.0	140.0	126.8	111.9	90.3	84.1
Lowfat Milk	61.3	73.5	82.2	88.8	100.6	108.3	106.3
Skim Milk	11.5	11.5	11.3	11.6	14.0	22.9	25.0
Cream	3.4	3.3	3.5	4.0	4.7	4.6	4.8
Yogurt	2.1	2.5	2.5	3.7	4.4	4.1	4.3
Eggnog	0.4	0.4	0.4	0.5	0.5	0.5	0.5
Butter	4.7	4.4	4.2	4.9	4.7	4.4	4.2
Sour Cream	1.6	1.7	1.8	2.2	2.4	2.5	2.7
Cheese	14.3	16.8	18.2	21.5	24.1	24.6	26.0
Cottage Cheese	4.6	4.7	4.3	4.1	3.9	3.4	3.1
Evaporated/ Condensed Milk	8.7	7.5	7.2	7.4	8.0	7.9	8.5
Ice Cream	18.6	17.6	17.4	18.2	18.4	15.8	16.4
Sherbet	1.5	1.4	1.3	1.3	1.2	1.2	1.3
Ice Milk	7.6	7.7	7.0	7.0	7.4	7.7	7.1
Other Frozen							
Dairy Products	1.0	0.7	0.8	0.8	1.2	3.7	4.4
Nonfat Dry Milk	3.3	3.1	2.1	2.5	2.5	2.9	2.7
Other Dry Milk Products	2.5	2.9	3.3	3.8	4.3	4.6	4.4
Total - Milk Equivalent	539.1	544.3	540.6	581.9	601.3	569.7	564.6

Source: Putnam, Judith Jones and Jan E. Allshouse, *Food Consumption, Prices, and Expenditures, 1970-92*, ERS-USDA, Statistical Bulletin No. 867, September 1993.

### Fluid Milk Sales

While sales of fluid milk products per capita on a product weight basis reflected a slight downward drift in the 1970s, they subsequently have been relatively stable at about 225 pounds. Lower whole milk consumption essentially has been balanced by more lowfat and skim milk consumption. USDA estimates indicate that in 1986, for the first time ever, per capita consumption of lowfat milk including skim milk (113.6 pounds), exceeded per capita consumption of whole milk (109.9 pounds). However, these fluid milk consumption data need to be scrutinized more closely because of sales shifts within the fluid category.

The federal order program reports sales data for ten different fluid milk products. These values are reported in terms of changing shares of the fluid milk market, compare 1993 sales with 1980 sales, and are

reported in Table 2. For example, whole milk sales accounted for 58.7 percent of fluid milk sales in 1980, but only 34.9 percent in 1993.

Table 2. Fluid Milk Sales, All Federal Order Milk Markets, 1980 and 1993

	1980 40.85 bil. lbs.	1993 44.70 bil. lbs.
Whole Milk	58.7%	34.9%
Whole Flow Milk	2.0	1.5
2% Lowfat Plain	19.1	34.2
2% Lowfat Fort.	4.6	2.8
1% Lowfat Plain	4.5	7.6
1% Lowfat Fort.	1.9	1.0
	30.1%	45.6%
Skim - Plain	3.2	10.9
Skim - Fort.	1.5	1.8
	4.7%	12.7%
Flavored Lowfat/Skim	2.8	3.9
Buttermilk	1.7	1.5
Total	100.0%	100.0%

Source: Federal Milk Market Order Annual Statistics for 1980 and 1993.

A number of points stand out from an inspection of the total in Table 2:

