

Anne M. Christner, University of Rhode Island¹ABSTRACT

Food and nutrition policies should be based on accurate models of the marketplace. Using structural and production changes in the dairy processing industry for documentation, the argument is made that the "needs of production" have been more important determinants of dietary changes in the U.S. than the whims of consumer preferences.

Professionals involved in consumer issues are well aware that U.S. dietary patterns are somewhat problematic today. For the majority of Americans, problems of food habits are associated with the ingestion of excesses of either specific nutrients (i.e. fat, sugar, salt) or of total calories relative to metabolic needs. One estimate suggests that the annual health costs of poor nutritional status approaches \$40 billion. (11,p 2) Yet another source states that the elimination of deaths linked to poor dietary habits would increase the average life expectancy of infants by 18 years, as compared with only the 2 years that would be added by the elimination of all deaths from cancer. (4,p 214)

Attention to this matter culminated in Spring 1980 with the publication of dietary guidelines for improved health and longevity by the U.S. Departments of Agriculture and Health, Education and Welfare. Not surprisingly, there is not a general consensus about what to do about the problem of dietary habits, nor about whether there is even a problem. Policies are currently being formulated in the U.S. (and in other countries) by representatives from the fields of health, agriculture, nutrition and consumer education, and the food processing and distribution industries. This paper is presented because of my concern that food and nutrition policies will be based on models of the marketplace which make erroneous assumptions about the sovereignty of consumers. Specifically, it will be argued that the "needs of production" of food industries during this century have been more important determinants of dietary changes than the whims of consumer preferences.

Dietary patterns are highly complex phenomena which defy any monocausal explanation even when attempting to understand changes in choices of food. The most popular theories have focused on food choices as economic acts, typically in a neo-classical framework. From this position, observers conclude that humans have their own irrational preferences to blame if the food they choose in an abundant market is not of optimum utility healthwise. The theory of welfare economics posits that each actor has an opportunity set of alternative lines of action, each having a relative cost. Choices are limited by individuals' means and by the costs of their opportunities. What this perspective does not address are the

questions of what determines the opportunity set of an individual and what is the larger process of choice which generates the overall structure of opportunity sets comprising the economic decision-making process.

According to Samuels, "The opportunity set of the individual, within which he attempts a constrained maximizing equilibrium, is a function of the total structure of mutual coercion, grounded upon relative power." (10,p 65) the position of radical economists is that the choice-set of socially feasible options does not extend over all the technologically feasible alternatives. This is so because the available alternatives must be compatible with capitalist production. In order to illustrate the reasoning behind this conclusion, I draw your attention to Figure 1.

A DIETARY CHANGE MODEL

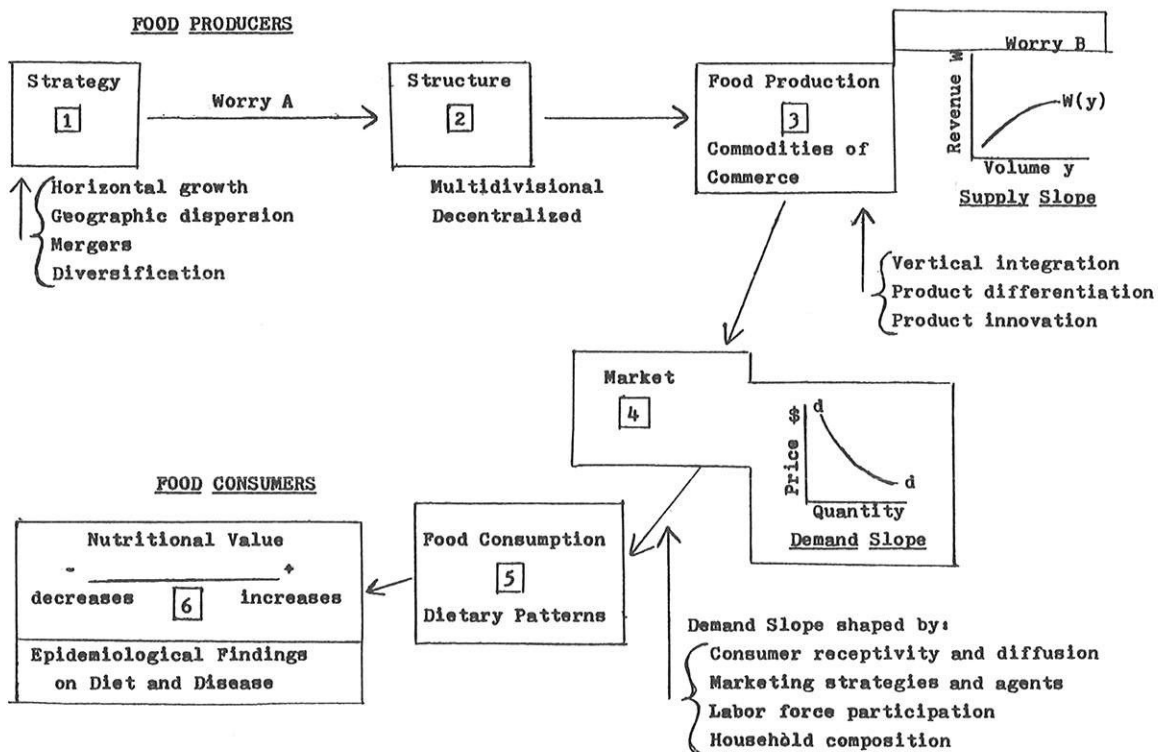
The consumption changes documented by the Senate Select Committee on Nutrition and Human Needs represent a series of "demand slopes" whereby relative prices and volume consumed have had different outcomes for various commodities. It is these demand slopes in stage four which serve as the focal point for neo-classical and liberal reformist theories about changes in dietary habits. For example, attempts are made to alter demands by means of consumer education and/or better labeling. Food consumption (stage five) has varied over time as new products have become available, old ones have become scarce or inconvenient, and as lifestyles have been transformed. Thus dietary habits have changed such that the nutritional value of some foods consumed has improved while that of others has deteriorated. Stage six is the object of concern and of emerging policies.

Although the predominant theories about food patterns have been relatively accurate for stages four through six, they have ignored the significance of what happens in stages one through three. Prior to the point where consumers and producers interact in the market, producers have employed various strategies and evolved into rational structures which have profound effects on the ultimate choice-set available. Stage one--the choice of strategies to strengthen a firm's market position--is impelled by Worry A, the fear that other firms will strengthen their respective positions at the former ones expense. Additionally, there is the fear that products will become obsolete due to a scarcity of raw materials or the discovery of a less expensive or more desirable substitute component.

The strategies of horizontal growth, geographic and class dispersion of markets, diversification, and mergers have led to new structures of food corporations (stage two). Although these struc-

¹Assistant Professor of Consumer Studies

FIGURE 1: A MODEL--CHANGES IN DIETARY PATTERNS



tures do vary somewhat, they are all multi-divisional organizations. The management of each unit within an organization has as its goal to increase profits and/or improve efficiency. This decentralized structure can have an anarchic effect within a firm even as anarchy exists between firms and within the marketplace. Stage three represents the production of commodities of commerce where vertical integration becomes crucial to the maintenance of a firm's market share.

Backward integration--gaining control over raw materials and their transportation and processing--is effected in order to avert shortages and gluts which would reduce profits and control over production. Activities in this domain include Research and Development (R&D) aimed at finding substitute ingredients either because traditional commodities have become too expensive to procure, process, or store, or because other commodities have become so plentiful. In addition, processing techniques are invented to reduce loss due to spoilage.

R&D activities also play a role in forward integration of food firms. Product differentiation is instrumental in a firm's attempt to maintain and/or increase its market share of particular food products. This includes not only the marketing of products as unique in a field of poor imitations, but also the constant in-

production of new products. The primary motivation for product proliferation is the potential for growth in corporate profits. (3) The source of that potential growth lies in the value-added components of new products since basic commodities are so difficult to differentiate. As firms are successful in convincing consumers that the new products are superior to old ones for a variety of reasons, the ultimate in forward integration has occurred. That is, firms have the power to influence consumer perceptions and thus, their preferences. Having accomplished that, Worry B--how to distinguish your products from those of competitors, how to make surplus profitable, and how to insure a certain volume of sales--has been alleviated, at least for a while.

By directing your attention to the effects of "supply slopes" rather than "demand slopes", I will demonstrate how changes in the food forms offered and promoted in the market have been predictable outcomes of producers' strategies to maximize their profits and control over the business environment. In order to illustrate this assertion, I will review the history of dairy product development during this century. By examining changes in the structure and strategies of one large firm in this sector, we can see the sequence of events as viewed in stages one through three.

A CASE STUDY OF DAIRY PROCESSING

The consumption of milk has been historically seasonal and confined to the immediate environs of production, not only because of the perishability of the product but also due to fluctuations in milk production by cows. Because of this characteristic of milk, it has required special handling and has caused considerable worry to producers desiring profitable disposal, especially when there is surplus. Because milk in its fresh form is very difficult to differentiate from the products of competitors, early growth strategies for dairy processing firms focused primarily on horizontal concentration and efficient production, growing from cottage industries to industrial factories. (5) However, rises in agricultural productivity and technological developments--both impelled by the drive for capital accumulation--had important influences on processors' growth strategies.

Whereas the stock of beef cattle has continually grown throughout this century, the number of dairy cattle declined from 23 million in 1947 to 13.5 million in 1967. Part of this decline is due to reduced use of dairy cattle for slaughter but it is also attributable to increased productivity of the animals. During the same period, the average annual milk production per cow went from 5,000 to 8,000 pounds. Even with the shrinking stock of dairy cattle, surplus milk production was still a problem because the per capita consumption was dropping. (12,p 1)

Maintaining sufficient milk supplies has been considered so important as a Federal policy that minimum prices processors can pay dairy farmers have been set in order to encourage the latter to stay in business. One of the consequences has been that processors have to look for profits in directions other than lowering the cost of their primary raw material. Consumer Reports claims the situation has encouraged price fixing as an oligopolistic market-share pooling strategy. (6) I would argue that the marketing-order system has also provided an incentive for focusing on value-added features of products and forward integration to aggressively convince consumers to eat more of all their products.

Early in this century as population became concentrated more heavily in urban areas, it became more expensive and controversial to keep dairy herds within city limits. Fortunately, it was possible to engage in the dairy business from more distant points by this time because of mechanical refrigeration, pasteurization, and more sanitary handling techniques that developed from the scientific and technological activities of the late nineteenth century. The logical outcomes were the development of dairy firms integrated to perform production, processing, and distribution tasks or specialization of functions, each on a larger scale. (5) It was only a matter of time before milk processing plants would be combined into regional and even national companies. Furthermore, the dairy firms would logically process more than fluid milk since they had control over the raw materials and by-products.

