AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search
http://ageconsearch.umn.edu
aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

United States
Department
of Agriculture

Economic
Research
Service

Economic
Research
Report
Number 24

August 2006

How Low Has the Farm Share of Retail Food Prices Really Fallen?

Hayden Stewart

Electronic
Report

Visit Our Website To Learn More!

Want to learn more about the farm share of retail food prices? Visit our website at **www.ers.usda.gov.**

You can also find additional information about ERS publications, databases, and other products at our website.

National Agricultural Library Cataloging Record:

Hayden, Stewart.

How low has the farm share of retail food prices really fallen?
(Economic research report (United States. Dept. of Agriculture. Economic Research Service) ; no. 24)
1. Farm income—United States. 2. Food prices—United States.
3. Fruit—Prices—United States.
4. Vegetables—Prices—United States.
I. United States. Dept. of Agriculture. Economic Research Service.
II. Title.

HD9254.U62

Cover photo courtesy of Creatas.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or part of an individual's income is derived from any public assistance program (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410, or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

United States Department of Agriculture

Economic Research Report Number 24

August 2006

An Electronic Report from the Economic Research Service

www.ers.usda.gov

How Low Has the Farm Share of Retail Food Prices Really Fallen?

Hayden Stewart

Abstract

For the commodities they sell, farmers have been receiving a decreasing share of what consumers pay for food at retail stores for some time, but the extent of this decrease has been overstated for at least a few commodity groups. Current estimates of farm share are based on baskets of foods representative of what households bought between 1982 and 1984. Using updated baskets based on what American households bought for at-home consumption between 1999 and 2003, this report estimates farm share for two major commodity groups—fresh fruits and fresh vegetables. Using this approach, this report found that farmers are capturing more of the consumer's food dollar than current estimates suggest. The methodology behind the market basket data series is also detailed.

Keywords: marketing margin, farm share, farm-retail price spread, food prices, fruits, vegetables

Acknowledgments

I thank Gerald Schluter, Noel Blisard, Mark Denbaly, Howard Elitzak, Abebayehu Tegene, Gary Lucier, Susan Pollack, Elise Golan, Albert Reed, and Veronica Jones, all of ERS, for their helpful insights and suggestions. I also thank Enrique Ospina of the Agricultural Marketing Service for his thoughtful comments and Lou King (ERS) for editorial assistance.

Contents

Summary iii

Introduction 1

Changes in Fresh Fruit and Vegetable Marketing 4

Consumer Baskets Reflect What Households Buy at Retail 5

Calculating Updated Consumer Baskets 7

Farm Baskets Contain What is Needed to Produce Consumer Baskets 8
Farm Share Calculated 11
Farm Share Calculated for the Updated Data Series 12

Farm Share Declined Less Than Expected 15

References 17

Summary

The Economic Research Service estimates the share of retail food prices that farmers earn for producing various commodities. Estimates are based on baskets of foods representative of what a typical American household buys at a retail foodstore for at-home consumption during 1 year, compared with the revenues earned by farmers for a corresponding basket of agricultural commodities. In recent decades, the farm share of consumer food expenditures has been shrinking.

What Is the Issue?

To facilitate the calculation of an annual market basket data series, ERS works with the same consumer baskets that have been used since 1982-84. Researchers working with these baskets need only to follow changes in farm and retail prices over time. The value of the consumer baskets is updated using measures of retail price inflation supplied by the Bureau of Labor Statistics (BLS), and the value of the farm baskets is updated using prices received by farmers for their commodities. Although working with fixed baskets makes calculating the data series easier, it does not allow researchers to account for changes in shopping patterns, such as increased purchases of fresh fruits and vegetables over the past few decades.

What would the farm share for these commodity groups look like if the consumer baskets were updated to reflect what American households bought at retail in more recent years? To answer the question, this study identified the contents of more recent fresh fruit and fresh vegetable consumer baskets (1999-2003) and used the information to estimate farm share for both commodity groups for the years 1997 through 2004.

What Did the Study Find?