- Combined sales of class I products as identified in the table increased by almost 10 percent to 44.7 billion pounds from 1980 to 1993.
- Whole milk (plain) underwent a major decrease and accounted for only 34.9 percent of the fluid milk market in 1993.
- Combined plain lowfat and skim sales increased from 34.8 percent of the fluid milk market in 1980 to 58.3 percent in 1993.
- Plain lowfat milk (2 percent and 1 percent), was 41.8 percent of fluid sales in 1993. Most of the plain lowfat milk (82 percent) was identified as 2 percent; the remainder of the plain lowfat milk was labeled as a 1 percent milkfat product.
- A small portion (8 percent) of the 2 percent lowfat milk was fortified with additional solids-not-fat. About 12 percent of the 1 percent lowfat milk had added solids-not-fat. The proportions of both 2 percent and 1 percent lowfat milk that were fortified with added solids-not-fat declined substantially from 1980 through 1993.
- The skim milk share of the fluid milk market tripled from 1980 to 1993, from 4.7 percent to 12.7 percent. Solids-not-fat fortification of skim milk declined, and in 1993, 86% of all skim milk was plain (non-fortified).
- Flavored milk products accounted for 5.4 percent of the fluid milk market in 1993, a slight

increase from 1980. In 1993, almost three-fourths of flavored milk products were either a lowfat or skim product; only one-fourth were whole milk products.

In reviewing these observations in conjunction with the per capita estimates in Table 1, some general conclusions can be reached.

- The shift away from whole milk to lowfat milk continues without interruption, probably both due mostly to milk-fat/cholesterol reasons.
- Except for California with its different standards of identity, fortification of lowfat and skim milk has decreased since the 1960s and now accounts for only small shares of those markets. Higher nonfat dry milk prices and consumer acceptance of non-fortified milk has discouraged fortification in the past twenty years. Greater calcium awareness could help reverse the fortification downtrend. (See Leaflet P-13 for a discussion of the minimum nonfat standards issue.)
- Flavored milks are fairly small shares of the fluid milk market, and per capita consumption of flavored milks shows only modest strength.

- Skim milk has a small but rapidly growing share of fluid milk sales.

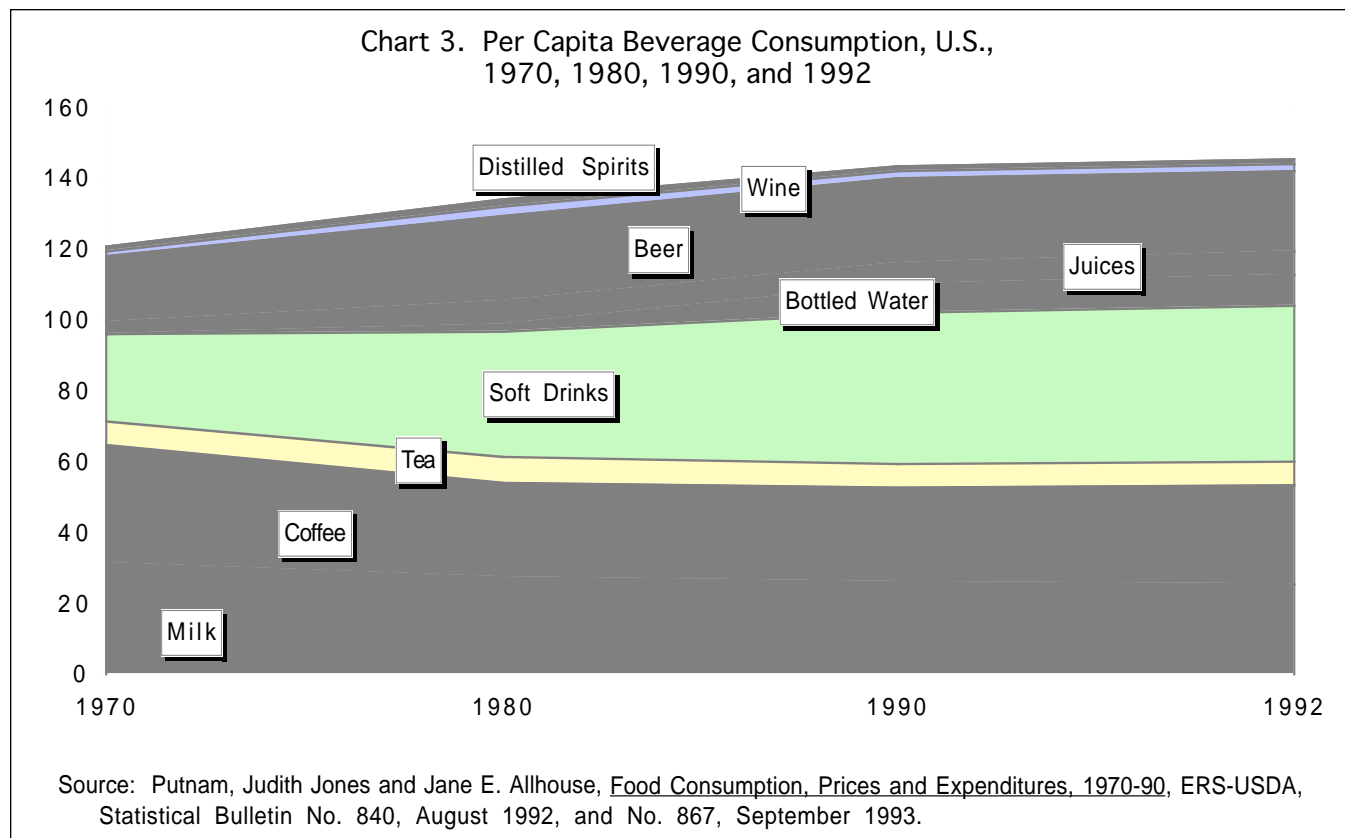
**Fluid Products as Part of a Broader Beverage Market**