After National Dairy Products Corporation (later to be known as Kraft Co.) was formed from two dairy firms in 1923, it went on to acquire six companies in 1924 and sixteen more in 1925. In the president's message to shareholders in 1925, he explained the rationale:

The experience of your company has demonstrated that there is a real advantage both to the producer of milk and to the public in the combination of milk distributing and ice cream producing units because such a combination provides a natural market for the normal increased milk production during the summer months. (8:1925,p 2)

Up to 1928 when the annual report listed 71 companies as subsidiaries, National Dairy made acquisitions primarily for geographical expansion. Although the firm was taking steps to unify purchasing, accounting control, and technical research, it remained a holding company until 1956. This is an example of cases that are not at all unusual. When firms remain holding companies with decentralized operations and management, they defy one of the major arguments in favor of mergers--economies of scale in management. (7)

In 1929, the directors contracted to purchase the Kraft-Phenix Cheese Corporation, thus beginning the firm's strategy for diversification. The president wrote of that move:

It is the opinion of the Board of Directors that the acquisition of this business will be of real value to the corporation as it will provide for an interchange of products and facilities of mutual advantage to both businesses. (8:1929,p 3)

Statements in the early annual reports of National Dairy suggest that R&D efforts were initially aimed at sanitation, better control over production, and efficiency of operations. But a major problem confronted the executives during the depression when price levels for dairy products declined while milk production exceeded demand. The Federal marketing-order system provided for higher prices going to farmers for drinking-grade milk. All farmers were required to have some of their milk go for manufacturing purposes (i.e. butter, cheese, milk powder), but it was obviously to their advantage to sell more drinking milk. For the processors, this policy meant that the profit margin for fluid milk was lower than for any other branch of the industry.

That condition was no doubt an incentive for processors to reduce the proportion of their operations dependent on fluid milk sales. For example, National Dairy claimed that while fluid milk accounted for 39 percent of its net sales in 1937, it provided only 22 percent of the total operating profits. (8:1937) In 1935 the firm announced the formation of its Sealtest System of Laboratory Protection, a centrally directed R&D system.

The purpose of the Sealtest system is to maintain high standards of quality in the production of our products by

daily, systematic laboratory supervision and to develop new commercial uses for milk. (8:1935,p 4. Emphasis added)

In addition to building more plants for cheese production and encouraging extended use of ice cream during the 1930s, National Dairy introduced mayonnaise, Miracle Whip salad dressing, and Kraft confections (caramels and butter toffee). The firm also produced more evaporated and condensed milk and milk powder specifically for feed and the baking industry. It is notable that except for the salad products, all of these items represent ways to use milk, cream, or butter such that their processing increases the value-added characteristics while also prolonging the shelf life. That is, they are solutions to the problems of surpluses and low profit margins. This assertion is supported by the fact that Beatrice, Borden, and Carnation also list some or all of these among their products. All four firms produce candy.

The nutritional consequences of these "solutions" are interesting as well. Ice cream and the two candies introduced during the 1930s are considerably higher in total and saturated fat than fluid whole milk and both have sugar or corn sweetener added. Cheese being a more concentrated food than fluid milk, has the potential for contributing more total calories and fat to the diet, since it is often consumed as a snack or in addition to other protein sources. In addition, cheeses tend to be high in sodium, having had salt added for flavor, processing, and preservation. The annual reports of National Dairy repeatedly report advances made in the aggregate and per capita consumption of all the dairy products they produce, claiming how beneficial this is for the public's health. Such data are generally presented with the impression that it doesn't matter in what form dairy products are taken since they are all part of the same food group. Of course, the Four Food Groups teaching aid relays the same message to the unknowledgeable.

From the late 1930s on then, it appears the focus of R&D activities was on product innovation and diversification with the pace picking up after the war. At National Dairy, innovation became noticeably faster around 1958. The firm had opened a new research laboratory on Long Island in 1948, with a larger staff of scientists and technicians. Then in 1958, they built an even larger facility in Glenview, Illinois, at which time R&D was designated a separate division of the corporation. The nature of the product diversification can be summarized as: the addition of new flavors, sizes, packaging, and conveniences to basic items such as ice cream, cheese, and milk; the introduction of non-dairy substitutes as well as foods other than dairy products: commercial development of dairy by-products appealing to a growing food service market; and, a notable record of contributions to the market for snack foods and confectionery.

The management of the firm has been consistently

clear about corporate objectives and performance criteria. In 1947, the annual report claimed, "Our research program of product diversification continues with most satisfactory prospects." (8:1947,p 6) Further, officers of the company, believing that the profit margins were too low for what they were offering, reiterated the importance of mass production for corporate earnings.

We hope that expanding volume and the efficiency resulting from our building and improvement program will enable us to hold our selling prices down and permit us to increase profit margins. (8:1949,p 5)

A major means for holding costs down is to effect some backward integration in company operations. It is understandable, for example, that processors would conduct research and try disseminating those findings and others to the people who produce the raw materials. Thus, National Dairy has not only used contracts for reliable milk supplies but also has consistently informed dairy farmers about herd management and "cooperated with" colleges of agriculture, agricultural experiment stations, and cooperative extension agents. (8:1949) Furthermore, National Dairy and Carnation both manufacture animal feed from dairy by-products which they sell back to dairy farmers.

Other examples of this firm's backward integration include: building and acquiring vegetable oil refineries to supply its own needs for manufacturing margarine, pourable and non-pourable salad dressings, and nondairy coffee lightener and dessert topping; the acquisition of an egg breaking and processing plant providing inputs for ice cream, salad dressings, and candy; opening a facility in Maine to process Irish moss for stabilizing and emulsifying agents for soups, gravies, and chocolate drinks; developing a unit to produce such things as flavoring and emulsifying agents, carbonated beverage base, and concentrate base for iced tea and other beverages; and, the acquisition of Metro Glass Company to produce food product containers. Most of these operations produce for direct sale of the ingredients as well as for the corporation's needs. (8:1950, 1951, 1952, 1956, 1962, 1971)

There is one last dairy product of interest here because of its spectacular rise in popularity in recent years. Although yogurt has a long history, it has only been in the last ten or fifteen years that it has been nationally available and familiar. It is not clear when National Dairy first introduced yogurt or in what form, but Sealtest yogurt is first mentioned in the 1954 annual report. There were no further references to yogurt until 1965, when it was announced that Breakstone had added two fruit flavors to its line. Then during the 1970s, Breyers and Light n' Lively brands introduced full lines of fruit flavored yogurt. The only explanation given in annual reports for these products is that they reflect consumer interest in high quality dairy products with lower fat or caloric content. Such a statement is in keeping with the theory of consumer sovereignty since "demand

slopes" appear to be directing production changes.

However, examining stages one through three of the model suggests otherwise. For example, in trying to explain the fourfold increase in per capita yogurt consumption during an eight year period, one source suggested it was due to innovations in the industry and the use of fruit flavors.

The addition of flavors, fruits, and preserves to yoghurt has become very popular in recent years. ---Flavored yoghurt has a definite advantage over the plain yoghurt in that the harsh acidity in the product is less pronounced, the incidence of objectionable off-flavors is reduced, and much of the need for concentrating milk is eliminated. (12,p 40)

The advantages derived from having greater control over the end products and reducing the cost of processing provide support for my assertion about the role of the needs of production in determining product innovation. Yogurt is a product with a longer shelf life and greater value added than fluid milk while seeming to be a low calorie, low-fat alternative to cheese and ice cream. Since there is no FDA standard of identity, manufacturers can use whole milk, low-fat, skim, evaporated, or dry milk as well as stabilizers such as gelatin and modified food starch. This results in a product that can range in butterfat content from 0 to 5 percent and in solids content from 9 to 20 percent of the finished yogurt. For an 8-ounce serving, the caloric value ranges from 125 for plain, nonfat milk yogurt to 280 for whole milk yogurt with fruit flavor added. (9) The "needs of production" argument can also be invoked where flavor, style, and brand proliferation are concerned. According to Henderson, "The special facilities required for these operations (cultured products) require large volume production in order to secure economical costs." (5,p 426)

To complete the picture of what takes place prior to the point at which producers and consumers come together in the market, we need to consider attempts by firms at forward integration. For it would be highly irrational for firms who have invested so much and fought so hard to outmaneuver competitors in the race for corporate growth to leave purchase decisions completely up to chance. Just as political candidates attempt to persuade voters of their superiority, consumers are persuaded that particular brands and new products are the only ones worthy of their dollar votes. In the case of dairy products, processors have an advantage in that their products have an entire food group designated to them, thus making consumers more receptive to incorporating them into their diets. Dairy processors have capitalized on this in their advertising and promotional programs, and as previously mentioned, do not distinguish the nutritional qualities of their various products.

There is probably no more familiar brand of dairy

products in the U.S. than Kraft. Among the most vivid memories of my childhood are the attractive and appetizing recipes demonstrated on the Kraft Television Theater which had its inception in 1947 and aired weekly for more than two decades. In 1965 it was reported that "Full color was used on a larger scale than ever before both in print and in television to show more vividly the many appetizing and attractive uses of our food products." (8:1965,p 13) Of course, these recipes as well as ones for the Sealtest division were generated by the company's test kitchens, well funded and highly visible activity centers for the firm. In addition, National Dairy has a long history of distributing printed materials on food preparation and nutrition not only to homemakers but also to children and their teachers. The latter materials were first mentioned in the firm's 1946 annual report and in 1973, they boasted that Kraft Foods' educational program, which was in its fourteenth year, reached more than half of the nation's teenagers. (8:1973,p 10)

The firm has also made extensive use of in-store displays that are bright and eye catching, appealing to impulse buying decisions. Such promotionals are in the retailers' interests since faster turnover of inventory makes for higher profit margins in their operations. As if all these socialization techniques were not enough for effecting forward integration, National Dairy has also gone heavily into supplying the restaurant and institutional food industry. Thus, even consumers who take their meals away from home may be receiving more amenities or services, but they are often unknowingly eating the same food they would at home if they depend on prepared convenience foods. (Note dairy products are not alone in this trend as many of the large corporations that manufacture for the consumer market also produce for food service facilities.)

CONCLUSIONS

The material reviewed here about one firm in one sector of the food industry is part of a much larger research project. I believe it illustrates my reasons for questioning the efficacy of leaving consumer welfare completely to a market mechanism. Aside from the problems of incomplete, conflicting, or confusing consumer information, the model presented indicates that consumer sovereignty is a very weak theory where the determination of production decisions are concerned. Producers of food (as well as other commodities) are highly organized, efficient, and motivated to maximize their profits and their control over conditions of business. On the other hand, consumers are dispersed, having no identity as a class and underdeveloped notions of what consumption decisions are in their best interests. To the extent that consumers depend on processor determined formulation of their diets, they are little more than captives in the market.

This dichotomy in itself represents obvious differences in power with respect to what food products will be offered in the market. However, even more importantly, this model argues that not

all technologically feasible alternatives are offered in the market and those which are have more to do with the needs of production than of consumption. Policies that are formed and implemented to improve the nation's nutritional status must examine what happens in stages one through three prior to reaching the market. Otherwise, consumer and nutrition educators will continue blaming the victims for choices over which they have very little control.

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LESSONS CONSUMERS CAN LEARN FROM THE ERRATIC ECONOMY

Michael L. Walden, North Carolina State University¹

ABSTRACT

Consumers have been plagued by an economy which can be characterized as erratic during the past decade. This paper attempts to give some order and understanding to the erratic economy by presenting logical explanations for its occurrence. The paper focuses on explaining three key variables: inflation, interest rates, and recession. It is argued that sustained increases in monetary growth cause increased inflation, that increasing inflation causes increasing interest rates, and that recession is the initial, inevitable, but temporary result of national policies designed to reduce inflation. Using recent empirical results for the relationship between changes in monetary policy and changes in inflation and interest rates, a framework is designed for consumers to anticipate changes in the economy.