Using the updated market basket data for fresh fruits and fresh vegetables, ERS confirmed a general trend: that the farm share of consumer food expenditures has been shrinking. But the study also found that the farm share for these two commodity groups has decreased less than previously believed.

The updated estimates show a larger farm share than the current, unadjusted data series. The unadjusted data series estimates the 2004 farm share at 19 and 20 percent for fresh vegetables and fresh fruits, respectively; the updated consumer baskets yield farm shares of 23.5 percent for fresh vegetables and 26.6 percent for fresh fruit. While the updated estimates are lower than the farm share estimates for 1982 (34 percent for fresh vegetables and 33 percent for fresh fruit), they do suggest that the existing (unadjusted) series has overstated the decrease in farm share.

The unadjusted and updated consumer baskets differ in important ways. The updated basket includes greater quantities of high-value fresh vegetables, such as asparagus (with a relatively high farm value in 2004 of $1.22/lb), bell peppers ($0.34/lb), broccoli ($0.33/lb), agaricus mushrooms ($1.14/lb), and romaine lettuce ($0.19/lb). By contrast, celery ($0.15/lb), corn on the cob ($0.21/lb), iceberg lettuce ($0.17/lb), and onions ($0.11/lb)

are included in the updated basket in smaller quantities than in the 1982-84 consumer basket.

These results apply only to fresh fruits and fresh vegetables. Separate analyses are needed for other commodity groups included in the market basket data series. In addition to fresh fruits and fresh vegetables, the market basket data series provides estimates of consumer expenditures for meats, poultry, eggs, dairy products, fats and oils, processed fruits and vegetables, and bakery and cereal products.

How Was the Study Conducted?

The study constructed consumer baskets representative of what households bought at retail in 1999-2003 and used them to estimate farm shares.

The updated market baskets were constructed using data from BLS on food spending by American households in conjunction with data from ACNeilsen on the shopping habits of American households. In 1999, on average, households spent $148.51 for fresh vegetables, including $18.92 for lettuce, $26.91 for tomatoes, $28.35 for potatoes, and $74.33 for other fresh vegetables. Quantities were inferred from these expenditures using the ACNeilsen data. For example, head lettuce (primarily iceberg) accounts for about 62 percent of the value of all lettuce purchased by the ACNeilsen sample, and iceberg lettuce can be used to represent all purchases of head lettuce. Romaine can likewise be used to represent all purchases of romaine and leafy lettuce, implying that a representative household split its lettuce expenditures of $18.92 into $11.73 for iceberg and $7.19 for romaine. Using ACNeilsen national average prices and these values yielded estimates of physical quantities. For example, with iceberg lettuce averaging $0.78 per pound in 1999, a representative household bought about 15 pounds with its $11.73.

This same procedure was repeated using data for 2003. The final market basket was constructed by averaging the contents of the 1999 and 2003 baskets.

The values of the two consumer baskets (fresh fruits and fresh vegetables) were then updated using BLS measures of retail price inflation, and the values of the corresponding farm baskets were updated using prices received by farmers for their commodities.

At the time the study was conducted, 1999 and 2003 were the earliest and most recent years, respectively, for which both BLS and ACNeilsen data were available.

How Low Has the Farm Share of Retail Food Prices Really Fallen?

Hayden Stewart

Introduction

Farmers are receiving a smaller share of what consumers pay for many food products at retail. The market basket data series, maintained by USDA's Economic Research Service (ERS), shows that costs for marketing services—such as transportation, processing, and retailing—are growing more quickly than farm receipts for major commodity groupings. For example, in 1982, farmers[1] captured 34 percent and 33 percent of what consumers paid for fresh vegetables and fresh fruit, respectively, at retail foodstores; by 2004, these farm shares had declined to 19 percent for fresh vegetables and 20 percent for fresh fruit. However, like most data series, these estimates are sensitive to some methodological assumptions.

[1]For fresh fruits and fresh vegetables, farmers are defined to include grower-shippers, firms, or cooperatives that grow, pack, and ship produce, or pack and ship produce for other growers.

