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FOOD EXPENDITURE PROJECTIONS: 1990-2010

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In 1991 the U.S. food marketing system contributed approximately 9.5 percent of the gross national product after purchasing approximately $109 billion of agriculture commodities from the farm sector. About $286 billion was spent in retail food stores while another $251 billion was spent in food service establishments. However, sales in current dollars declined by about 0.5 percent from 1990 to 1991. Slower sales relative to the 1980's in both at-home and away-from-home food expenditures are expected to continue throughout the 1990's and into the next century. Demographic trends often cited as reasons for this include a slower growing population, changing age distribution, regional migration, increased longevity, and altered employment patterns.

Long term survival for both production and marketing firms will depend in no small part on an understanding of how these demographic trends will impact the demand for food. Two of the most important demographic changes which will affect food demand are the slowing of the overall population growth rate and the subsequent aging of the population. For example, from 1970 to 1990 the U.S. population increased from 204.0 million to approximately 249.9 million, which is an annualized growth rate of 1.00 percent. However, from 1990 to 2010 the population is projected to grow to approximately 282.1 million. This represents an annualized growth rate of 0.6 percent, or just over half the growth rate of the 1970-90 period. Hence, firms will not be able to rely on population growth to fuel expansion in terms of output and profits.

The decrease in the growth rate of the U.S. population and increased longevity will result in changes in the age distribution. For example, in 1985 approximately 47.5 percent of the population was under 30 years of age. However, this figure is expected to decline to approximately 41 percent by the year

2000, and to approximately 39 percent by the year 2010. Likewise, in 1985 persons 45 years old and over accounted for just 31 percent of total U.S. population. By the year 2010 this group is expected to represent 41 percent of population

These demographic changes along with regional population shifts, and anticipated growth in consumer income have implications for food consumption. In addition, since many agricultural subsectors are almost entirely dependent on the U.S. domestic market, future resource adjustments within many agricultural subsectors are likely to be closely linked to changes in the domestic demand for specific goods.

Before presenting some of our analysis relating to demographic and socioeconomic factors in demand, it is appropriate to mention two limitations when such analysis is used for projection purposes. First, there is an implicit assumption that as an individual moves from one group to another his or her preferences immediately take on the characteristics of the "new" group, regardless of his or her previous identify. Second, the analysis is based on cross section data collected over a short period of time and it is usually assumed that prices are constant across groups. Thus, the observed purchase behavior is for a fixed set of food and non-food prices. No one can be sure that the same consumption patterns would exist under alternative relative price observations.

Given this background, the remainder of the paper will be devoted to presenting some results from a recent study of food consumption by demographic groups using data from the Bureau of Labor Statistic's Continuing Consumer Expenditure Survey for 1988 and 1989. The presentation will be organized as follows: (1) identification of important socioeconomic and demographic groups; (2) expenditure patterns for the groups expected to experience the most dynamic changes; (3) implications for future food demand; and (4) implications for production agriculture.

Consumption Patterns By Demographic and Socioeconomic Group

With respect to implications for food consumption, income and population growth will have a large impact. However, the following demographic and socioeconomic changes will also effect the demand for food to some extent:

1. The slowing of the overall population growth rate with the projected growth over the next 20 years (13 percent) just slightly more than half the growth rate between 1970 and 1990 (22 percent).

2. Changes in the age distribution toward an older population.

3. Changing geographic distributions suggesting that the Northeast and North Central regions will experience declines in their share of the total population while the South and West will gain population share over the next 20 years.

4. Changing racial mix with blacks becoming a larger share of the total. Blacks currently represent about 12.6 percent of the population and are expected to account for slightly more than 14 percent in 2010.

Table 1. Simulated Impact of Regional Location on Per Person Food Expenditures: Selected Foods

Item	Northeast	North Central	South	West
		Percent of base a/		
All Food	103.0	95.5	99.0	103.3
Food Away From Home	99.0	98.4	103.0	99.2
Food At Home	105.3	94.7	95.5	106.2
Beef	103.6	96.4	98.8	102.4
Pork	101.0	104.4	105.9	91.2
Poultry	126.0	84.4	102.6	96.1
Dairy Products	105.2	94.3	94.3	107.9
Fruits	109.1	93.5	90.9	109.1
Vegetables	103.3	90.1	97.4	110.5
Fats and Oils	96.4	96.4	96.4	105.5

a/ Percent of overall sample means, holding all variables constant at mean levels including the region of interest, but excluding the other three regions.