INTRODUCTION

Consumers have ridden an economic rollercoaster during the past decade. It seems that consumers have either been subjected to periods of rising inflation, rising interest rates, and falling unemployment or periods of falling inflation coupled with rising unemployment and stagnant interest rates. The periods 1971-73 and 1976-79 fall into the first category and the periods 1974-75 and 1980-82 comprise the second category. Consequently, changes in consumer purchasing power (real disposable personal income) have been uneven, both rising and falling in the past decade. In short, consumers have experienced an "erratic" economy during the past decade.

Much mystery and confusion prevail about the causes of the erratic economy. Our economic woes have been blamed on OPEC, oil companies, tax increases, tax reductions, "easy" money, and "tight" money to name a few. This paper attempts to give some order and understanding to the erratic economy by presenting logical explanations for its occurrence. The explanations are drawn from elementary macroeconomic theory. Implications for consumer behavior are developed by focusing on lessons which consumers can learn about three key economic variables: inflation, interest rates, and recession.

LESSON 1: INFLATION

"Inflation is always and everywhere a monetary phenomenon..." wrote Milton Friedman [6]. This sentence sums up both the cause and control of inflation as stated by the monetarist school. Inflation, which is a sustained increase in the average level of prices in the economy, occurs

when the money supply consistently grows faster than the quantity of goods and services produced in the economy.

The Inflation Process: Theory

The monetary-inflation relationship has been described in detail (see [10] for example) and will only be summarized here. The central link is the equation $M \cdot V = P \cdot Q$, where M is the nominal money supply, V is the velocity of circulation of money, P is the average price level, and Q is the economy's quantity of goods and services. Given that: (1) velocity is a function of variables independent of the money supply, or velocity changes at a much slower rate than does the money supply; and (2) output in the economy (Q) grows independently of the money supply, then an increase in the money supply increases the average price level. Dynamically, the rate of increase in average prices equals the difference between monetary growth and economic growth. A sustained excess of monetary growth over economic growth results in a sustained increase in the average level of prices, or inflation. Since government (in the U.S., the Federal Reserve System) controls monetary growth (i.e., growth of the monetary base), inflation is a problem resulting from an excessive monetary growth policy of the government.

The process by which monetary expansion leads to inflation involves banks and changes in credit supply. The government's central bank (hereafter termed the Fed) increases the money supply by purchasing federal securities from private banks and consequently augmenting their reserves. Given more reserves, banks increase the amount of credit which they offer. A greater supply of credit results in lower interest rates charged to borrowers and therefore more borrowing and spending by consumers and firms. But if the rate of increase in spending exceeds the rate of increase in goods and services produced in the economy, excess demand for goods and services results and prices consequently rise. If the Fed continues to increase reserves at a rate faster than the economy's growth rate, sustained price increases, or inflation, result.

The Inflation Process: Debate

The monetarist view of inflation has both its strong proponents and critics. One of the major criticisms is that the Fed cannot control the money supply [10, p. 57]. As evidence, these critics cite recent fluctuations in and substitutions between the various monetary aggregates (e.g., M_1 , M_2 , M_3). Monetarists respond that the Fed cannot control, and should not try to control, the various monetary aggregates. Instead, the monetarist explanation of inflation is based on the Fed controlling the source of monetary expansion,

¹Associate Professor of Economics and Business

bank reserves.

Other critics of monetarism, who may grant that the Fed's monetary policy influences inflation, contend that the Fed merely pursues a reactionary, passive policy dependent upon changes in real prices and wages [10, p. 59]. For example, if a major product such as oil increases in price, or if a major labor union negotiates a large wage pact, this view states that the Fed "monetizes" such price increases by correspondingly increasing the money supply. Of course, such a policy, termed monetary accommodation, ultimately results in all prices rising, but the point of the critics is that the Fed's actions are triggered by other factors. Hence, these other factors (a major price or wage increase) are the actual causes of inflation.

The monetarist reply to this argument is simple. A policy of monetary accommodation requires a direct decision by the Fed to inflate. In the absence of monetary accommodation, individual price increases do not result in inflation [7, pp. 59-60]. Consider an increase in oil prices. With the money supply unchanged (or, more technically, with the difference between the rate of monetary growth and the rate of economic growth unchanged), consumers and firms must eventually reduce their expenditures on (and demand for) other goods and services in order to afford the higher cost of oil products. The reduced demand for non-oil goods and services eventually causes a reduction in the prices of these products (or, more technically, a reduction in the rates of price increase of these products). These price reductions counter the oil price increase and the result is no change in average prices (or, more technically, no change in the rate of change of average prices). Of course, relative prices are changed (e.g., oil products are relatively more expensive).

Finally, another line of criticism of the monetary explanation for inflation is that it is inconsistent with reality. Consumers and firms observe inflation resulting from price increases filtering up the production chain [1, pp. 20-21]. For example, consumers observe retailers raising prices. But retailers are merely passing on the higher prices charged by wholesalers, and wholesalers are merely passing along the higher prices charged by manufacturers, who in turn are passing on the higher prices and wages of basic inputs. Therefore, inflation must ultimately result from price increases of basic inputs.

There are two flaws with this "cost-push" argument. First, for an initial input price increase to stimulate an increase in all prices (that is, for inflation to result) it must be "ratified" via monetary accommodation. This requires a decision by the Fed to inflate. Second, the cost-push argument confuses effect with cause [1, pp. 25-26]. The stimulus of inflation is not a unilateral increase in input prices. Rather, the stimulus is excess demand generated by excessive monetary growth. Excessive monetary growth generates excess demand at every level of the product chain until it reaches the input level where

prices are bid up. Higher input prices are then merely filtered up to the manufacturing, wholesale, and retail stages.

The Inflation Process: Evidence

The relationship between monetary growth and inflation has been estimated in numerous studies [2, 3, 8, 9]. All suggest a lag between monetary growth and inflation.² For example, most recently Carlson [3] estimated a mean lag of five quarters (1.25 years) between monetary growth and inflation. This means that half the impact of monetary growth on inflation occurs before five quarters and half occurs after five quarters. The full impact of monetary growth on inflation was estimated to occur within eight quarters (2 years).

Of course, these results also mean that a decline in monetary growth will not have an immediate impact on reducing inflation. This has important implications for an anti-inflation policy, as will be seen in a later section. Recent theoretical work suggests, however, that as economic agents learn about the consequences of monetary policy, the lag between monetary growth and inflation should decline [5].

LESSON 2: INTEREST RATES

Why do interest rates exist? The reason is quite simple. People would rather have money now than in the future. The future is uncertain, the present is known. The individual cannot predict with certainty his circumstances in the future. On the other hand, money received today can always be saved for use in the future, if the individual so desires. Therefore, most individuals must be paid in order to give up (loan) money which they possess today and are promised to have returned in the future. The payment on such loans comes in the form of interest payments by the borrower to the lender. The interest rate, termed the "real" interest rate, necessary to attract money for loans averages 3 to 6 percent per year for each dollar loaned depending on the risk of the loan.

Why, then, don't we observe interest rates today in the 3 to 6 percent neighborhood, as was observed in the early 1950's? The answer, of course, is inflation. Inflation, to re-emphasize, is an increase in the general price level. Therefore, inflation has the effect of reducing the value, or purchasing power, of a dollar. With respect to dollars to be repaid on a loan, future inflation reduces the purchasing power of those dollars. Lenders, therefore, are very aware of the impact of inflation on loan repayments. For

²The theoretical reason for the lag is that producers initially cannot distinguish between permanent excess demand generated by sustained excessive monetary growth and temporary excess demand generated by random factors. Only after the excess demand continues for a sustained period will producers contract for more resources and bid up prices [see 3].

example, if a lender charges 4 percent on a loan of \$1 for a year, the lender receives \$1.04 at the end of the year. However, if the general level of prices increased by 10 percent during that year, the purchasing power of the \$1.04 is only 94.5¢ ($\$1.04/\1.10); the lender effectively loses money on the loan (5.5¢ per \$1 loaned in this example). For this reason lenders try to project what the average annual inflation rate will be over the terms of their loans. This "inflation premium" is then added to the real interest rate necessary to attract and loan money. The inflation premium protects lenders against the loss of purchasing power on repaid dollars.

The major reason for movements in interest rates is changes in expected inflation rates.³ As the expected inflation rate rises, interest rates rise; as the expected inflation rate falls, interest rates fall.⁴ As was argued in the first section of this paper, changes in inflation rates are primarily a function of changes in monetary growth vis-a-vis economic growth. Consequently, if the difference between monetary growth and economic growth becomes permanently larger, interest rates ultimately rise. Conversely, if the difference between monetary growth and economic growth becomes permanently smaller, interest rates ultimately fall. However there are important short-run and long-run differences in the relationship between monetary policy and interest rates. These differences have significance for the next topic, recession.

LESSON 3: RECESSION

In order to reduce inflation, it was argued that the Fed must follow a policy that reduces the growth rate of the money supply and brings it more in line with the growth rate of goods and services produced in the economy. However, one initial result of such a policy is usually the onset of an economic recession. A recession occurs when the output of goods and services produced in the economy does not increase for a sustained period of time (e.g., six months).

³In the debate over the economy's performance in the early 1980's, much concern has been expressed about the impact of actual and projected federal budget deficits. Many economists have dismissed budget deficits, in both theoretical and empirical work, as having any impact on the real economy. However, if budget deficits are assumed to increase the relative demand for credit, then some empirical results show that for every one percentage point increase in the deficit/GNP ratio, real interest rates rise by one percentage point [4]. At this rate, the relative increase in the budget deficits could account for a 3.8 percentage point increase in the level of interest rates between 1980 and 1983.

⁴Interest rates of different terms can rise and fall at different rates as lenders' estimates of future inflation vary for different terms.

The reason a recession occurs when the Fed "fights" inflation is as follows: The real interest rate is determined by the supply and demand for credit. The Fed reduces the growth of money by reducing the growth of reserves to banks and, consequently, reducing the growth of credit which banks can make available. However, consumers and firms don't interpret, for various reasons, this change in monetary policy as immediately meaning a permanent reduction in inflation.⁵ Therefore, no immediate change occurs in the growth of demand for credit by consumers and firms. Consequently, the price of credit (the real interest rate) rises. With credit relatively more expensive, consumers and firms reduce their rate of borrowing. Business expansion slows and consumers reduce additional purchases of homes, cars, and other goods usually bought on credit. Firms notice their products not selling as fast as before and their inventories rising. As a result, new hirings are reduced, and after a time, some current employees may be dismissed as many firms draw down on their inventories, reduce purchases, and lower production of new goods and services. In short, the economy slows down. Most consumers, therefore, find their income not increasing as much as it had been, and many consumers actually find their income reduced. These consumers reduce purchases, reinforcing the economic slowdown.

The beneficial result of a recession is a decrease in inflation. Since new spending in the economy falls, buyers don't compete as hard for products and prices stop rising as fast as they had been. Similarly, with new hirings reduced, firms don't compete as hard for workers and wages rise at a slower rate.