The market basket data series compares the retail price of a market (consumer) basket of foods with the revenues received by farmers for the contents of a corresponding agricultural basket. Estimates are provided for nine major commodity groups: meats, poultry, eggs, dairy products, fats and oils, fresh fruits, fresh vegetables, processed fruits and vegetables, and bakery and cereal products. Consumer baskets represent what a typical American household buys at a retail foodstore for at-home consumption. For example, the consumer basket for fats and oils contains a certain quantity of peanut butter. The corresponding agricultural basket contains enough peanuts to produce that same amount of peanut butter.

To make the challenge of calculating an annual data series less daunting, ERS researchers have continued to work with consumer baskets representative of what households bought between 1982 and 1984. Under this assumption, we only need to follow changes in farm and retail prices over time to estimate farm share in other years.

However, shopping and eating patterns have changed over the past few decades. For one thing, supermarkets tend to be larger and stock a greater variety of items (Kaufman). Food availability data (also known as disappearance data) further identify changes in the amounts of some commodities available for consumption. For example, there have been increases in the per capita supply of romaine lettuce and cheese. Commodities available in only the same or smaller quantities include head lettuce and beverage milk.

The market basket data series aims to inform both policymakers and the agricultural community about the costs of marketing commodities and how these costs compare with what farmers themselves earn (see box, "Objectives and History of the Market Basket Data Series"). The American Farm Bureau Federation, for example, has been concerned about agriculture's decreasing "portion" of the consumer's food dollar (e.g., Kleckner). Throughout this study, I use the words "contribution," "portion," and "share" interchangeably.

Objectives and History of the Market Basket Data Series

USDA's Economic Research Service seeks to inform policymakers, agriculture, and the general public about marketing costs for agricultural commodities. We also have a Congressional mandate to provide this information. A number of data products compare the prices paid by consumers for food with the prices received by farmers for their commodities. To keep this information useful and accurate, ERS must also undertake periodic reviews of these data products.

Included in the information provided by ERS are estimates of the farm share of individual foods. If a policymaker were interested in the cost of marketing wheat that is used to produce bread, for example, he or she might need an estimate of the farm share of a loaf of bread.

By themselves, estimates of the farm share of individual commodities are not always sufficient. A dairy cooperative, for example, might be less interested in the farm share of the retail price of cheese and yogurt, viewed as individual products, than in a composite estimate of the farm share of all dairy products.

Individual foods must be grouped into baskets in order to provide an estimate of the farm share of a commodity group such as dairy foods. For the market basket data series, ERS researchers have grouped foods into baskets according to what a typical American household buys at retail in 1 year's time. Estimates of farm share are then based on a comparison of the retail cost of these "market baskets" with the revenues received by farmers for a corresponding agricultural basket.

To identify agricultural baskets, we rely on conversion factors specifying the amounts of agricultural goods needed to produce specific retail foods. For fresh fruits and fresh vegetables, these conversion factors inflate the retail quantity by the amount necessary to compensate for waste and shrinkage that occurs as goods are prepared for presentation in retail stores. For example, ERS estimates that farmers must supply 1.031 pounds of carrots for marketers to provide 1 pound at retail. However, for more highly processed foods, the calculations can be complex and involve more than one commodity. For example, to manufacture some dairy products, sugar must be added to milk.

Estimates of farm shares are provided for nine major commodity groups: meats, poultry, eggs, dairy products, fats and oils, fresh fruits, fresh vegetables, processed fruits and vegetables, and bakery and cereal products.

A review of the market basket data series is now underway. For each commodity group, we will weigh the value of reporting estimates of the farm share of baskets relative to reporting estimates of the farm share of individual, illustrative foods. We will also consider the availability of conversion factors.

The market basket data series is available on the ERS website at http://www.ers.usda.gov/Briefing/FoodPriceSpreads/. ERS and its predecessor agencies have long produced data products comparing retail food prices with farm gate prices, including, for example, *The Margin Between Farm Prices and Retail Prices of Ten Foods* by Frederick V. Waugh, published in 1935.

In addition to the market basket data series, another ERS data series estimates the farm share of retail cuts of beef and pork. However, this series is not based on a basket of foods typically bought by households at retail. It is based on the cuts from a standard animal, cut up and retailed in a standard way.

