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# **Are Agricultural Policies Making Us Fat? Likely Links between Agricultural Policies and Human Nutrition and Obesity, and their Policy Implications**

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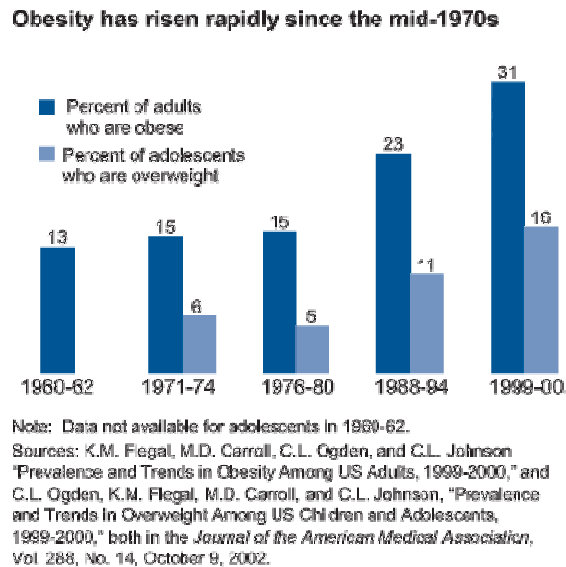
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## 1 – Introduction

Obesity is rapidly increasing in the United States (see Figure 1) and the related health concerns are priority issues for the U.S. government; health care costs associated with obesity are soaring (Flegal et al. 2002), and the negative implications for worker productivity may be large. Of particular concern is the rising rate of obesity among children (Ogden et al. 2002).

**Figure 1: Obesity among Adults and Adolescents**



The U.S. government has a stated objective of reducing rates of increase in obesity (USDHHS 2001). One option is public education programs, and there is some evidence that these may have some effect (e.g., Nayga 2001). Other options include regulatory or fiscal instruments that work to discourage “unhealthy” consumption choices and encourage “healthy” choices (Drewnowski et al. 2004; Fields 2004; Variyam 2005). For instance, there is speculation about banning certain types of advertising and taxing foods with high fat or high sugar content (Jacobson and Brownell 2000; Cash, Sunding and Zilberman 2004).

Implicit in the discussions of tax policies, in particular, is a conception that changing the prices faced by consumers will appreciably affect their consumption choices in ways that will lead to healthier diets and lower rates of obesity. Moreover, it is increasingly common in the popular press to

find authors declaring that highly productive and heavily subsidized domestic agriculture is an important underlying cause of obesity in the United States, and suggesting that reducing support to agriculture will (symmetrically) go a long way towards solving the problem (e.g., see Pollan 2003). The connections between such instruments and the desired outcomes are complex and hard to predict, and the costs to consumers, especially poor consumers, farmers and government associated with particular policy instruments are rarely explored. This paper addresses these issues with a view to better-informed policy both in the United States and abroad (Martorell 2003).

### ***Food Consumption and Obesity***

The primary proximal cause of obesity is simple and not disputed: people consume more food energy than they use (Goldberg et al. 2004; Jen 2004). Both the nutritional story and the behavioral story involve complex dynamics, and many aspects of the relationships are not clearly understood. For example, it may be the case that food consumption has been stimulated by growth in real incomes (partly because of lower food prices) and by falling prices of food (Lakdawalla and Philipson 2002). A variant of this hypothesis is that certain types of more-fattening foods (fats, sugars, and carbohydrates) have become relatively cheaper, especially compared with the healthier foods such as fruits and vegetables, and this accounts in part for why consumers continue not to consume a more healthy diet (Drewnowski et al. 2004). It is easy to challenge this simple theory (e.g., Kuchler et al. 2004), but work remains to be done to quantify this aspect.

A key factor appears to have been the rising consumption of restaurant meals, and the high caloric content of those meals. The National Alliance for Nutrition and Activity (NANA 2002) argues that increasing portion size increases costs (and price) only modestly, but substantially increases calorie and fat content. Food companies are said to pursue a strategy of “value marketing” in which they compete for customers by offering them value for money, and to do this they increase portion sizes and bundle items together, which encourages overeating (NANA 2002). Agricultural policies

may have contributed to the problem indirectly: by making agricultural commodities much cheaper as raw materials used as food ingredients, agricultural R&D has made it cheaper to increase portion sizes.