How long will a recession last? The key is what firms and consumers anticipate will happen to the economy, particularly regarding inflation. When firms and consumers believe that inflation has been permanently reduced for the foreseeable future, then prices will be expected to rise less rapidly. With prices (including wages) expected to rise less rapidly in the future, firms and consumers reduce their estimates of credit necessary to finance purchases. This revision has the effect of reducing the growth in the demand for credit consistent with the lower growth of money (and credit) supplied by the Fed. Consequently, the price of credit, the real interest rate, falls to its pre-recession level. This stimulates firms and consumers to increase their borrowing and spending to the levels that existed before the recession. Consumers now find that lower wage and salary increases are adequate to meet expected future expenditures. Observed interest rates are lower due to the lower real rate

⁵One reason may be that consumers and firms don't understand the significance of changes in monetary policy. Probably a better reason is that, given past policy reversals of the Fed, a change in monetary policy needs to be sustained for it to have an impact on inflationary expectations.

component and the lower inflation premium.

Therefore, the key for economic recovery, without inflation, is for firms and consumers to be convinced that inflation will be lower in the future. Central to this belief is a conviction that the Fed will not revert to policies that lead to inflation. Of course, the Fed can engineer an economic recovery by re-inflating. This reduces real interest rates to their normal range but also rekindles inflation.

IMPLICATIONS FOR CONSUMERS

The previous discussion presents a framework for understanding the erratic economy of the 1970's and 1980's. Perhaps more importantly, the framework can be used for projecting future changes in the economy.

The major factor in generating the erratic economy, it was argued, has been the monetary policy of the Federal Reserve System. A monetary policy resulting in a sustained rate of money growth greater than economic growth produces sustained price increases, or inflation. Higher inflation increases the inflation premium included in interest rates, thereby pushing interest rates higher. Therefore, the way to reduce inflation and interest rates is to reduce the rate of monetary growth to a range much closer to the average rate of growth of the economy.

However, both theory and evidence indicate that there are significant short-run and long-run differences in the consequences of a change in monetary policy. These differences are the central cause of the erratic economy. The immediate (0-12 months) impacts of a sustained increase in the difference between monetary growth and economic growth are lower interest rates and a temporary "boom" in the economy. However, the long-run (post 12 months) impacts are higher inflation and higher interest rates. Conversely, the immediate impacts of a sustained decrease in the difference between monetary growth and economic growth are higher interest rates and a temporary recession. But the long-run impacts are lower inflation and lower interest rates.

As evidence for these relationships, consider Figure 1, which shows movements in monetary base growth (the Fed's policy variable) and short-term interest rates (3 month T-bill rate). From 1973 to mid 1975 the Fed followed a disinflationary policy by trending monetary growth downward. Initially (early 1973) interest rates rose but later (through 1975) fell. From mid 1975 to early 1978 the Fed followed a steady inflationary policy. Initially (mid 1976 - mid 1977) interest rates fell but thereafter steadily rose. In both mid 1978 - mid 1979 and early 1980 the Fed followed short-lived disinflationary policies. In both periods interest rates initially rose and then fell. Finally, at the beginning of 1981 the Fed embarked on its most dramatic and consistent disinflationary policy of the past decade. Again, interest rates initially rose to new heights in early 1981 (thereby

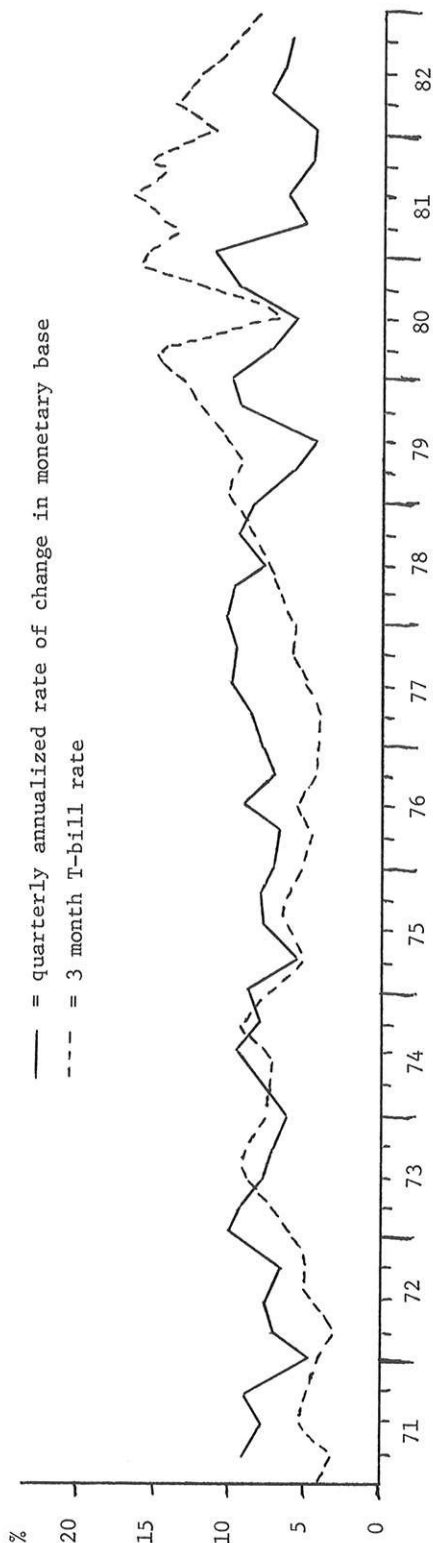


FIGURE 1. Monetary Growth and Interest Rates

creating the 1981-82 recession) but since mid-1981 have fallen.

Therefore, as a working model the consumer can use the scheme illustrated in Figure 2. In general, the economy grows at a 2 to 5 percent real (after inflation) rate each year. If the consumer notices a sustained acceleration of monetary growth (specifically, monetary base) above this range, then expect immediate prosperity but long-run inflation and higher interest rates. On the other hand, if the consumer notices a sustained deceleration of monetary growth to a point closer to the 2 - 5 percent range, then prepare for an immediate recession but expect long-run declines in inflation and interest rates.

FIGURE 2. A Model for Understanding the Erratic Economy

Policy Change	Short-run impact (0-12 months)	Long-run impact (post 12 months)
Fed accelerates monetary growth above 2-5% annual rate range	Lower interest rates, "boom"	Higher inflation rates Higher interest rates
Fed decelerates monetary growth to point closer to 2-5% annual rate range	Higher interest rates, recession	Lower inflation Lower interest rates

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A COMPARISON OF FOOD EXPENDITURES BETWEEN VEGETARIANS AND NONVEGETARIANS¹

Sue Alexander Greninger² and Jeanne H. Freeland-Graves,³ The University of Texas at Austin

Abstract

Although vegetarians perceived that they spent less money for food than nonvegetarians, no differences existed in weekly expenditures for total food or for groceries between 82 vegetarians and 82 nonvegetarians matched for age and sex. Savings from avoidance of expensive meat products by vegetarians were offset by their increased spending for vegetables, fruits and other protein sources.

INTRODUCTION

Resource limitations or economic conditions have been cited as a primary reason for the prevalence of vegetarianism in developing countries and among low-income consumers (13, p. 62-63). In recent years, concern for improved health and physical well-being, philosophical and ecological issues and the growth of non-traditional religions have generally been regarded as the reasons underlying the increasing interest in vegetarianism among young people (5, p. 529; 6, p. 503). Although the role economics plays in the adoption of vegetarianism has received little empirical attention, the general view seems to be that it is more economical to consume a vegetarian as opposed to a traditional meat-and-potato diet. In a 1978 nationwide poll of a representative sample of Americans, economy was seen to be the second most important reason for becoming a vegetarian after improved health (14).

Whether vegetarian consumers, especially the "new" youthful ones, are actually spending less for food than their nonvegetarian counterparts is the focus of this research. The primary objectives of the study were to compare the weekly food expenditures of vegetarians with those of a control group of nonvegetarians and to test the hypothesis that there would be no difference in the mean amount spent per week for food among the two groups. It was anticipated that the absence of relatively expensive meat products in the market basket of vegetarians would be offset by spending for foods in other categories such as

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²Assistant Professor, Family Economics and Home Management, Department of Home Economics

³Associate Professor, Graduate Nutrition Division

fruits, vegetables and other non-animal protein sources. A third objective was to determine if those vegetarians who reported economic reasons for their choice of diet actually spent less than those who did not mention economics as a reason for being a vegetarian.

RESEARCH METHODOLOGY

The subjects visited the university on two occasions. On the first visit, a general questionnaire was administered which included questions regarding demographics, general health, perceptions of food expenditures and motivations for becoming a vegetarian. Additionally, instructions for recording all foods purchased during a one-week period on a market basket survey form were given. On the second visit, the subjects turned in completed market basket forms which were checked for completeness by a trained nutritionist and received a remuneration fee for their participation.

Subjects

Subjects were recruited via advertisements in campus and local newspapers, posters around campus and personal contact. Selection was limited to those who were between 18 and 41 years of age, nonpregnant and in relatively good health. Each of the 82 vegetarians were matched one-for-one with a nonvegetarian for age (± 2 years) and sex. Only one person from a specific household was included in the study to maintain independence in the data analysis. Vegetarian status was defined as avoidance of all meat and poultry products for a minimum of four months. The mean length of time the subjects had practiced vegetarianism was 5.5 years and ranged from 4 months to 37 years. The majority of the vegetarian subjects (62 percent) were categorized as lacto-ovo-vegetarians since they abstained from all meats, fish and poultry but ate dairy and egg products. Approximately one-fifth (21 percent) were lacto-vegetarians who consumed dairy but not egg products, and one-tenth (10 percent) were pesco-vegetarians who ate fish infrequently (<1 time/month). The remaining subjects (7 percent) were vegans who practiced a restrictive form of vegetarianism in which all animal protein sources are eliminated from their diet.

The mean ages of the vegetarians and nonvegetarians were 25.4 years and 26.1 years, respectively. Both groups were comprised of 62 percent females and 38 percent males. No significant differences existed between vegetarians and nonvegetarians in terms of their race, household size, marital status and educational level. The major differences ($p < .05$) in sample characteristics were in religion, university enrollment and current

living arrangements. More vegetarians than non-vegetarians belonged to non-traditional religious categories (30 vs. 10 percent, respectively) or claimed no religious affiliation or to be an agnostic or atheist (38 vs. 32 percent, respectively). A large proportion of subjects in both groups were students; however, there were more nonstudents among the vegetarians (42 percent) than among the nonvegetarians (28 percent). Living arrangements between the groups differed with more vegetarians than nonvegetarians living in apartments or duplexes (62 and 50 percent, respectively) and in cooperatives (7 and 0 percent, respectively). No differences existed, however, in ownership of living quarters.

While median incomes were relatively low among the subjects, these figures were somewhat higher among vegetarians than nonvegetarians -- \$4988 and \$4580, respectively. Household income reflected the same general relationship with the respective medians being \$5910 and \$5200. Although there was variance in the income data, the Mann-Whitney U test indicated no significant differences in the distribution of both personal and household income.

Instrument

A two-part market basket survey instrument was developed for the subjects to use in recording their food purchases during a one-week period. Form A was used for food purchased for home preparation and included information regarding the age and sex of all persons in the household served by the food. Purchase information included the store, size and/or amount, number of units, unit price and total cost for each entry. Form B was used for foods consumed away from home. Subjects were asked to record the prices of food items they purchased at such places as restaurants, cafeterias, fast food establishments and vending machines. In this case, only the subject's away-from-home food purchases were requested and not those of the entire household. In the few cases where food costs were included for a group of people, such as for pizza, manual adjustments were made to factor out the subject's share of the cost based on number and age of those served. Food purchases were verified by having the subjects turn in receipts for their purchases along with the completed market basket form.