Chart 3 contains per capita beverage consumption estimates for nine beverages for 1970, 1980, 1990, and 1992. Consumption of most beverages (excluding milk and coffee) has trended upward in recent decades. In 1970, total per capita beverage consumption was 120.9 gallons and it was estimated at 145.3 gallons in 1992.

Total beverage consumption (for the nine identified beverages) is up by nearly 25 gallons per capita over the twenty-two year period. Across all beverages in the 1970-1992 period, coffee and milk have been the big losers. The remarkable surge in soft drink consumption dominates the beverage consumption picture. An interesting phenomena that has occurred recently is that milk processing plants have begun to process other products such as fruit juices in an effort to capitalize on expanding demand for these products and keep plant capacity fully utilized.

**Butter**

In 1957 per capita margarine consumption exceeded per capita butter consumption for the first time.



Since about 1970, the consumption relationship between these two products has been relatively stable at 11 pounds per capita margarine consumption and 4 pounds per capita butter consumption. Blends of vegetable oil and milkfat are becoming a more significant factor in the “spread” market but market data on this particular item are not publicly available. Some observers believe that the blend market will increase the total market for milkfat, but this has yet to be demonstrated.

With respect to butter, only 30 percent is consumed at home. The other 70 percent is consumed as an ingredient and in the away-from-home market. Additionally, government programs such as the Temporary Emergency Food Assistance Program have made substantial butter donations in recent years, which have displaced margarine, and not butter sales (see Leaflet P-4).

### ***Cheese***

Per capita cheese consumption has more than doubled since 1970, reaching an estimated 26.0 pounds in 1992. Growth has been primarily in the away-from-home market and as ingredients in the processed foods market. Currently, an estimated 38 percent of cheese is consumed at home, 39 percent away from home, and 23 percent as ingredients in processed foods. Cheese demand has been somewhat vulnerable to government donations programs. USDA has estimated that each 100 pounds of cheese donations displaces about 35 pounds of commercial purchases.

Imitation cheese (made with dairy proteins such as casein and non-dairy oils) became a measurable factor in the marketplace in the 1980s. Such products may equal as much as 7 to 8 percent of the cheese market. Most imitation cheese is used by food processors, particularly on frozen pizza. However, the imitation cheese market has not grown as rapidly as early projections suggested. Relatively strong world prices for casein in the United States have removed some of the cost advantage associated with imitation cheese.

### ***Frozen Dairy Products***

Frozen dairy product consumption, including ice cream, ice milk, and sherbet, has held at relatively strong and constant levels in recent years at approximately 6 gallons per capita annually. Per capita consumption of other frozen dairy products, especially frozen yogurt, have increased dramatically in recent years.