Source [1]

Tables 1, 2, and 3 contain summarized results of statistical analysis of the 1988-89 BLS Continuing Consumer Expenditure Survey designed to determine the net effect on food expenditures due to changes in certain demographic variables. The results are reported in percentages relative to a "base" number as defined in a footnote to each table. In each case, all explanatory variables, except those of interest, are held constant at their mean values. Thus, the analysis is an attempt to measure the marginal impact of certain factors, holding all other factors constant.

Table 2. Simulated Impact of Age on Per Person Food Expenditures: Selected Foods

Item	Age Group 20-29	30-44	65-74
	Percent of base a/		
All Food	93.1	98.0	98.1
Food Away From Home	135.9	119.7	87.2
Food At Home	69.9	85.1	104.6
Beef	65.7	79.3	95.3
Pork	56.3	78.5	108.1
Poultry	67.0	85.7	111.0
Dairy Products	81.5	92.8	104.8
Fruits	61.0	76.1	122.5
Vegetables	60.2	79.6	111.0
Fats and Oils	58.0	72.5	108.7

a/ Percent of average expenditures by 45 to 64 year old, holding all other variables constant at their mean level.

Source [1]

Regional impacts on food expenditures are presented in Table 1. When adjusted for other socioeconomic and demographic variables, regional differences in consumption expenditures for aggregate food groups tend to be small. The most variation appears in the poultry group with expenditures in the Northeast averaging 26 percent above the base average and North Central expenditures averaging 15 percent below the base. Expenditures on food-at-home were 5 and 6 percent higher in the Northeast and West respectively, but approximately 5 percent lower for the North Central and South.

Some regional variation in food expenditures may represent regional differences in average prices over the 1988-89 data collection period. Regional differences might be more important in determining how food is prepared and consumed than in determining the absolute consumption level.

Table 3. Simulated Impact of Race on Per Person Food Expenditures: Selected Foods

Item	Nonblack	Black
	Percent of base a/	
All Food	101.6	89.7
Food Away From Home	102.9	82.8
Food At Home	101.0	93.4
Beef	100.0	101.8
Pork	96.1	116.7
Poultry	96.1	129.0
Dairy Products	103.9	76.0
Fruits	100.0	98.9
Vegetables	100.0	98.7
Fats and Oils	101.8	80.0

a/ Percent of overall sample means, holding all other variables constant including the appropriate race variable but excluding the other.

Source [1]

Table 2 focuses on estimates of how average per capita food expenditures change as the consumer ages, holding all other factors constant. The results are expressed as percentages of average expenditures for the 45 to 64 year old "base" group. Food-away-from-home expenditures are 20 to 36 percent higher for persons between age 20 and 44 than they are for persons between age 45 and 64. On the other hand, food-at-home expenditures are 15 to 30 percent lower for the 20 to 44 age group as opposed to those 45 to 64. Because of this, the at-home expenditures for all the major food groups are less for the 20 to 44 age group than for those 45 and over. Food-at-home, pork, poultry, dairy, vegetables, and fats and oils tend to peak with the 65 to 74 year old group.

Table 3 indicates that, other factors equal, nonblack households spend more per person than their black counterparts for most food groups. Black households' average total food expenditures are estimated to be over 10 percent below the average for all families of similar characteristics. Across food groups, the results imply that blacks and nonblacks allocate their food dollar in substantially different ways.

Nonblacks' per capita expenditures for dairy products average nearly 28 percent above the per capita expenditures by blacks. However, blacks tend to spend more for beef, pork, and poultry. In fact the results suggest that per capita expenditures for poultry are nearly 34 percentage points higher for blacks than nonblacks.