Preparation of Data for Analysis

Foods recorded on the market basket forms were divided into general categories by a computerized program developed at the University of Texas. The general categories are listed in Table 1. The category of extended animal protein included preparations such as spaghetti and meatballs and macaroni and cheese. Extended plant protein included various combinations of plant proteins such as rice and beans or legumes and grains. The category of sandwiches/short orders included foods which contain items from more than one category. For example, a hamburger could be listed within red meat, bread or grains, and

possibly vegetables (lettuce, onion) or fruits (tomato). A miscellaneous category provided for a variety of items such as spices, sauces, condiments and leavening agents. Alcoholic beverages were included in the beverage category whereas fluid milk was included as a dairy product. Non-food purchases such as detergents and paper towels were excluded from the analysis.

Spending for grocery purchases among the various food categories were listed individually on the market basket forms. Expenditures for foods eaten away from home were more difficult to evaluate since some meals were priced on a unit basis. In these cases, the cost was assigned to the first food item listed which was usually the entree.

Several adjustments in the data were necessary because of price changes which occurred during the eight-month study period and the impossibility of restricting the sample to households of a similar size and composition. First, each individual food price was adjusted using the appropriate percentage change in Consumer Price Index values for that food category from the month of purchase to December 1979 (2, pp. 90-91; 3, pp. 86-87). This adjustment enabled all food prices to be based on the same time period and on comparable price levels. Second, it was necessary to adjust the grocery data for differences in household composition since the grocery purchases were made for a household rather than for just the subject. To determine only the subject's share of the household grocery expenditures, an energy scale based on the Recommended Daily Allowances of food energy or calories for various age and gender categories was utilized (7). The third adjustment was necessary due to economies of scale since it is less expensive per person to purchase food for a larger household than for a smaller household (10, p. 2). Factors utilized by the U.S. Department of Agriculture to compensate for varying household sizes were applied to these data.

It was impossible to adjust for availability of different foods, especially fresh produce, during the study period. Since the nonvegetarian matches were chosen after their vegetarian counterparts, the nonvegetarian data were collected approximately one month later on average than the vegetarian data. However, since data analysis was restricted to broad food categories, it was assumed that substitution of various types of fruits and vegetables and processed forms for fresh ones would occur.

Statistical Analysis

All data were analyzed by a computerized statistical package, SPSS (12, pp. 267-270 and 223-224). Significant differences between continuous variables such as food expenditures were determined by student's *t*-tests. Chi squares were computed on all frequency data such as household size and living arrangements. The Mann-Whitney-U test was utilized to test for differences in the distribution of incomes between the groups.

RESULTS AND DISCUSSION

Weekly Expenditures

The data presented in Table 1 represent the subject's share of food expenses which have been adjusted for household composition, economies of scale and price changes. Total weekly food expenditures were not significantly different, averaging \$19.80 for the vegetarians and \$21.01 for the nonvegetarians. There was even less of a difference in spending for groceries between the two groups with the vegetarians and nonvegetarians averaging \$15.53 and \$14.64 per week, respectively. The only significant difference

between the two groups in overall expenditures was for foods eaten away from home where nonvegetarians spent \$6.37 while vegetarians spent \$4.27 ($p < .05$).

With regard to total spending for specific food categories, vegetarians spent significantly more than nonvegetarians on legumes, nuts, vegetables and fruit. Nonvegetarians spent more money than vegetarians on red meat, poultry, extended animal protein and sandwiches/short orders. Spending was highest among nonvegetarians for dairy products (\$3.20) followed closely by beverages (\$3.06) which was the highest expenditure category for the vegetarians (\$3.02). Vegetarians

TABLE 1. Comparison of Mean Weekly Expenditures¹ for Total Food, Food Prepared at Home, and Food Eaten Away From Home among Vegetarians and Nonvegetarians.

Food Category	Total food		Food prepared at home		Food eaten away from home	
	Vegetarians N=82	Nonvegetarians N=82	Vegetarians N=82	Nonvegetarians N=82	Vegetarians N=82	Nonvegetarians N=82
Red meat	\$.10	\$ 2.60***	\$.10	\$ 1.80***	\$.00	\$.80**
Poultry	.01	.59***	.01	.45***	.00	.14*
Fish	.22	.55	.05	.54***	.17	.02
Extended animal protein	.01	.56***	.01	.23***	.00	.33*
Legumes	.80	.31***	.72	.30**	.08	.00
Nuts	.42	.13**	.41	.13**	.01	.00
Seeds	.09	.02	.09	.02	.00	.00
Grains	.88	.72	.80	.69	.08	.03
Extended plant protein	.73	.50	.27	.03**	.46	.47
Dairy	2.73	3.20	2.53	2.96	.20	.25
Eggs	.48	.76	.26	.34	.22	.42
Vegetables	2.96	1.25***	2.73	1.06***	.22	.19
Fruit	2.64	1.36**	2.62	1.30**	.02	.06
Fats	.55	.39	.55	.39	.00	.00
Baked products	.92	1.10	.72	.87	.20	.23
Desserts	.04	.02	.00	.02	.03	.01
Beverages	3.02	3.06	2.24	2.13	.78	.93
Sugars	.39	.36	.39	.31	.00	.05
Soups	.16	.20	.05	.18*	.12	.02
Salads	.74	.56	.12	.17	.62	.39
Sandwiches/ short order	1.12	2.19*	.05	.16	1.07	2.03*
Miscellaneous	.79	.60	.79	.60	.00	.00
Total	\$19.80	\$21.01	\$15.53	\$14.64	\$4.27	\$6.37*

¹ Subject's share of expenditures was calculated after data were adjusted for household composition, economies of scale and price changes during the interview period. Columns do not necessarily add to the exact figure indicated due to rounding.

* Significant difference between the two groups at the .05 level.

** Significant difference between the two groups at the .01 level.

*** Significant difference between the two groups at the .001 level.

spent more on both vegetables (\$2.96) and fruits (\$2.64) than nonvegetarians spent on red meat (\$2.60). Thus, these findings support the hypothesis that there would be no difference in the total food expenditures of the two groups and that spending for the other food categories by vegetarians would offset the relatively high expense of meat products.

Differences between the two groups in their spending for groceries were similar to those observed in their total food expenditures. In addition, significantly more was spent by the nonvegetarians than the vegetarians for fish and soups for home preparation. The reverse was true for extended plant protein where vegetarians spent nine times the amount reported by nonvegetarians. The categories receiving the largest average expenditure for groceries were vegetables (\$2.73) for the vegetarians and dairy products (\$2.96) for the nonvegetarians.

Although the total amount spent for food away from home differed significantly between the two groups, there were fewer differences in the expenditures for the various food categories. Differences were again observed in the red meat, poultry and extended animal protein categories, but the relationships were weaker than they had been for expenditure of groceries and total food. The category receiving the greatest expenditure for food away from home for both vegetarians and nonvegetarians was sandwiches/short orders. Nonvegetarians reported almost twice as much money spent on this food category as vegetarians -- \$2.03 and \$1.07, respectively.

It is difficult to compare the data presented here to previous studies since 1) no other reports of food expenditures of vegetarians exist and 2) the data were collected in 1979. The most comprehensive, recent report of food consumption expenditures is the 1977 Nationwide Food Consumption Survey conducted by the U.S. Department of Agriculture (8). When the 1977 values of the survey are updated by appropriate Consumer Price Indices to December 1979 values, it is interesting to note how similar the data are even though the studies do not measure exactly the same variables. (The current study reports the amount

spent during a week while the nationwide data reports the money value per household member of food used during a week.) Updated survey data for the \$5,000-9,999 income category, which is comparable to the present study, indicate that the average amount used for total food would be \$21.55; this amount is only slightly higher than the \$19.80 and \$21.01 spent by vegetarians and nonvegetarians, respectively. The price-adjusted amounts used nationwide would be \$17.00 for in-home consumption and \$4.87 for food eaten out in 1979. The in-home figure is somewhat higher and the food eaten away-from-home figure is somewhat lower than comparable amounts spent by the subjects in this study. The percentage of expenditures accounted for by food eaten out averaged 26 percent in the present study; this is similar to the 24 percent reported in the nationwide survey. The two-year time differential and the young, student-oriented sample could easily account for this small difference.

Expenditures by Gender

Considerable similarity existed in the spending of vegetarians and nonvegetarians when comparisons were made by gender as reported in Table 2. The significant difference in overall spending for foods eaten away from home was attributable to differences between male vegetarians and nonvegetarians. The former spent less than half as much as the latter on foods eaten away from home. In fact, the male vegetarians spent less than the female vegetarians on food away from home which countered the normal trend where males generally outspent their female counterparts. Analysis of the food expenditures of males indicated that vegetarians spent less than nonvegetarians for both groceries and foods eaten out. For the females, however, vegetarians spent more for groceries and less for foods eaten out than nonvegetarians. Except for the basic difference in spending on food eaten away from home between all vegetarians and nonvegetarians and male vegetarians and nonvegetarians, these differences were not statistically significant.

Although the methodology varies somewhat, benchmarks for comparing the weekly cost of groceries for males and females are also available from the

TABLE 2. Comparison of Mean Weekly Expenditures for Total Food, Food Prepared at Home, and Food Eaten Away From Home among Male and Female Vegetarians and Nonvegetarians.

Subjects	Total food		Food prepared at home		Food eaten away from home	
	Vegetarians	Nonvegetarians	Vegetarians	Nonvegetarians	Vegetarians	Nonvegetarians
Total (N=164)	\$19.80	\$21.01	\$15.53	\$14.64	\$4.27	\$6.37*
Male (N=62)	20.46	26.81	16.99	18.92	3.48	7.95*
Female (N=102)	19.40	17.47	14.64	12.04	4.76	5.44

*Significant difference between the two groups at the .05 level.

U.S. Department of Agriculture. In December 1979, the estimated cost for one week on the thrifty and low-cost food plans for males 20-54 years of age was \$14.50 and \$19.00, respectively (4, p. 42). The average expenditure for the vegetarian males in this study was \$16.99 which fell about midway between these two plans. The \$18.92 expenditure for the nonvegetarian males was very close to the amount of the low-cost food plan. For females between 20-54 years of age, the estimated weekly cost for the two food plans were \$11.90 and \$15.50 in December 1979 (4, p. 42). Since female vegetarians and nonvegetarians in this study averaged \$14.64 and \$12.04, respectively, per week for groceries, these amounts also fell between those estimated for the thrifty and low-cost plans.

Spending Perceptions

When asked "Do you think you spend more or less of your income on food as a vegetarian than you would as a nonvegetarian?" the majority (61 percent) of the vegetarians thought that they spent less. This group of vegetarians estimated they saved on average \$10.59 per week by following their restrictive dietary pattern. One-tenth of the vegetarians thought they spent more than the nonvegetarians, while approximately three-tenths believed they spent about the same amount. Only one-third of the nonvegetarians, when asked a similar question, "Do you think you would spend more or less...as a vegetarian...?," responded that they would spend less. The majority (51 percent) felt they would spend about the same amount as they did as nonvegetarians, whereas the remaining 16 percent felt they would spend more. The differences in the scaled response patterns to these questions by the two groups were significantly different ($p=.001$). Thus, although their expenditures did not prove to be lower in actuality, it is apparent that vegetarians generally perceived that they spent less than nonvegetarians for food.