### ***Cream***

Per capita consumption of cream products in the United States generally held in the 11-13 pound range annually in the 1940s and early 1950s. Due to quality problems and relatively higher prices, cream products became a natural target for substitution. By 1970, per capita cream consumption (including sour cream) had dropped to under 5.5 pounds. Substitution was seen in both the light cream (coffee cream) market and in the heavy cream (whipping cream) market. However, real cream products have made a significant comeback in the marketplace since 1984, probably because coffee cream is now available in long shelf-life forms (ultra pasteurized); also, changes in cream pricing (class II) have resulted in relatively lower prices.

### ***Milkfat Substitutes***

The food industry is involved in continuing research and development efforts aimed at finding milkfat substitutes that diminish or avoid the saturated fat-cholesterol issues associated with animal fats. In 1990, the Food and Drug Administration approved one of these fat substitutes, Simplese, as a “Generally Regarded As Safe” product. Simplese is a natural product of egg (white) proteins or milk (albumin) proteins. Simplese is made by using a patented heating and blending process called microparticulation. The protein is made into tiny ground particles that provide a creamy mouth feel. One gram of Simplese is 1.3 calories as contrasted with one gram of fat at 9 calories. When heated, Simplese, as a natural protein, will gel. Therefore it has some usage limitations. However, it has a wide range of potential uses in refrigerated and frozen dairy products as well as other food products. The market at this juncture has not adopted Simplese as widely as earlier projections had suggested. Other fat substitutes, several of which utilize whey proteins, continue to be in development stages.

### ***Factors Affecting Demand for Milk and Dairy Products***

Higher consumer income and declining retail prices for milk and dairy products relative to other foods have caused most of the increase in per capita consumption that has occurred since 1980. The 22 percent increase in total consumption from 1980 through 1993 reflects a combination of the increases in per capita consumption and the growth in population. Factors other than income and price have affected per capita consumption changes. These factors include advertising, concerns regarding

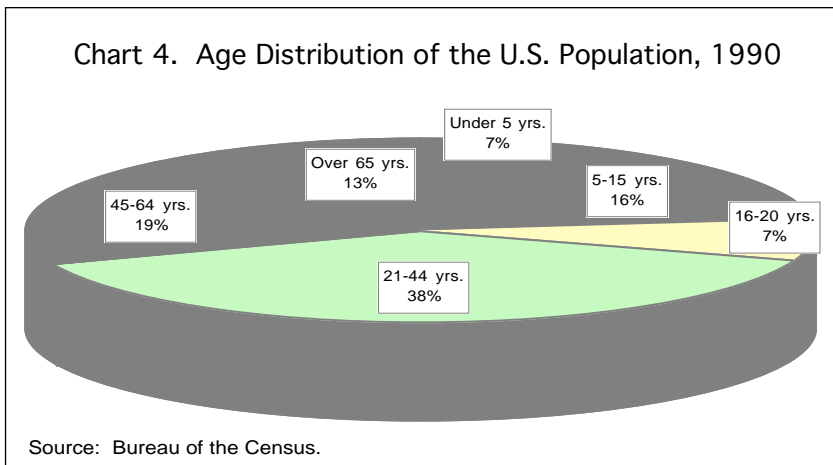
health and nutrition, changes in demographics, and levels of government donations. However, these other factors are secondary to the price-income effects.

A recent USDA analysis reported a number of price and income elasticities. The price relationships all showed the expected effects (higher prices, lower consumption, etc.) and were relatively consistent with prior studies. The income effects were strong and positive for products such as cheese but negative for fluid milk and nonfat dry milk (Table 3). The USDA report cautions that these income elasticities should be interpreted conditionally because it is difficult to separate the effects of income from trend effects. The fluid milk income elasticity with its negative sign, for example, may come closer to reflecting changes in tastes and preferences over time. However, the elasticity measures of about -0.3 for fluid milk and cheese are generally believed to be accurate.

	Price Elasticity	Income Elasticity	At Home Consumption Income Elasticity
Total Dairy Products	-0.31	0.18	0.14
Fluid Milk	-0.26	-0.22	0.02
Cheese	-0.33	0.59	0.32
Butter	-0.17	0.02	0.35
Evap., Cond., Dry Milk	-0.83	-0.27	-0.12
Frozen Dairy Products	-0.12	0.01	0.21

Source: Haidacher, R.C., J. R. Blaylock, and L. H. Myers. Consumer Demand for Dairy Products. ERS-USDA, Agricultural Economic Report No. 586, March 1988, p. 7.