Projections

There is much interest in the implications of changing demographic and socioeconomic characteristics on long-term food demand patterns. An analysis of demographic differences in food demand was combined with projections of changes in age distribution, regional shifts, racial mix, income growth, and total population growth to obtain estimates of the impact on future expenditure patterns. It is beyond the scope of this speech to detail all of the assumptions underlying the projections for changes in the demographic characteristics over the next 20 years. Additional specific assumptions are detailed in [1].

Results summarized here are from projections based on the following major assumptions:

a. The U.S. population will grow from 249.9 million in 1990 to 282.1 million in 2010. This is the Bureau of the Census Middle Series projection. [2].

b. Blacks will increase from 12.6 percent of the total

population in 1990 to 14.1 percent in 2010.

c. The regional population distribution, expressed as shares of the total U.S. population will change as follows [1]:

Year	Northeast	North Central	South	West
	----------	Percent	----------	
1990	20.3	24.1	34.6	20.9
2010	19.1	21.2	36.7	23.1

d. The age distribution, expressed as a percent of the total population will change as follows [2]:

Age Group	1990	2010
	---------- Percent	----------
0-9	14.5	12.5
10-19	14.0	13.0
20-29	16.2	13.8
30-44	24.2	19.2
45-64	18.8	27.5
Over 65	12.8	13.9

The demographic determinants of demand considered in the projections are race (black/nonblack), age distribution, geographic distribution, and size of the population. Projections are made under the assumption that real per capita income will grow at 2 percent per year. Although commodity prices and consumer tastes and preferences are known to be important factors influencing food consumption over time, economists generally have little knowledge about the future course of these factors. For purposes of this study, relative prices and consumer tastes and preferences within the defined categories are assumed to remain stable at levels existing during the 1988-89 period.

Table 4 contains the projected changes in per capita consumption between 1990 and 2010 due to projected changes in demographic characteristics and to assumed income growth. Columns 1 through 4 contain the estimated impacts of changes in individual factors, assuming all other variables are unchanged. The last column, labeled "Total", contains the net estimated change after accounting for the projected adjustments in all variables.

Of the three demographic characteristics (age, regional distribution, and race), changes in age distribution are likely to have the biggest impact on per person demand. Age distribution changes are projected to increase per capita food expenditures by 1.0 percent over the 20 year period. Regional population distribution changes are expected to have a slight positive effect on total food expenditure and changing racial mix will have an expected slight negative impact.

Table 4. Estimated Percentage Change in Food Expenditures, 1990-2010.

	Effect Due to:				
Food Group	Age Distribution	Regional Distribution	Race	Income	Total[a/]
	percent				
All Food	1.0	0.1	-0.2	14.9	16.1
Beef	3.7	0.1	0.1	3.5	7.5
Pork	4.1	-0.3	0.3	1.3	6.2
Poultry	2.7	0.1	0.7	5.3	9.6
Cereals & Bakery	2.6	0.0	-0.2	4.7	7.3
Dairy Products	1.5	0.1	-0.4	4.7	6.0
Fruits	3.7	0.1	-0.1	10.5	14.8
Vegetables	4.3	0.5	-0.1	6.1	11.1
Sugars & Sweeteners	2.4	0.3	-0.1	6.2	8.8
Fats & Oils	4.2	0.2	-0.2	4.6	8.9

a/ Net adjustment after accounting for projected changes in all variables.

Source: [1]

The change in age distribution has the most impact on vegetables (up 4.3 percent), fats and oils (up 4.2 percent) and pork (up 4.1 percent). The least impact is expected for dairy products (up 1.5 percent) and sugar and sweeteners (up 2.4 percent). Age

distribution changes are expected to be a positive force for per capita expenditures of all major food groups.

As indicated by the result for total food, per capita expenditures for the identified food groups are expected to be influenced little by changes in the regional population distribution. Pork would experience a slight decline while the other groups would experience a slight increase. The basic conclusion is that regional distribution changes will have a negligible impact on the demand for food.

While racial distribution changes will generally have a negative impact on per capita expenditures, poultry, pork, and beef will have slight increase whereas the other food groups would have slight decreases.