When asked to list their reasons for becoming a vegetarian, almost one-fourth (23 percent) of the vegetarians listed economics as a reason. The mean weekly amount spent for food by this economically-motivated group of vegetarians was about \$3 less than that for the vegetarians who gave no economic reasons, \$13.26 vs. \$16.21, respectively. Since this difference was not statistically significant, it cannot be substantiated that being economically motivated to become a vegetarian results in a measurable difference in food expenditures.

CONCLUSIONS AND IMPLICATIONS

Although vegetarians perceived they spent less money for food than nonvegetarians, this was not the case as indicated by comparisons of the actual expenditure data. No significant differences existed in expenditures for total food or groceries between the two groups. Savings from the avoidance of expensive meat products by the vegetarians were offset by increased spending for vegetables, fruits and other non-animal protein

sources. Even the food expenditures of vegetarians who listed economics as a reason for the adoption of their dietary pattern were not significantly lower than those who gave only non-economic reasons. The only major difference in overall spending between vegetarians and nonvegetarians was that the nonvegetarians spent more for foods eaten away from home. This difference was largely due to the male nonvegetarians whose expenditures for foods eaten out were twice those of their vegetarian counterparts.

The findings from this study indicate that economic factors are of lesser importance in the adoption of vegetarianism than generally perceived. The majority of vegetarians in this study believed they were spending less for food than they would as nonvegetarians. Since the comparisons of actual food expenditures contradicted this widely-held perception, it may well be that economic justifications for such dietary choices is more akin to a rationale than a true reason or motivation for the behavior. That meats are high priced and consume a major share of the normal food dollar are factors which might contribute to the perception that omission of such products from the diet should result in lower food expenditures. This reasoning could occur without further thought regarding the relative expense of fresh fruits and vegetables and other protein sources such as dairy products, nuts and seeds.

Previous literature has indicated that health and nutritional concerns are becoming more influential in food choice and resulting in changing food consumption patterns (11, p. 29; 15, p. 21). In fact, a 1979 survey by the U.S. Department of Agriculture's Economics and Statistical Service indicated that almost two-thirds of the American consumers surveyed had made dietary changes during the previous three years for health and nutrition reasons (9, p. 16). Dwyer *et al.* has reported that "new" vegetarians are sensitive to health issues and give health-related reasons more frequently than other reasons for their dietary patterns (5, pp. 530-531). Food purchases made for health reasons may actually contribute to higher food expenditures. For example, Brown and Bergan reported that vegetarians purchased foods at natural food outlets or direct from farmers even though they realized the products were more expensive from these sources than from supermarkets (1, p. 456). Patronage of such non-traditional establishments could contribute to the lack of savings observed among vegetarians. It is possible that vegetarians are more concerned about freshness and quality of their purchases and, therefore, shop with greater frequency than their nonvegetarian counterparts. A pattern of more frequent shopping might also influence total food cost. In addition, the products purchased by vegetarians may lack preservatives and additives, which contribute to shorter shelf life, greater spoilage and waste and higher cost. Further research is needed to determine if differing purchase patterns contribute to the lack of measurable savings in the food expenditures of vegetarians when compared to nonvegetarians.

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A RATIONAL EXPLANATION FOR DECLINING BEEF CONSUMPTION

Desmond A. Jolly, University of California-Davis¹

ABSTRACT

Since 1976, per capita beef consumption has decreased by nearly 20 percent. Consumer surveys indicate that consumers perceive economic factors as the principal determinants of their changed consumption patterns. Economic and statistical analyses of time series data covering the 1960-80 period confirm that economic factors do, indeed, explain the changes in per capita consumption.

NATURE OF THE PROBLEM

Between 1976 and 1980, per capita beef consumption declined from 94.4 pounds to 76.5 pounds - a decrease of 19 percent. From the beef industry's perspective, consumer demand has been somewhat capricious and has resulted in depressed producer prices and a consequent decline in income. In a more analytical vein, decline has been attributed to a growing concern with the cholesterol content of red meats and their potential health effects - a perception which informed the grade change petitions of the National Cattlemen's Association and the Iowa Cattlemen's Association in 1981. Consumer response to those proposals led U.S.D.A. to decide in favor of retaining the status quo. The producer associations saw the proposal as favoring the production of leaner meat. Consumers, on the other hand, expressed misgivings as to their potential economic effects. Table 1 charts changes in per capita consumption between 1960 and 1980.

TABLE 1. Per Capita Beef Consumption, 1960-80

Year	Lbs.	Year	Lbs.
1960	64.2	1971	83.4
61	65.8	72	85.5
62	66.2	73	80.5
63	69.9	74	85.6
64	73.9	75	87.9
65	73.6	76	94.4
66	77.0	77	91.8
67	78.8	78	87.2
68	81.2	79	78.1
69	82.0	80	76.5
70	84.1		

Source: U.S.D.A., Food Consumption, Prices and Expenditures, 1960-80, Washington, D.C., September 1981, Table 4, p. 6.

What is needed, from an analytical perspective, is a reasonable, rational explanation for the perceptible change in beef consumption patterns. This paper is an attempt to provide such an analysis.

¹Extension Economist, Lecturer, Department of Agricultural Economics,

METHODOLOGY AND HYPOTHESIS

There are basically two methodological approaches to analyzing the pattern of causation in the decline in beef consumption. Consumer surveys can provide timely, cross-sectional information as to consumer sentiments, preferences, concerns and perceived constraints. Alternatively, or additionally, the use of time series data in econometric analysis may indicate the relative significance of various economic factors in accounting for changes in consumption. Cross section data is provided in a nationwide consumer survey conducted for the American Meat Institute by the firm of Yankelevitch, Skelly and White in 1981 (1). The results of the survey, covering 1,019 households, are instructive of how the respondents perceived various influences and constraints on their consumption decisions. Time series data are from U.S.D.A.'s Food Consumption, Prices and Expenditures, 1960-80 (2).

Survey Results

The survey results, as expected, indicate, strong economic motivations to change purchasing behavior and consumption patterns. Fifty-three percent of the respondents economized on food purchases as a means of reducing their living expenses. Fully a third - 33 percent - reported serving less fresh meat than during the previous year. Only 10 percent indicated they were serving more (1, 71). Table 2 shows the principal reasons identified by respondents for changing meat consumption patterns.

While the multiple responses are not additive, they suggest that approximately 80 percent of the households are responding primarily to economic factors in reducing their meat consumption. For heavy users of fresh meat, those serving fresh meat more than 14 times in a two-week period, cost was viewed as a constraint by 89 percent of the respondents. Among moderate users, serving meat nine times during a two week period, 80 percent saw cost as their principal constraint. Among light users, those who serve fresh meat six times or less per two-week period, health, demographic and food preferences were more significant. Nonetheless, 62 percent perceived meat as being too expensive. Interestingly, vegetarian dietary habits and changes in tastes and preferences were of relatively minor significance, accounting for 3 percent and 4 percent, respectively. Nine percent reported serious health concerns affecting their meat consumption patterns. Clearly, the data do not support the notion that the decline in beef and meat consumption since 1976 can be attributed to health and dietary concerns.

TABLE 2. Reasons Serving Less Fresh Meat Than One Year Ago

(Percentage in Population)	(Unaided)			
	Primary Food Shoppers	Fresh Meat Frequency		
		Heavy	Moderate	Light
(100)	(30)	(34)	(36)	
%	%	%	%	
<u>Total</u>	<u>100*</u>	<u>100</u>	<u>100</u>	<u>100</u>
Cost/too expensive	73	89	80	62
Health reasons: e.g., high blood pressure	9	5	10	10
Change in household size	8	6	4	12
Prefer other food	8	5	7	10
Trying to save money	5	8	5	5
Eating out more	4	2	4	5
Change in tastes	4	3	4	4
Vegetarians	3	-	-	7
Poultry less expensive	3	3	5	3
Other	12	5	9	17

* Multiple responses.

Source: American Meat Institute, Consumer Climate Barometer Relevant to Meat Products, Washington, D.C., May, 1981, p. 89.

Analysis of Time Series Data

Consumer demand theory recognizes several determinants of consumer demand: tastes and preferences, consumer incomes, the price of the product and the relative prices of substitutes. While the practical utility of much of neoclassical economic theory is open to question, there is no denying that consumers do, in fact, behave generally in accordance with the paradigms of consumer demand theory--increasing amounts purchased when prices decrease and (*ceteris paribus*) decreasing quantities consumed when prices increase. If demand is inelastic, a price increase may not necessarily lead to reduced consumption. And when prices and incomes are increasing *pari passu*, a price increase may not significantly affect consumption, since real incomes may not be materially affected. Thus, the potential effect of a price increase may be masked. If real incomes decline, however, a price increase may elicit a negative consumption response. It is instructive therefore to examine the behavior of some key economic variables in the period under consideration. Use of time series data on consumer incomes, the prices of beef and its close substitutes may refute or corroborate the conclusion suggested by the consumer survey data.

Consumer Incomes

Aggregate income, in 1972 dollars, went from \$1,122.4 billions in 1970 to \$1,480.7 billions in 1980--a 32 percent increase. Personal income increased similarly from \$869.1 billions to \$1209.0 billions over the period. However, when we examine another indicator of potential

purchasing power, average real spendable weekly earnings, a different pattern emerges. Real spendable weekly earnings peaked in 1972 at \$97.11 and declined fairly consistently to \$83.56 in 1980--a decrease of 14 percent. In the critical period, 1976-1980, average real spendable earnings went from \$91.42 to \$83.56--a nine percent drop (3). Examination of changes in per capita beef consumption, along with changes in average real weekly spendable earnings are closely related.

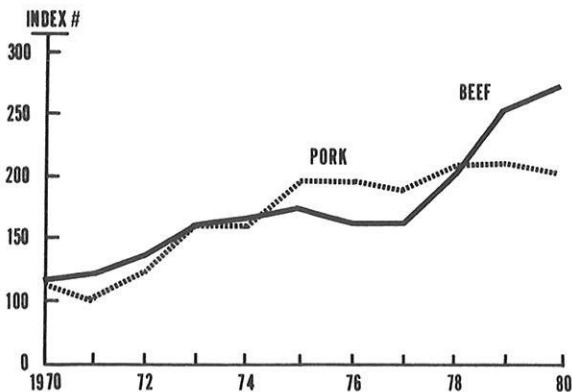
The relationship between average real weekly spendable earnings and per capita beef consumption is graphically apparent (See Figure 2).

Prices

Consumer demand responds to changes in the price of the product, as well as to changes in the relative prices of substitutes. Examination of the behavior of the beef price index suggests that changes in beef prices may be partially responsible for the changes in consumer demand. Between 1960 and 1970, the beef price index went from 92.3 to 119.5--an increase of 27.2 points or approximately 29 percent. During this period per capita beef consumption increased by 31 percent, nearly a third. By contrast, between 1970 and 1980, the index went from 119.5 to 270.3--an increase of 150.8 points or approximately 126 percent. Beef price increases, alone, during the nineteen-seventies would have had some negative impact on demand. But the more rapid rate of increase of the beef price index, compared to that of its close substitutes, would have magnified the impact.