### ***The Links between Agricultural Policy, Food Consumption, and Obesity***

Government policy affects food consumption and other consumer choices that affect dietary outcomes in myriad ways. Agricultural policy acts directly on the markets for agricultural commodities, but only indirectly on the market for food and thus on food consumption choices, and these choices do not completely explain nutritional outcomes. Individual consumers are *not* typically the buyers of agricultural commodities. The demand for agricultural commodities is expressed by market intermediaries who take into account both consumer demands for foods and the cost of the raw materials, among other things. There is a complex linkage from consumers' demand for retail food products to the demand for agricultural commodities and their characteristics in space, time, and form. Agricultural policy interposes and to some extent modifies the transmission of these market signals and their consequences, but other factors play pivotal roles in determining food intake and nutrition outcomes (Philipson et al. 2004). This paper examines some of these interrelationships.

## **2 – U.S. Agricultural Policy and Agricultural Productivity**

The U.S. Farm Bill is the main federal mechanism for influencing agriculture. In 2004 USDA outlays in the federal budget totaled about \$113 billion (about 5 percent of total federal government spending);<sup>1</sup> about 25 percent of these outlays are discretionary and support the WIC (Women, Infants, Children) program, rural development programs, research and education, soil and water conservation programs, forest management, and domestic and international marketing assistance.<sup>2</sup>

Of particular interest is spending on commodity programs (including crop insurance and other risk management programs, about \$32 billion or 28 percent of the total in 2004) and agricultural R&D

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<sup>1</sup> Expenditure figures reported in this paragraph were taken from <http://www.usda.gov/agency/obpa/Budget-Summary/2005/FYbudsum.pdf>.

<sup>2</sup> The WIC program is described on <http://www.wicprogram.org/>

(about \$2.5 billion or 2.2 percent of the total in 2004), the two sets of agricultural policies selected for examination in this paper. Over time, total spending under the various Farm Bills has generally trended up, with a shifting balance of spending among categories reflecting evolving public policy priorities. In particular, there has been a secular trend to increase the share going to food and nutrition programs (about \$45 billion or 40 percent of the total in 2004) and some elements of environmental programs. It should also be remembered that many elements of agricultural policies that may have important implications for prices and consumption of food commodities—such as trade policies or regulatory programs, e.g., the dairy and sugar programs—do not have major budget implications.

Farm subsidy policies implemented by the U.S. government include literally hundreds of specific provisions for particular commodities. These programs support farm incomes either through transfers from taxpayers, or at the expense of consumers, or both. Farm commodity programs might make agricultural commodities cheaper or more expensive, scarcer or more abundant. For example, every food product that contains white sugar and dairy products is more expensive as a result of farm programs. Alternatively, farm programs may result in lower U.S. prices of some commodities, such as food grains or feed grains, and hence lower costs of producing breakfast cereal, bread or livestock products. And the effect of lower-priced feed grains may be different between poultry, hogs, and cattle, with implications for the relative prices of poultry meat, pork, and beef.

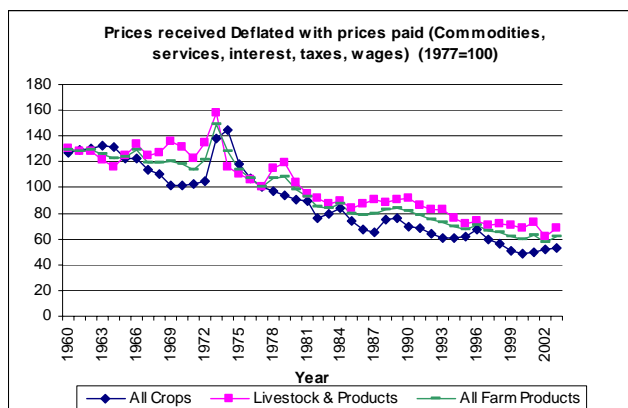
The general effects of R&D expenditures are easier to predict, though the absolute size and timing of effects are challenging to estimate. Agricultural R&D contributes to reductions in costs of production and processing, and these cost reductions (*ceteris paribus*) reduce per unit prices for agricultural products. The public sector in the United States has invested very substantially in agricultural R&D, especially in the second half of the 20<sup>th</sup> Century. These outlays have dramatically increased farm productivity and hence made agricultural commodities much cheaper and more abundant than they would have been otherwise (Alston and Pardey 1996; Johnson 2000).