Still another data series, the marketing bill, was introduced in the 1980s to provide an estimate of the farm share of all foods, including foods marketed for away-from-home consumption. It also breaks down the contribution of the food marketing system into the portions attributable to labor, packaging, transportation, and other major marketing inputs.

Two commodity groups—fresh fruits and fresh vegetables—serve as case studies for evaluating the ERS market basket data series. This evaluation begins with a brief examination of recent changes in shopping and eating patterns, which are likely to have influenced the mix of fresh fruits and fresh vegetables that households tend to buy at retail. Then, I updated the baskets to represent what households bought between 1999 and 2003 for each commodity group. Compared with the 1982-84 baskets, the updated baskets contain a greater variety of fresh fruits and fresh vegetables. Finally, I calculated new estimates of the farm share using the new baskets and compared them with existing estimates.

Changes in Fresh Fruit and Vegetable Marketing

Over the past few decades, several factors have likely affected the mix of fresh fruits and fresh vegetables that a typical American household tends to buy at retail.

Supermarkets are stocking a greater quantity and variety of fresh fruits and fresh vegetables. Kaufman et al. report that supermarkets expanded their produce departments from 4,817 to 5,140 square feet, on average, between 1987 and 1997. Added space helped them increase the number of stock-keeping units (SKUs) from 173 to 335 over the same 10-year period. Additional SKUs included ready-to-eat fresh vegetables such as bagged baby carrots, salads, and broccoli florets. The growth in SKUs was also driven by the year-round supply of fresh items that had been available only seasonally. Significant changes in grower-shipper operations have allowed these companies to supply grapes and other perishables year round (Kaufman et al.; Wilson and Thompson).

Data on food availability show not only an increased supply of fresh fruits and fresh vegetables, but also changes in the mix of items within each commodity group. For example, between 1982 and 2003, the supply of fresh vegetables per capita increased from 150.9 pounds to 199.8 pounds (note: figures do not include melons). As shown in table 1, some traditional varieties also lost share to specialty items. For example, although the amount of head lettuce available for consumption did not increase, there were increases in the supply of asparagus (0.6 lb), bell peppers (3.9 lb), broccoli (3.5 lb), and romaine lettuce (about 7.9 lb).[2]

[2]The growth in the supply of romaine lettuce is a comparison of 1985 and 2003. Data on food availability did not include romaine lettuce prior to 1985.

Table 1
Quantities available for consumption (per capita) have increased for many types of fresh vegetables and fresh fruits, 1982 versus 2003[1]

Vegetable	1982	2003	Fruit	1982	2003
	Pounds			*Pounds*	
Asparagus	0.4	1.0	Apples	17.7	17.1
Bell peppers[2]	3.0	6.9	Cantaloupe	7.7	10.8
Broccoli	2.0	5.5	Cherries	0.5	1.0
Cabbage	8.6	7.5	Grapefruit	7.2	4.1
Carrots	6.6	8.8	Grapes	5.8	7.7
Cauliflower	1.3	1.6	Honeydew melon	1.8	2.2
Celery[2]	7.4	6.3	Kiwifruit	0.1	0.4
Corn on the cob	6.0	9.5	Lemons	2.1	3.3
Cucumbers	4.2	6.1	Oranges[3]	13.8	14.6
Head lettuce	24.9	22.2	Peaches & nectarines	5.3	5.2
Romaine lettuce	3.3*	11.2	Pears	2.9	3.1
Mushrooms	1.4	2.6	Fresh prunes & plums	1.1	1.2
Onions[2]	12.2	19.5	Strawberries	2.4	5.3
Potatoes	47.1	47.2	Watermelon	12.5	13.6
Sweet potatoes[2]	5.4	4.7			
Tomatoes	12.9	19.5			