One issue that has emerged from the USDA study concerns a finding of the relative unimportance of advertising as a factor affecting demand. Olan Forker of Cornell University has responded to the USDA report on the advertising issue as follows: "...enough research has been completed to indicate that generic advertising can increase dairy product sales.... The results of the fluid milk models developed here at Cornell and by others for UDIA and the National Dairy Board can be validated and imply that the fluid milk advertising at current levels is worthwhile. The results of the cheese models are inconclusive. The calcium model does not provide a measure of volume yet...."



This issue is discussed more completely in Leaflet P-12 of this series.

The primary demographic factors that have been identified as having significant influences on milk and dairy product consumption include age, household size, race, and region. Age distribution appears to be the primary change factor as we look ahead. A decreasing proportion of our population will be in age groups under forty as we approach the year 2000. Chart 4 reports the age distribution of the United States population by age groups for 1990. The median age of the U.S. population moves to new record highs each year. In 1983, it was 30.9 years; it was an estimated 33.1 years in 1990; and is projected to reach 36.3 years at the turn of the century. Milk is generally viewed as a food of children and young adults. Dairy product advertising can be expected to place increased emphasis on the importance of consuming dairy products at older ages.

The 1987-1988 USDA Nationwide Food Consumption Survey measured many relationships including weekly per person dairy expenditures by household type, family income, race, and geographic region. The average weekly expenditures for dairy products by household type are indicated in Table 4. Households with male and female heads spent approximately 10 percent more per week on dairy products than female head households. This is possibly due to the fact that single females with children have significantly less income—about half that of other households. Income quintile (Table 5) appears to have a large impact on the amount of money spent on dairy products. In every category, the higher the income, the higher the weekly expenditures on dairy products.

Table 4. Average Weekly Dollar Value of Food Used at Home by Household Type

	HOUSEHOLD TYPE			
	Female Head with Children	Male & Female Head with Children	Other	All
Dairy Products	\$2.78	\$3.05	\$3.21	\$3.07
Fresh Milk	\$1.34	\$1.43	\$1.38	\$1.40
Frozen Desserts	\$0.29	\$0.39	\$0.45	\$0.40
Cheese	\$0.74	\$0.88	\$1.08	\$0.93

Source: Lutz, S. M., D. M. Smallwood, J. R. Blaylock, and M. Y. Hama. "Changes in Food Consumption and Expenditures in American Households During the 1980s," USDA, ERS, HNIS, Statistical Bulletin 849, December 1992.

Table 5. Average Weekly Dollar Value of Food Used at Home by Income Quintile

	INCOME QUINTILE				
	First	Second	Third	Fourth	Fifth
Dairy Products	\$2.69	\$2.80	\$3.05	\$3.38	\$3.59
Fresh Milk	\$1.32	\$1.35	\$1.40	\$1.46	\$1.49
Frozen Desserts	\$0.25	\$0.33	\$0.44	\$0.44	\$0.53
Cheese	\$0.66	\$0.78	\$0.95	\$1.04	\$1.24

Source: Lutz, S. M., D. M. Smallwood, J. R. Blaylock, and M. Y. Hama. "Changes in Food Consumption and Expenditures in American Households During the 1980s," USDA, ERS, HNIS, Statistical Bulletin 849, December 1992.

The USDA survey revealed that weekly dairy expenditures for Whites averaged \$3.25 (Chart 5). For Blacks, weekly dairy expenditures were 37 percent under that amount; and for non-White/non-Black racial groups, expenditures were 17 percent under that of Whites. This is not surprising due to the reported incidence of lactose intolerance among Blacks. Fairly modest changes in race distribution in the future, as the proportion of Whites decreases marginally, indicate that if current expenditure patterns hold, race will have a small but negative impact on consumption.