### 3 – Trends in Commodity Prices

What do these commodity-specific trends in productivity growth mean for commodity prices?

Figure 2 depicts real prices received by farmers (nominal farm gate prices deflated by an index of prices paid by farmers for inputs and services) (a) for all farm products, (b) for crops, and (c) for livestock & products. Beginning in the early 1970s the downward trend is clear.

**Figure 2: Real Prices Received by Farmers**



Sources: Prices received are USDA indexes taken from: <http://usda.mannlib.cornell.edu/reports/nassr/price/zap-bb>;  
Prices paid are BLS indexes from <http://data.bls.gov/cgi-bin/surveymost?wp>

Similar general downward trends in real farm gate prices can be found for grains, poultry, and eggs. Farm gate prices for beef cattle, on the other hand, have not declined as swiftly, and experienced several increases over the past 30 years or so. The dairy sub-sector has also experienced fairly consistent declines in farm gate prices, especially since the early-1980s. Real farm gate prices for sugar beets and sugarcane have also registered steady declines despite heavy policy intervention. The picture is somewhat different for at least some of the commodities that by and large enjoyed *neither* federal commodity support nor large public sector R&D programs.

Of particular interest are the commodities that occupy the ‘wedges’ of the new USDA food pyramid normally associated with so called “healthy foods” such as fruits and vegetables. With the exception of lettuce and asparagus, deflated farm gate prices for selected vegetables have declined. For example, tomato prices fell approximately 40 percent over the period 1970 to 2000. The same is

roughly true for broccoli and potatoes. Trends in farm gate prices for fruits tell a mixed story. There is a clear decline in prices received for strawberries during 1960-80, but a clear increase in prices received for table grapes. Prices of oranges (the focus of federal support via trade policy) show no trend after about 1970. Even still, those claiming that healthier food are increasingly expensive (e.g., Drewnowski et al. 2004) cannot look to the farm gate as a source for such trends.

#### **4 – Linking Commodity Prices to Food Prices**

A detailed examination of average national prices paid by consumers (deflated by the CPI for foods consumed at home) reveals some interesting patterns. These patterns reflect the roles of government policies and market intermediaries and changes in services associated with food and other quality characteristics. Whilst farm product prices have generally trended down, mainly reflecting the influence of technological change, the corresponding food prices might have fallen faster or slower, or not at all.

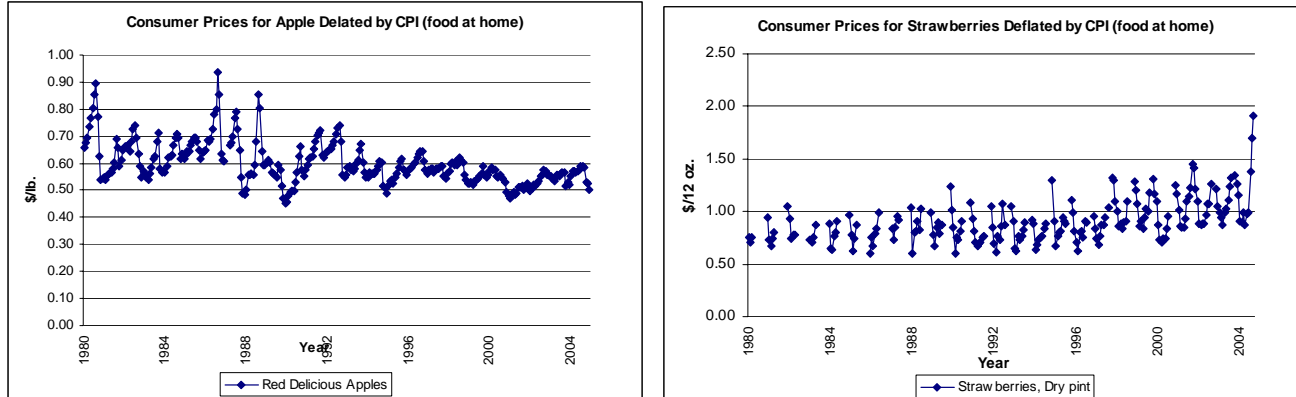
In many cases, food prices paid by consumers have not fallen in step with commodity prices. Real prices for rice and for wheat flour have declined; indeed, declines in wheat flour prices have kept pace with declines in farm gate wheat prices. However, the real per-unit price of white bread has essentially not changed over the past 25 years, with other factors offsetting the impact of lower prices of the primary ingredient. Similarly, despite dramatic increases in milk cow productivity the average real price of milk paid by consumers has been relatively stable over the past decade or so, mainly reflecting dairy price policy. Consumer prices for raw potatoes have also remained relatively constant over the past several decades but the price of potato chips has tended to decline somewhat over time.