*Now a major item, USDA did not include romaine lettuce in the data series until 1985.
[1] Figures include quantities marketed for both at-home and away-from-home consumption.
[2] Dual-use crops (move into both fresh and processing markets). Per capita data do not distinguish between uses.
[3] Includes tangerines, temples, tangelos, and mandarins.
Source: USDA/Economic Research Service. Food consumption (per capita) data system: http://www.ers.usda.gov/data/foodconsumption/

By contrast, other trends may have reduced the quantities of fresh fruits and fresh vegetables bought by a representative household for at-home consumption. Eating away from home is one notable phenomenon. Restaurant foods account for a growing share of the typical American's total caloric intake, increasing from around 18 percent in the late 1970s to about 32 percent in the late 1990s (Guthrie et al.). Decreasing household size is another of these phenomena. The average household now contains 2.5 people, compared with 2.8 people in 1980 (Cromartie).

What effects have these changes in shopping and eating habits had on the mix of foods that a typical household tends to buy at retail? To answer this question, I review how consumer baskets are created, and then update the consumer baskets for fresh fruits and fresh vegetables according to what households have been buying more recently. I also compare estimates of farm contribution based on the existing baskets with estimates based on the updated baskets.[3]

[3]Farm contribution has been estimated for consumer baskets sold at retail as long ago as 1913. At various points in time, ERS researchers have revised the contents of the consumer baskets as well as the quantities in the corresponding agricultural baskets.

Consumer Baskets Reflect What Households Buy at Retail

Farm share is estimated for a basket of foods that is representative of what a typical American household buys at retail over 1 year. To identify the consumer baskets behind the existing data series, ERS researchers used data collected by the Bureau of Labor Statistics (BLS) to maintain the Consumer Price Index (CPI).

For fresh vegetables, for example, BLS data were used to determine how much money a representative household spent on the commodity group in 1982-84. These expenditures were then allocated over a group of fresh vegetables selected for inclusion in the consumer basket, such as potatoes and iceberg lettuce. Other types of fresh vegetables, including leafy lettuces, were excluded from the basket. Expenditures on a food included in the basket account for money spent by the representative household on that particular food as well as spending for similar omitted foods. For example, spending for iceberg lettuce exceeds what households spent on iceberg lettuce, on average, because those expenditures also represent spending on omitted leafy lettuces. Finally, given expenditures, the quantities in the consumer basket were estimated as the ratio of expenditures to 1982-84 retail prices.

The 1982-84 consumer baskets for fresh vegetables and fresh fruits contain eight and nine items, respectively (table 2). The existing consumer basket for fresh vegetables contains potatoes, sweet potatoes, head lettuce, tomatoes, carrots, celery, onions, and corn on the cob. The basket for fresh fruits contains apples, oranges, lemons, grapefruits, pears, strawberries, peaches, cantaloupes, and grapes.

These consumer baskets are constructed to monitor marketing costs, not international trade flows. On the one hand, we exclude foods derived from agricultural commodities that are almost entirely imported. For example, bananas have been excluded from the consumer basket for fresh fruits. On the other hand, grapes, strawberries, and cantaloupes have been included in proportions reflective of what American households tend to have bought at

Table 2
Consumer baskets behind the updated series (1999-2003) contain a greater variety of foods than baskets behind the existing data series (1982-84)

Vegetables	Quantity (1982-84)	Quantity (1999-2003)	Fruit	Quantity (1982-84)	Quantity (1999-2003)
	Pounds			*Pounds*	
Asparagus	--	2.00	Apples	41.7	34.07
Bell peppers	--	6.47	Cantaloupe	8.8	11.25
Broccoli	--	6.71	Cherries	--	2.11
Cabbage	--	7.51	Grapefruit	13	15.08
Carrots	20.2	21.11	Grapes	14.7	15.90
Cauliflower	--	2.19	Honeydew melon	--	1.81
Celery	20.2	5.34	Kiwifruit	--	0.91
Corn on the cob	14.9	4.38	Lemons	6.9	6.02
Cucumber	--	6.80	Oranges	39.8	25.02
Iceberg lettuce	30.3	15.37	Peaches	11.1	8.87
Agaricus mushrooms	--	3.11	Pears	5	3.87
Onions	49.2	24.22	Plums	--	2.47
Potatoes	81.4	82.92	Strawberries	3.4	8.27
Romaine lettuce	--	7.96	Watermelon	--	19.75
Sweet potatoes	8.5	4.67			
Tomatoes	25.9	20.90			

-- = This item is not included in the existing (1982-84) market basket data series.
Source: USDA/Economic Research Service.

retail over 1 year. Though a significant quantity of each commodity is imported, domestic production is still sufficiently large that American farmers could produce the commodities used by marketers to supply the foods in the consumer baskets.