Region becomes another factor in demand prospects for milk and dairy products, particularly as the West and South are projected to have growing shares of the U.S. population compared to the Northeast and North Central regions. As reported in the Nationwide Food Consumption Survey, per person expenditures for all dairy products are highest in the Northeast and lowest in the South, but individual dairy products show substantial differences from this pattern. Chart 6 shows weekly dairy expenditures per person by region. Weekly per person expenditures for dairy products in the North Central, South, and West regions generally are below those in the Northeast.

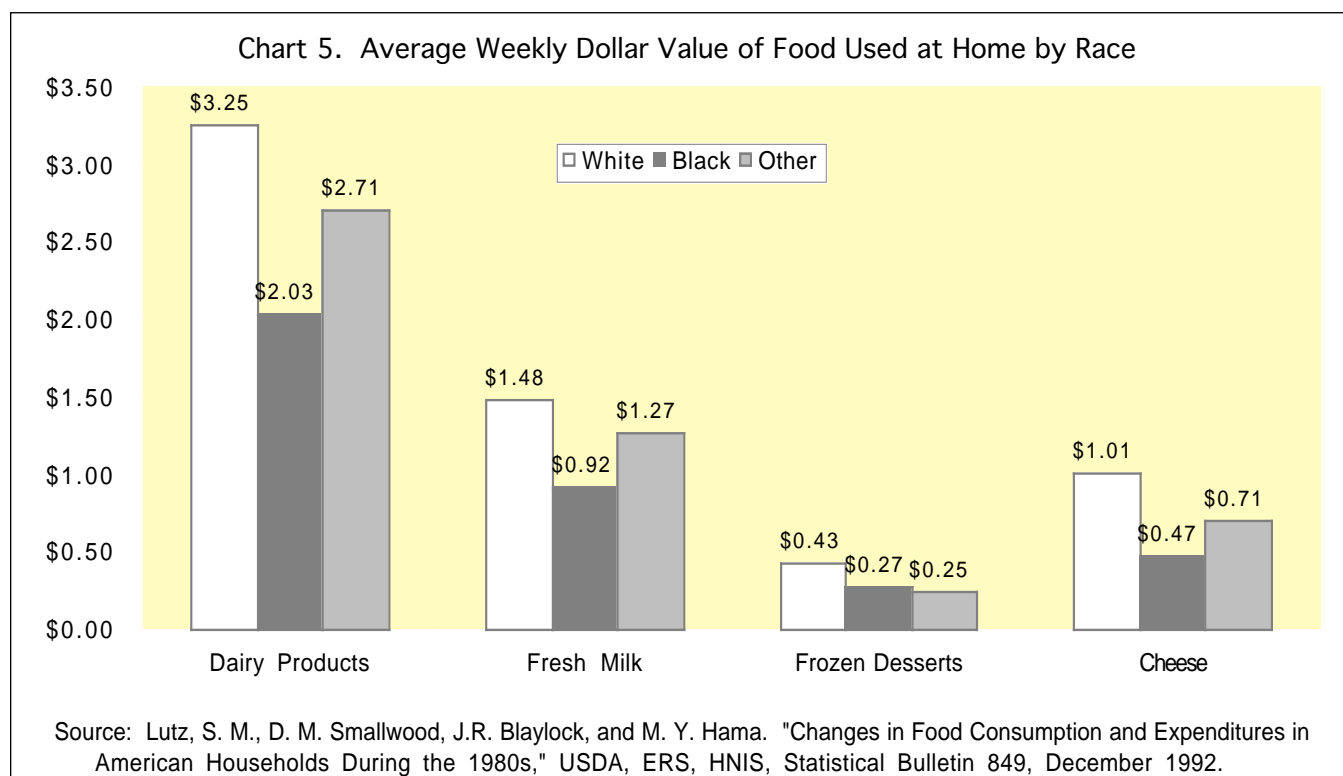
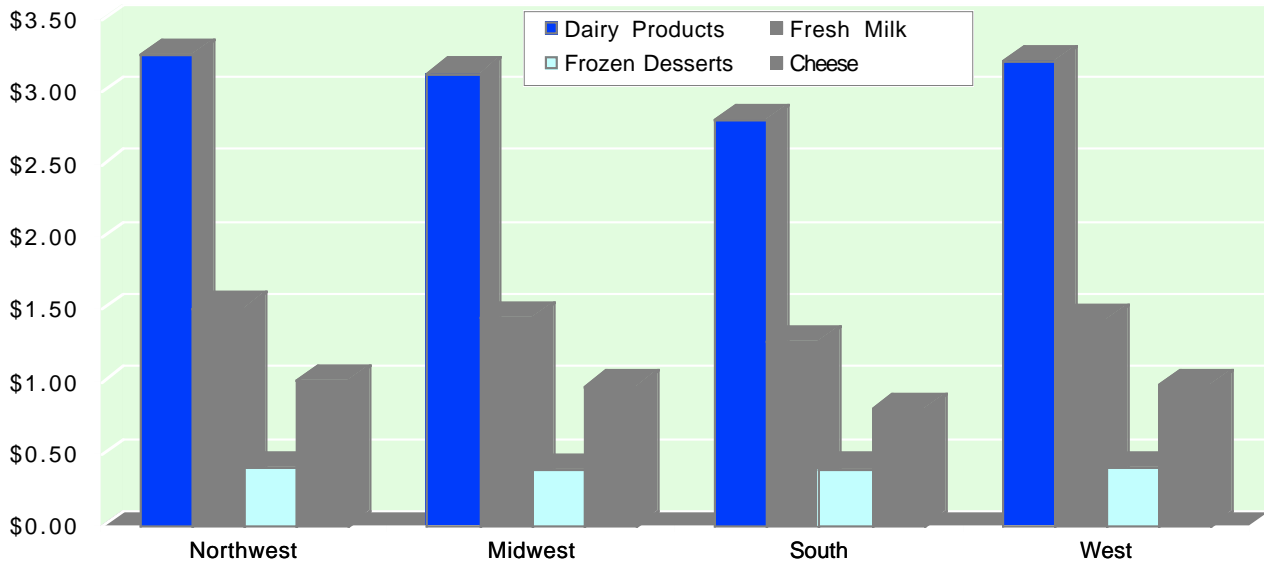