On the other hand, average prices for apples have declined steadily over the past 25 years, with a substantial reduction in seasonal swings in apple prices (Figure 3); similar patterns are evident for many other fruits and vegetables. Average prices of meats and some fish have generally followed a



common trend of decreasing prices and lower price variability over time. Even white sugar, one of the most protected commodities in the United States, has become cheaper.

**Figure 3 – Real Prices Paid by Consumers for Apples and Strawberries**



Source: Consumer Price Indexes are BLS estimates from <http://data.bls.gov/cgi-bin/surveymost?cu>  
 Consumer prices are BLS estimates from <http://data.bls.gov/PDQ/outside.jsp?survey=ap>

In contrast, average consumer prices for several fruits and vegetables have, according to available data, increased over the past 25 years, but these average figures may be misleading because the product has changed over time. Figure 3 depicts the prices for strawberries, showing an increase in average price and an apparent increase in seasonal price volatility. But trends derived from market prices may not tell the whole story, especially for perishable fruits and vegetables that have short seasonal production cycles. Until relatively recently strawberries were simply unavailable during most of the year. Changes in production technology and varietal improvements have extended the national production season and international trade has now made strawberries available throughout the calendar year. Similar, though less dramatic, stories apply for table grapes and other fruits. In these cases, trends in average prices reflect both a generally declining price for products of a given quality and a change in the product mix (in terms of seasonal availability or varieties) that entails an increase in average “quality”. Other cases may also entail hidden quality improvements (or the converse) and the provision of different services associated with products (such as enhanced packaging or further processing). Price trends for iceberg lettuce capture many of the salient characteristics of many fruits

and vegetables that to date are not internationally traded, or if they are, for which trading is limited to a single international border. Over time consumers have experienced slow declines in the price of this perishable vegetable, and seasonal price spikes (associated with the month or two during the year in which lettuce supplies are very low) have been decreasing over time as seasonal niche production areas have been identified.

### ***Other Factors that Influence the Cost of Meals and Consumption Choices***

Analysis to this point has focused on foods that can be consumed in the home, and generally are. But dietary outcomes have been driven in part by available time and broader changes in society. Food consumption patterns have changed in the context of a complex of changes in technology (microwaves, home freezers), household structure (single-parent households, few non-working spouses), and tastes, which together have promoted a shift in consumption to more food away from home and more consumption in the home of pre-prepared meals (Senauer et al. 1991; Lakdawalla and Philipson 2002; Mancino et al. 2004; Variyam 2004).

Rising real income, smaller households, and a rising opportunity cost of time together imply an increased demand for more services, including convenience associated with food. The nutritional characteristics of meals (including nutrient content and portion size) in the fast food industry may be systematically different than for meals prepared at home. Incomes have played a role here but it is a complicated one. Changes in agricultural commodity prices are involved as well, through their influence on food manufacturers' least-cost combinations of inputs and other economizing choices they make. To begin to understand the potential role of commodity prices in changes in prices of processed foods, we need to examine the relative contributions of commodities, semi-processed food and other factors to finished products, including energy costs, wages, employee benefits and overhead. Clearly, the role of commodities in determining costs has decreased since the 1950s, and the relative importance of real estate, wages, benefits and insurance have all increased.