The amount of a food in a consumer basket may exceed what typical households are likely to have bought, on average. This result, too, stems from basket construction. As noted earlier, expenditures on foods included in a basket account for expenditures not only on those items but also on excluded foods. For example, as table 2 shows, the 1982-84 consumer basket for fresh vegetables contains 49.2 pounds of onions. According to table 1, only 12.2 pounds of fresh onion were available for consumption per person in 1982, or about 34.16 pounds per household, since the average household contained about 2.8 people at that time (Cromartie).[4]

[4]The discrepancy is even greater than it may at first appear. Food availability figures include foods that are marketed for both at-home and away-from-home consumption. Undoubtedly, some of the 12.2 pounds of fresh onions available per person were marketed for away-from-home consumption, and were therefore not available for marketing for at-home consumption.

Calculating Updated Consumer Baskets

For the updated data series, I created consumer baskets for fresh vegetables and fresh fruits to represent what households bought for at-home consumption in 1999 and 2003. The final baskets are an average of the 1999 and 2003 baskets.

Calculations for the updated baskets use data from the Consumer Expenditure (CE) Survey. The CE is administered by the Census Bureau for the BLS. These data are then used by BLS to calculate expenditure weights for the Consumer Price Index (see box, "Methodology for Calculating CPI"). Each year, in the diary section of the CE, households report their food expenditures for 2 weeks. For example, in 1999, households spent $148.51 for fresh vegetables, including $18.92 for lettuce, $26.91 for tomatoes, $28.35 for potatoes, and $74.33 for "other fresh vegetables," on average. Prior to 1999, diary sample sizes were around 5,000 households. Since then, they have numbered approximately 7,500.

Because the CE contains no information on prices or quantities purchased, I augmented the CE with ACNeilsen "Homescan" data.[5] ACNeilsen's consumer panel households keep a record of their purchases at retail foodstores using a scanner installed in their home. Upon returning from a shopping trip, panelists re-scan purchased items or manually enter information on products lacking a bar code. Thus, these data contain information on prices paid and quantities purchased of individual fresh fruits and fresh vegetables. The sample available for this study contains data for 7,200 households in 1999 and 8,833 households in 2003.

[5]These data include a weight for matching the income and demographic characteristics of the sample with the characteristics of the population of the United States. I use that weight in all calculations.

Consumer baskets were updated using both sets of data. For example, based on the ACNeilsen data, a representative household split its CE expenditures of $18.92 for lettuce into $11.73 for iceberg and $7.19 for romaine ("Iceberg" lettuce represents all purchases of head lettuce, which accounts for about 62 percent of the value of all lettuce purchased by the ACNeilsen households; "Romaine" represents all purchases of leafy lettuce.). Using ACNeilsen national average prices, I further estimated quantities purchased.[6] For example, since iceberg lettuce averaged $0.78/lb, I estimated that a representative household bought 15.04 lb with its $11.73.

[6]Prices were estimated as the ratio of expenditures to pounds purchased (also known as unit values).

A similar process was used to estimate purchased quantities of fresh potatoes, fresh tomatoes, and "other fresh vegetables." For selecting items to represent "other fresh vegetables," I first used the ACNeilsen data to rank foods with the potential for inclusion by expenditure share, then selected the top 12. I then divided the $74.33 spent by households in the CE on other fresh vegetables among the selected 12.[7] For example, since broccoli accounted for 7.46 percent of what panelists in the ACNeilsen sample spent on the 12 "other fresh vegetables," I allocated 7.46 percent of the $74.33 spent by households on other fresh vegetables in the CE to expenditures on broccoli, which totaled $5.55. Because the price of broccoli averaged $0.88 per pound at retail, I inferred that a representative household bought 6.3 pounds.