Chart 6. Average Weekly Dollar Value of Food Used at Home, by Region



Source: Lutz, S. M., D. M. Smallwood, J. R. Blaylock, and M. Y. Hama. "Changes in Food Consumption and Expenditures in American Households During the 1980s," USDA, ERS, HNIS, Statistical Bulletin 849, December 1992.

In a recent report, the U.S. Department of Agriculture consolidated the demographic factors and made projections to 1990 and 2000 based on 1980 expenditure levels. These projections are reported in Table 6.

Demographic Factors	Milk and Cream	Cheese	Butter	Other Dairy Products	All Dairy Products	
--percent changes in expenditures from 1980 levels--						
Age	1990	-0.2	1.0	1.1	0.5	0.5
	2000	-0.9	1.9	1.8	2.1	1.6
Region	1990	-0.1	-0.2	-0.7	0.1	-0.1
	2000	-0.2	-0.4	-1.3	0.3	-0.1
Race	1990	-0.3	-0.5	-0.2	-0.2	-0.3
	2000	-0.5	-0.1	-0.3	-0.4	-0.6
Total	1990	-0.6	0.3	0.2	0.4	0.1
	2000	-1.6	1.4	0.2	2.0	0.9

Source: Haidacher, Richard, and James Blaylock, "Why Has Dairy Product Consumption Increased?" *National Food Review*, ERS-USDA, Vol. 11, Issue 4, October-December 1988, p. 31.

It is evident from the data that age is the dominant demographic factor affecting expenditures for dairy products through this next decade. While most of the region and race coefficients carry negative signs, the age signs are mostly positive and, more important, the total for all dairy products indicates that weekly expenditures per person will be up by 0.1% in 1990 and up by 0.9 percent by 2000.

#### Summary and Conclusions

While debate continues about how much weight to give the various factors affecting demand, it is evident that the generally accepted factors continue to include price, income, price of substitutes, advertising, and demographics. The short review of these factors implies slow steady growth in domestic consumption over the next decade.