Whereas the real prices of beef, pork and chicken were comparable in 1973, expressed in 1967 dollars, subsequent price relationships may explain changes in consumer demand patterns. Between 1974 and about 1977, the real price of pork was higher than that for beef. Not surprisingly, per capita beef consumption increased from 80.5 pounds in 1973 to 94.4 pounds in 1976 and declined only marginally to 91.8 pounds in 1977. Pork consumption decreased from 78.7 pounds in 1971 to only 50.6 pounds in 1975. By 1976 it was still only 55.8 pounds--a decrease of 29 percent. As illustrated in Figure 1, beef prices began to increase at a noticeable rate in 1977, and by 1980 the beef price index was 61 points higher than the pork price index (1967=100). Figure 1 traces the relative movements of the beef and pork price indexes.

FIGURE 1. Beef & Pork Price Indices (1967=100)



Chicken can be considered a reasonable, if not close, substitute for beef. Thus, the movements of relative prices between beef and chicken may indicate possible economic motivations for changes in consumption patterns.

As indicated, the real prices of beef and chicken bore the same relationship to each other in 1973 as in 1967. Divergence between the beef price index and the chicken price index was not great between 1973 and 1977. In fact, they nearly converged again in 1977. Subsequently, however, the beef price index increased at a fairly steep climb; by 1980 reaching 270.3 compared with 190.8 for chicken (1967=100)--a gap of 79.5 points. Between 1975 and 1980 the price index for chicken increased by 17.5 percent. The index for beef increased by 59 percent.

Our basic hypothesis is that the changes in beef consumption patterns between 1960 and 1980 can be explained by changes in the levels and rates of change of economic variables.

STATISTICAL ANALYSIS AND RESULTS

The objective of the statistical analysis is to ascertain whether using a specified set of economic variables in simple and multiple regression equations, we can adequately explain variations in per capita beef consumption.

Equations take the basic form

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + e.$$

The goodness of fit is indicated by the coefficient of determination for the regression equation. The reliability of the α and β coefficients depend on the size of the Durbin-Watson statistic for which low values suggest the presence of positive serial correlation in the errors. The F statistic evaluates the statistical reliability of the regression coefficient of determination.

In the following set of equations the arithmetic values of the variables are used. The set of independent variables are:

X_1 = per capita beef consumption

X_3 = average real spendable weekly earnings of workers on private payrolls (income)

X_4 = the price index of beef

X_5 = the price index of pork

X_6 = the price index of chicken

X_7 = ratio of beef price index to pork price index

X_8 = the ratio of beef price index to chicken price index.

Results Using Arithmetic Values

$$X_1 = -61.2560 + 1.56398X_3 \quad (1)$$

(29.0389) (0.322567)

$$R^2 = .5530 \quad D-W = .6832 \quad F = 25.5083$$

$$X_1 = 69.9903 + .06796X_4 \quad (2)$$

(4.7909) (.32357)

$$R^2 = .1884 \quad D-W = .3601 \quad F = 4.41177$$

$$X_1 = -62.2945 + 1.48780X_3 + .056931X_4 \quad (3)$$

(25.0908) (0.280072) (.020850)

$$R^2 = .6839 \quad D-W = 1.0448 \quad F = 19.4758$$

$$X_1 = -31.9331 + 1.11762X_3 - .08812X_4 + 0.17131X_5 \quad (4)$$

(21.5468) (.244271) (.04469) (.04911)

$$R^2 = .8158 \quad D-W = 1.4682 \quad F = 25.0954$$

$$X_1 = 6.39563 + 0.856081X_3 - .02400X_4 + 0.34105X_5 - 0.365387X_6 \quad (5)$$

(26.0542) (0.250167) (0.04968) (0.08868) (0.16535)

$$R^2 = .8589 \quad D-W = 1.5622 \quad F = 24.3410$$

$$X_1 = -23.4507 + 1.3507X_3 - 17.9226X_7 \quad (6)$$

(37.4429) (0.3417) (11.7454)

$$R^2 = .6042 \quad D-W = .6998 \quad F = 13.7402$$

$$X_1 = -66.3857 + 1.4414X_3 + 15.1996X_8 \quad (7)$$

(27.4439) (0.310334) (8.13863)

$R^2 = .6256$ D-W = .8303 F = 15.0372

$$X_1 = 86.7237 - .08735X_4 - 70.0595X_7 + 73.023X_8 \quad (8)$$

(9.76726) (.039615) (9.46014) (15.1454)

$R^2 = .8094$ D-W = 1.7467 F = 24.0709

$$X_1 = 21.8893 + 0.7616X_3 - 44.7674X_7 + 33.4398X_8 \quad (9)$$

(26.0723) (0.2521) (9.3524) (6.6627)

$R^2 = .8405$ D-W = 1.5340 F = 29.8662

Equation 1, using income alone as an explanatory variable, has an R^2 of .55. The D-W statistic is below the critical d_L value. Although the coefficient of X_3 is significant at the .99 level, the standard error of α is large. The F statistic is not significant at the 5% level. Equation 2 uses the price of beef, alone, as the independent variable. The inadequacy of this regression in accounting for variations in per capita beef consumption is demonstrated by the low R^2 , the size of the D-W statistic and the very low F value. When, as in Equation 3, both income and the beef price index are used in the regression, the coefficient of determination increases measurably to .6839; but the D-W and F values remain low. Equation 4 makes beef consumption a function of income (earnings), the price index of beef, the price index of pork and the price index of chicken. Again, the R^2 increases substantially to .8158, the D-W statistic increases to 1.4682 and the F value is higher, at 25.0954. The standard error of the constant term, however, is quite large; and the D-W statistic is inconclusive with respect to autocorrelation. Equation 6 uses income and the price index ratio for beef and pork; while Equation 7 uses income and the price index ratio for beef and chicken. Coefficients of determination are lower; and the D-W statistic indicates the presence of positive serial correlation. Equation 8 shows marked improvement. The standard errors are relatively small; the $R^2 = .8094$; D-W shows no serial correlation; and the coefficient of determination of the regression equation is significant at the 5% level but not at the 1% level. Equation 9 shows a higher R^2 but a lower D-W.

The equations above, using the arithmetic values of a logical a priori set of economic variables, vary in their statistical integrity. Some yield high R^2 values, but most have high standard errors and low D-W values, indicating the presence of serial correlation. Logarithmic transformations of the arithmetic values produce some improvement in the following equations:

Results Using Logarithmic Transformations of Arithmetic Data

$$LX_1 = -3.91807 + 1.84235LX_3 \quad (10)$$

(1.59626) (0.354849)

$R^2 = .5866$ D-W = .6966 F = 26.9560

$$LX_1 = 3.52242 + 0.173862LX_4 \quad (11)$$

(0.287525) (0.0588935)

$R^2 = .3145$ D-W = .3870 F = 8.71514

$$LX_1 = -3.55515 + 1.62350LX_3 + 0.127610LX_4 \quad (12)$$

(1.28564) (0.292030) (.037639)

$R^2 = .7477$ D-W = 1.1390 F = 26.6697

$$LX_1 = -2.13590 + 1.29597LX_3 - 0.156514LX_4 \quad (13)$$

(1.20889) (0.275379) (0.106942)

+ 0.297197LX₅

(0.106706)

$R^2 = .8267$ D-W = 1.4549 F = 27.0402

$$LX_1 = 0.243863 + 0.915594LX_3 - 0.535487LX_7 \quad (14)$$

(1.16892) (0.259887) (0.105931)

+ 0.467390LX₈

(.083434)

$R^2 = .8718$ D-W = 1.5672 F = 38.5186

$$LX_1 = 5.09648 - .0443512LX_4 + 0.882580LX_5 \quad (15)$$

(0.388468) (0.121474) (0.129333)

-0.992212LX₆

(0.221840)

$R^2 = .8167$ D-W = 1.5639 F = 25.2497

$$LX_1 = 0.243863 + 0.915594LX_3 - 0.535487LX_7 \quad (16)$$

(1.16892) (0.259887) (0.105931)

+ 0.467390

(.083434)

$R^2 = .8718$ D-W = 1.5672 F = 38.5186

$$LX_1 = 4.36187 - 0.741372LX_7 + 0.606786LX_8 \quad (17)$$

(.0112939) (0.112939) (.093897)

$R^2 = .7781$ D-W = .9692 F = 31.5619

Equations 10, 11 and 17 show evidence of positive serial correlation in their low D-W values. Equations 10 and 11 which use income, alone, or the beef price index, alone, as independent variables have particularly low D-W values. The balance of the equations are inconclusive as to the presence of serial correlation, their D-W values falling in the range where $d_L < d < d_U$. Following a methodology proposed by Merrill and Fox (4,420) further transformations of the data were carried out to possibly reduce or eliminate the statistical problem of autocorrelation in the residuals of the equations. First differences is a suggested methodological alternative to achieve this end. Here, first differences of the logarithms are used so that the beta coefficients might be taken as the orders of magnitude of the elasticities of per capita beef consumption with respect to income and the beef price index. The results are given in Equations 18-23:

Equations Using First Differences of Logarithms

$$X_{10} = .008104 + .941594X_{11} \quad (18)$$

(0.941594) (.0106327)

$R^2 = .9976$ D-W = 1.9869 F = 7842.32

$$X_{10} = .0192330 + 1.15258X_{11} - 0.208484X_{12} \quad (19)$$

(.0111907) (0.110168) (0.108418)

$R^2 = .9980$ D-W = 2.1012 F = 4479.77

$$X_{10} = .0180497 + 1.12169X_{11} - 0.254396X_{12} + .0783X_{13} \quad (20)$$

(.01148) (.12048) (.12868) (.1138)

$R^2 = .9980$ D-W = 2.2027 F = 2899.33

$$X_{10} = .0192006 + 1.15318X_{11} - 0.206614X_{12} \quad (21)$$

(.0116820) (0.119187) (0.159404)

$-.00237457X_{14}$

(0.144558)

$R^2 = .9980$ D-W = 2.0959 F = 2820.64

$$X_{10} = .0159290 + 1.12785X_{11} - 0.203987X_{12} \quad (22)$$

(.0123582) (0.123568) (0.160608)

$+ 0.127858X_{13} - 0.100823X_{14}$

(0.147448) (0.184658)

$R^2 = .9981$ D-W = 2.0526 F = 2084.80

$$X_{10} = .00702601 + .950223X_{11} - 0.192317X_{15} \quad (23)$$

(.0110581) (.0147881) (0.145015)

$+ .0971632X_{16}$

(0.190492)

$R^2 = .9978$ D-W = 2.1442 F = 2610.92

In Equations 18-23 the symbols for the variables are as follows:

X_{10} = per capita beef consumption

X_{11} = income (earnings)

X_{12} = price index of beef

X_{13} = price index of pork

X_{14} = price index of chicken

X_{15} = ratio of beef price index to pork price index.