[7]Despite expenditure ranking, some fresh fruits were excluded from the fresh fruit consumer basket because they were largely imported (including bananas, mango, limes, and pineapples), or because conversion factors were not available for calculating farm weights (blueberries).

The estimated contents of the consumer basket are not unique, and alternative baskets could have been created. For instance, instead of choosing 12

items to represent "other fresh vegetables," it would have been equally reasonable to choose 10 or 14. Thus, to test the robustness of results, I experimented with consumer basket contents. In one experiment, asparagus was removed from the consumer basket while spinach was added in another. Estimates of the farm share changed by less than 1 percent whenever such changes were made.[8]

The consumer basket only contains whole vegetables, whereas food marketers now offer ready-to-eat items that have been prepared in various ways (cutting, chopping, etc.). To again gauge the robustness of results, I divided expenditures on broccoli and cauliflower into heads and florets, and expenditures on carrots into whole and ready-to-eat carrots (e.g., baby, cut, shredded, and peeled). In the ACNeilsen sample, florets and heads account for 44 percent and 56 percent, respectively, of expenditures on broccoli, so the $5.55 spent by a representative household on all broccoli was divided between each type according to these expenditure shares. Average prices for the two forms of broccoli were then calculated from the ACNeilsen data and used to infer quantities of florets and heads purchased at retail. The same procedures were followed for cauliflower florets and ready-to-eat carrots.

Incorporating ready-to-eat broccoli, cauliflower, and carrots into the consumer basket for fresh vegetables had little impact on estimates. The inclusion of these items caused a less than 1-percent change in the farm share estimates.[9]

Finally, as noted earlier, the above procedures were repeated to create a basket of fresh vegetables representative of household purchases in 2003. A final basket was then constructed by averaging the contents of the baskets from the 2 separate years.[10]

Quantities of fresh vegetables and fresh fruits in the updated consumer baskets are shown in table 2. Compared with the 1982-84 baskets, but consistent with table 1, the updated baskets contain items now available for consumption in greater quantities, such as asparagus, broccoli, and romaine lettuce. The basket for fresh fruits adds kiwifruit, cherries, and plums.[11]

Farm Baskets Contain What is Needed to Produce Consumer Baskets

Estimates of farm share are based on a comparison of the retail price of consumer baskets with revenues received by farmers for the contents of a corresponding agricultural basket. The contents of these agricultural baskets are determined by estimating the amount of farm products marketers need to produce the consumer baskets. That is accomplished by multiplying retail quantities by conversion factors. For the case of fresh fruits and fresh vegetables, these conversion factors inflate the retail quantity by the amount necessary to compensate for waste and shrinkage that occurs as goods are prepared for presentation in retail stores.[12]

The agricultural baskets for fresh fruits and fresh vegetables behind the 1982-84 data series are shown in table 3, including the contents of the consumer baskets, the conversion factors, and corresponding quantities of

[8] Changes included adding and removing one or two items representing a household's expenditures on "other fresh vegetables." However, only items representing a small share of a typical household's expenditures were removed or added. For instance, the removal of both mushrooms and bell peppers from the consumer basket could impact the estimate of farm contribution. Of the items representing other fresh vegetables, mushrooms and bell peppers command the third and fourth largest shares, respectively, of household expenditures, on average.

[9] This suggests that marketing costs for additional preparation may be offset by reductions in other marketing costs, such as those for transportation. In fact, for broccoli and cauliflower, Reed et al. find that buying florets is less expensive per serving than buying heads. Servings include only edible portions, and more servings are obtained per pound of florets than per pound of heads.

[10] For fresh vegetables, the baskets for the 2 years were similar. For fresh fruits, there were differences in the amount of citrus fruit purchased in the 2 years, possibly due to high prices for citrus fruit in 1999. However, estimates of farm share were robust to whether the contents of the baskets from the separate years were averaged, or a basket based on only 1 of the 2 years was used.