Far overshadowing the implications of changes in demographic characteristics are the projected changes in per capita food expenditures due to income growth. If we assume an average 2 percent per year growth rate for per capita real income, total per person food expenditures are projected to increase almost 15 percent over the 20 year period. Much of the total income response occurs in food-away-from-home expenditures which are estimated to grow about 24 percent (not shown in table).

Income growth benefits fruits (up 10.5 percent), sugars and sweeteners (up 6.2 percent) and vegetables (up 6.1 percent) the most. Beef and pork will benefit the least (up 3.5 and 1.3 percent respectively).

The scope of this presentation prohibits going into much detail concerning the projections. However, it is appropriate to note that these projections are for per capita expenditures,assuming fixed relative prices. As supply and demand conditions change over time, relative prices have to change and the expenditure patterns suggested here could be altered dramatically. Also, these results implicitly reflect changes in the quality and product mix of purchases. For example, the income-generated growth in dairy product expenditures reflects high growth in other processed dairy products (up 12 percent) and cheese (up 9 percent) and offsets a decline in milk and cream products (down 2 percent).

The net effect of projected changes in demographics and an assumed 2 percent real income growth is given in column 5 of table 4. Overall, per capita food expenditures are expected to grow 16.1 percent. The largest increases are anticipated for fruits (up 14.8 percent), vegetables (up 11.1 percent) and fats and oils (up 8.9 percent). Dairy products have the lowest growth with just a 6 percent increase. Likewise pork expenditures are expected to growth just 6.2 percent over the 20 year period.

So far we have discussed the outlook implications of demographic change and economic growth on per capita food expenditures. Another very important factor driving growth in food demand is the expansion of the total population. As indicated earlier, the Bureau of the Census middle series projections suggest that nearly 32 million additional people will have to be fed in the year 2010 compared to 1990. Table 5 contains estimates of the percentage changes in total national food demand between 1990 and 2010, after accounting for projected per capita expenditure changes and changes in the total population.

Table 5. Estimated Percentage Change in National Food Expenditures, 1990-2010.

Food Group	Percent Change[a/]
All Food	31.1
Away From Home	37.4
At Home	24.2
Beef	21.4
Pork	19.9
Poultry	23.7
Cereals and Bakery	21.1
Dairy Products	19.7
Fruits	29.6
Vegetables	25.4
Sugars and Sweeteners	22.8
Fats and Oils	22.9

a/ Assumes 2 percent annual income growth, demographic changes, and Bureau of the Census population growth projections.

Source: [1]

Total food expenditures are projected to increase 31.1 percent. Food-away-from-home expenditures increase 37.4 percent compared to 24.2 percent for food-at-home expenditures. Recall that these projections are made under the assumption of constant real prices; hence the estimates for individual food categories represent a "rough" estimate of volume changes. Note also that the individual food groups represent at-home consumption only. To the extent that the away-from-home market grows for particular foods, these projections will understate total expenditure growth for the individual food groups.

Population growth is a dominant factor affecting future food

expenditures. One effect of the slow but steady growth of the population is that the variation of growth levels between food groups as indicated in table 5 is less than that exhibited by the per capita projections in table 4. The largest projected increase is for fruits (up 29.6 percent) while the smallest is for dairy (up 19.9 percent).

Implications For Agriculture

While it is beyond the scope of this speech to detail all the implications for agriculture, some general observations relative to agricultural resource use are appropriate. Between 1955-59 and 1979-83, yields for major crops increased as follows: corn (110 percent), wheat (58 percent), sorghum (94.5 percent), and soybeans (29.5 percent). Focusing on the period from 1980 to 1987, the amount of acreage in total agricultural production decreased 4 percent while total agricultural production increased approximately 20 percent. If we assume trend growth rates in average production will continue, it is obvious that the projected demand increases for food will not require net additional acres of land and other inputs for feed and food production. Indeed, agricultural resources will be shifted to other areas of the economy, or we will have to experience substantial growth in foreign demand to maintain constant real prices.

References

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[2] Bureau of the Census. Projections of the Population of States, by Age, Sex, and Race: 1989 tp 2010. Current Population Reports, Series p-25, No. 1017. Washington, D.C.