X_{16} = ratio of beef price index to chicken price index

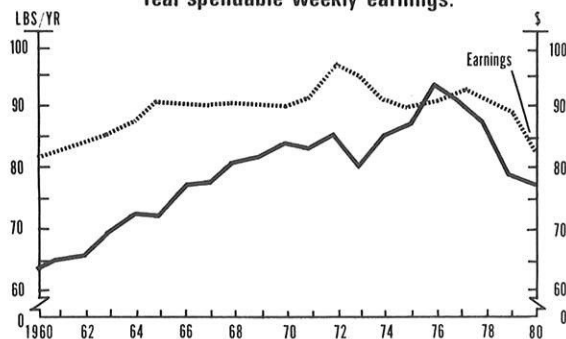
Equations 18-23 are considerably improved, statistically, over those utilizing the simple arithmetic values of the variables or their simple logarithmic transformations. Also improved are the values of the regression coefficients of determination. Surprisingly, the simple regression of beef consumption on income explains over 99 percent of the variation in beef consumption. The regression coefficient is significant at the 1% level. The partial coefficient of X_{11} is

significant at the 99% level.

In Equation 19 the R^2 increases marginally to .9980; the t tests for the earnings variable is significant at the 99% level; and the partial coefficient for the beef price index variable is significant at the 90% level. In Equation 20, the income coefficient is significant at the 99% level; the beef price index coefficient is significant at the 90% level; the pork price index coefficient is significant at the 50% level. Equation 21 utilizes the first difference of the logarithms of income, the beef price index and the chicken price index. The R^2 does not change; the D-W statistic is marginally reduced; the F value is significant at the 1% level; the coefficient of the constant is significant at the .75 level; the income coefficient is significant at the .99 level; and the partial coefficient for the beef price index is significant at the 75 percent level. The partial coefficient for the poultry price index is not significant.

Equation 19 is a reasonably good explanation of changes in per capita beef consumption between 1960 and 1980. The income coefficient is significant at the .99 level; the price index coefficient at the .90 level; the coefficient of determination is .9980; the D-W statistic rejects the null hypothesis of positive serial correlation; and the F value is significant at the 1% level. Figure 2 shows a graphic relationship between earnings and per capita beef consumption.

FIGURE 2. Per capita beef consumption, average real spendable weekly earnings.



CONCLUSIONS AND IMPLICATIONS

The analysis indicates that changes in per capita beef consumption between 1960 and 1980 can be explained by consumer response to economic factors, in particular, consumer purchasing power and beef prices. While the prices of pork and poultry were of some relevance to consumer decision making, they were not as significant as earnings and the price of beef. The cross section data suggests that health concerns and demographic factors have become more significant in recent years and are likely to increase in significance during the coming decade. Nonetheless, changes in meat and beef consumption will, in all likelihood, hinge on developments in the macro-economy. Most

favorable to beef consumption would be a broad based economic recovery with high levels of employment and increased levels of real earnings and incomes. Our analysis suggests that beef consumption is highly sensitive to changes in real income. Monetary and fiscal policy will play a vital role on the demand, as well as, the supply side. To the extent that these policies can stimulate growth without high inflation and with relatively low interest rates, consumer demand and the cost of production may both be positively affected. A high level of unemployment, inflation and other factors that depress real consumer purchasing power will continue to depress the demand for beef. Producers and the marketing system will also need to pay much closer attention to economic efficiencies on the supply side.

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SOCIAL-PSYCHOLOGICAL FACTORS ASSOCIATED WITH CHANGE IN
SUGAR-RELATED CONSUMPTION BEHAVIORS

Julie M. Domas and Kristin L. Kline, University of Illinois-Champaign-Urbana¹

ABSTRACT

Relationships among demographic variables, beliefs, attitudes, and behaviors with respect to sugar-related consumption were postulated from the Fishbein behavioral model. Associations were tested using data from a national survey by USDA. Changes in consumption were consistent with behavioral beliefs and attitudes. Beliefs appeared to mediate between demographic characteristics and attitudes.

INTRODUCTION

In 1980 the United States Department of Agriculture sponsored a nationwide survey to collect data on food consumption patterns and dietary changes made for nutrition and health reasons. A reduction in sugar consumption was the most frequently mentioned change among the two-thirds of individuals who reported a change in diet for nutrition and health reasons within the preceding three years. Interestingly, however, statistics on aggregate consumption show a ten percent increase in U.S. per capita sugar consumption during the 1970s, much of which has been associated with increased use of products high in hidden sugars, such as processed foods and soft drinks [25].

Currently, an average American consumes about 130 pounds of refined sugar per year; this comprises about 18 percent of total energy intake [13]. National dietary guidelines contain the recommendation that level of sugar consumption comprises only about 10 to 15 percent of the total energy intake [27]. For attainment of this guideline, a reduction in the consumption of all types of sugars, candies, soft drinks, ice cream, cakes and cookies is suggested. An increase in fresh fruit, vegetable and bread consumption has been recommended to replace sugary foods in the diet.

Because dietary patterns are a complex product of cultural habits, psychological factors, situational variables, past experiences, personal characteristics, tastes and preferences, cost and availability, it has been difficult for practitioners to predict food choice behavior or to initiate changes in food consumption [2, 17, 18, 21, 24]. Numerous studies have assessed effects of nutrition knowledge and attitudes on practices, correlated demographic and personal characteristics with nutritional behaviors, and isolated potential sources of influence on food choice [2-6, 9, 10, 12, 14, 16, 19-22, 28, 29]. However, a model of food choice which accurately predicts behaviors has been lacking.

This paper presents results of research testing the usefulness of the Fishbein behavioral model [7, 8] in predicting sugar-related consumption behaviors. The objectives of this research were as follows:

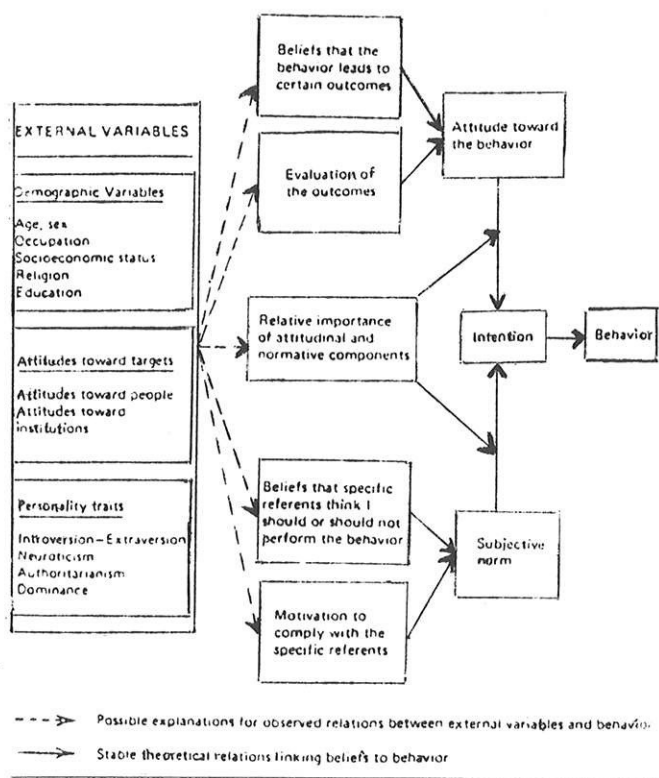
- 1) To determine the association between beliefs regarding sugar-related consumption behavior, health, and nutrition and attitudes toward sugar-related consumption behaviors.
- 2) To determine the association between attitudes toward sugar-related consumption and sugar-related consumption behaviors.
- 3) To determine the association between demographic characteristics and beliefs regarding sugar-related consumption behavior, health, and nutrition.
- 4) To determine what sources of information influenced individuals to make changes in food consumption for health and nutrition reasons and if type or number of sources were related to sugar-related changes.

THEORETICAL BACKGROUND

Hochbaum's [11] health belief model, Lewin's [14] channel theory, and the ecological systems perspective theory presented by Sims and Wright [23] are three theories which have applicability to the problem of explaining food habits and dietary change. However, none of these offers what the Fishbein Behavioral Intention (FBI) model does, that is, postulates concerning the motivations underlying a given behavior [7, 8]. The FBI model, shown effective in predicting a variety of behavioral objectives, assumes a person's intention to perform a behavior is the immediate determinant of the action. (See Figure 1.) Intentions are influenced by attitudes and subjective norms, and attitudes and subjective norms are influenced by beliefs. According to the theory, individuals will intend to perform a behavior when they evaluate it positively and when they believe important others think they should perform it. Since beliefs are shaped by past experiences it can also be argued that demographic variables, personality traits, and attitudes which influence a person's interpretation of past experiences can also influence their beliefs. The theory also postulates an indirect link between demographic variables and behaviors via beliefs.

¹Former M.S. student and Assistant Professor, respectively, Department of Family and Consumer Economics.

FIGURE 1. Behavioral Intention Model



METHODOLOGY

Data Description

The United States Department of Agriculture's Economic and Statistics Service 1980 survey of health and diet concerns was the source of data for this study [26]. The survey was conducted using a questionnaire-interview format and with households selected on the basis of a national probability sample; included in the sample were households residing in all four regions of the United States. Trained interviewers conducted a personal interview with the person primarily responsible for food preparation in the household. Efforts were made to find eligible respondents at home and to urge cooperation of those reluctant to participate.

A total of 2,200 households were selected in the national sample. However, 233 were excluded due to vacant housing units or reports of no food preparation in the households. Of the 1,997 households eligible for the survey, 68 percent (n=1,353) provided completed interviews.

Statistical Analysis

Chi square analysis [2] was used to test for association between the sets of variables. Crosstabs was the computer procedure used to make the computations [15]. The probability level at which results were considered significant was set at the 0.05 level.

Two-way crosstabulations were made for: (1) each belief with each attitude; (2) each attitude with each behavior; (3) each type of influence with each behavior; (4) the number of influences mentioned with each behavior; and (5) each demographic characteristic with each belief. Three-way crosstabulations were made for: (1) attitudes and behaviors, controlling for beliefs; and (2) demographic characteristics and attitudes, controlling for beliefs.

RESULTS

Sample Characteristics

Of the 1,353 respondents interviewed the majority were white women residing in urban settings. On the average, respondents were 44 years old, had finished high school, and had after-tax household income of about \$18,000.

Tests of Hypotheses

Beliefs and Attitudes. Results of analyses for associations among beliefs and attitudes indicated the following associations were significant: (1) Those who believed just about everyone should eat less sweets and sugars also tended to have the attitudes that they should decrease sugary food consumption and decrease caloric intake. (2) Those who believed there is a connection between certain foods and some diseases also tended to have the attitude that they should decrease sugary food consumption. The food-disease belief was not significantly related to attitude concerning caloric intake. Neither of the two beliefs was found to be related to an attitude consistent with decreasing soft drink consumption.

Attitudes and Behaviors. Attitudes were found to be consistent with behaviors regarding sugar consumption. Among respondents with attitudes consistent with decreasing soft drink consumption, sugary food consumption, and caloric intake a greater number than would be expected by chance decreased consumption of soft drinks and sugary foods.

A more extensive examination of the relationships among attitudes and behaviors was made in which beliefs were held constant. Among those whose beliefs and attitudes disposed them to decrease sugar-related consumption a greater proportion than that expected by chance had decreased consumption of soft drinks and sugary foods.

Demographics and Beliefs. The results provide some support for hypotheses linking demographic characteristics with beliefs. Those respondents agreeing that everyone should eat less sweets were more likely to be White, college-educated, and aged 25 or older. However, no significant associations were found for the belief that certain foods are linked to diseases.

Tests of association among demographic characteristics and attitudes, holding beliefs constant, were also made. A greater number of significant