## **5 – Conclusion, Policy Implications, and Next Steps**

Rates of obesity among adults and children in the United States are soaring, with potentially huge implications for health care costs and worker productivity. Increasing attention is being paid to agricultural policies as both the culprits and as the potential saviors. However, the effects of agricultural policies on human nutrition and obesity are not well understood. For example, obesity trends for adult males and children in Australia are similar to those in the United States and the proximate causes (among them dramatic increases in fast food and soft drink consumption) are essentially the same. However, Australia has generally different agricultural policies, with a much greater relative emphasis on agricultural R&D and no important farm commodity programs.

Federal agricultural policy, as articulated in the U.S. Farm Bill, is a complex set of policies that affect production costs, production, commodity prices and farm incomes in very different ways. Commodity-specific trade policy has clearly led to higher consumer prices of several major food commodities (such as beef, dairy products, sugar, and orange juice) than would have been the case without such policies, but consumer prices for virtually all of these foods have nonetheless trended down in real terms. Agricultural R&D has led to dramatic decreases in production costs and to consequent long-term declines in commodity prices. The speed of decline has been different for different commodities, reflecting the non-uniform focus of R&D expenditures and impacts over time. The consequences of commodity price changes (in either direction) for food prices are less easy to discern but likely to be muted because the contribution of commodity costs as a share of total prepared food costs is small, having fallen dramatically over the past several decades.

Even so, through its effects on lowering commodity prices, agricultural research must contribute to lower food costs—indeed, this effect is one of the primary justifications for public involvement. Those who are concerned about obesity—an apparent excess of nutrition—might conclude that agricultural research is counterproductive and that the federal government should fund

less of it as a way of achieving its national health objectives. This conclusion is probably false. The primary consumer benefit from a lower price of food is to free up funds that would have been spent on food and make them available for other purposes; only a small fraction of those funds is likely to be spent on additional food consumption per se. This argument applies for the general lowering of the cost of food as a result of research; more dramatic impacts may follow from changes in the relative prices of different foods (such as poultry versus beef).

Changes in relative prices of “healthy” versus “unhealthy” foods follow no easily identifiable patterns, and available data likely mask important contributions of agricultural R&D and trade to product availability (and hence price) and quality. But regardless, these differences in relative prices likely play only a small role in determining food consumption.

Low-cost agricultural commodities are not the primary cause of overeating. Moreover, a general policy called for by some authors of making agricultural commodities more expensive (through reducing agricultural research, say) might not be very effective at reversing the shift towards large portions of high calorie meals because of the low elasticity of the cost of meals with respect to agricultural commodity prices. Moreover, in view of the compelling evidence of a very high rate of return to agricultural research, reducing agricultural R&D would seem to be a very high-cost way of pursuing the objective of reducing obesity.

In our continuing work we will use simulation models of the agricultural sector (a) to evaluate the effects of agricultural policies on commodity prices paid by U.S. buyers, (b) to derive the quantitative implications of policy-induced changes in farm *commodity* prices for *food* prices, and characteristics of the bundles of food consumed by different demographic and income groups in society, and (c) to assess the implications for nutritional outcomes, including obesity.

Against this backdrop of general linkages from agricultural policy to food demand and nutritional outcomes, two detailed case studies will be developed. The first addresses the demand for

and supply of various caloric sweeteners. The study will consider how agricultural and proposed nutrition-related policies affect the relative attractiveness of the sweetener market substitutes, and with what consequences for human nutrition and obesity. A second case study will focus on the U.S. government's WIC program and will assess the likely effects for farmers and program participants of recent proposed changes in the WIC program, especially related to fresh fruits and vegetables. A final component of the research will evaluate these factors in the context of the effects of time constraints. That is, we will examine trends in off-the-job time and changes in the structure of retail food markets to better understand the situation of the 'doubly-poor' and the effects of agricultural policy on them.

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