[11] As they contain a greater number of items, the updated baskets are also closer to the consumer baskets behind the CPI (see box, "Methodology for Calculating CPI").

[12] Conversion factors for more highly processed foods are more complex and, generally speaking, involve more than one agricultural commodity. For example, to manufacture some dairy products, sugar is added to milk.

Methodology for Calculating CPI

The Bureau of Labor Statistics (BLS) has developed its own procedures for creating the Consumer Price Index (CPI). When creating consumer baskets for the market basket data series, ERS researchers have sought to maximize the similarity between their baskets and those underlying the CPI. The CPI is used to update the cost of ERS consumer baskets at retail, which requires some correspondence between the two.

To calculate the CPI, the BLS collects prices at retail outlets. That process begins by dividing consumer products into one of 211 strata, called "entry level items" (ELI). For example, lettuce, potatoes, tomatoes, and "other fresh vegetables" are each one of 211 ELI. Goods are then priced at retail outlets across the country. Once an outlet has been selected for pricing a particular ELI, BLS assigns a probability of being sampled to every product at the outlet within the ELI. For instance, broccoli is among "other fresh vegetables." If an outlet had been selected for pricing other fresh vegetables, broccoli would be sampled with a probability equal to its share of that outlet's total sales of other fresh vegetables. Thus, all fresh vegetables are likely to be included in the consumer basket for fresh vegetables behind the CPI.

Based on the price data collected at retail stores, BLS next calculates a basic index for each of its 211 ELI in each of 38 parts of the country. That amounts to 8,018 basic indexes (38 x 211 = 8,018). For example, 38 of the 8,018 basic indexes are for lettuce, including one for the average price of lettuce in the Los Angeles suburbs. Since 1999, the BLS has used a geometric mean to average over food prices. This is designed to overcome a long standing criticism of the CPI that it provides an upper-bound estimate of the rate of inflation.

In a second stage, BLS creates aggregate indexes based on weighted averages of subsets of basic indexes. For example, a national index for lettuce can be created by taking a weighted average of each of the 38 geographic basic indexes for lettuce.

Finally, the CPI for fresh vegetables can be derived by averaging over national indexes for lettuce, potatoes, tomatoes, and other fresh vegetables. Weights are derived from the Consumer Expenditure (CE) Survey and reflect how much American households spend on each type of vegetable. For more information, see Bureau of Labor Statistics, Handbook of Methods.

agricultural goods. As noted above, waste may occur as commodities are shipped and prepared for presentation in retail stores. For example, ERS estimates that farmers must supply 1.031 pounds of carrots for marketers to provide 1 pound at retail. Some carrots may spoil and, perhaps, others may need trimming.

Tables 4 and 5 detail the updated agricultural baskets, based on the 1999-2003 consumer baskets, and the reported conversion factors to adjust for waste. These newer conversion factors are often smaller than the conversion factors behind the 1982-84 data series. For example, the conversion factor for corn on the cob has been reduced from 1.25 to 1.087. This reduction is consistent with improvements in the efficiency of supply chains to reduce waste that occurs as agricultural goods are shipped, processed, and stocked in retail foodstores. All else constant, the newer, smaller conversion factors reduce farm share estimates, since a smaller quantity of agricultural goods is needed to supply any given quantity of food at retail.

Table 3
Consumer and agricultural baskets for fresh vegetables and fresh fruits, 1982-84

	Retail quantity	Conversion factor	Farm quantity
	Pounds		*Pounds**
Fresh vegetables:			
Potatoes	81.4	1.042	84.8
Sweet potatoes	8.5	1.111	9.4
Head lettuce	30.3	1.076	32.6
Tomatoes	25.9	1.176	30.5
Carrots	20.2	1.031	20.8
Celery	20.2	1.075	21.7
Onions	49.2	1.064	52.3
Corn on the cob	14.9	1.250	18.6
Fresh fruits:			
Apples	41.7	1.064	44.4
Oranges	39.8	0.0135	0.5373[1]
Lemons	6.9	0.0140	0.0966[1]
Grapefruits	13.0	0.0131	0.1703[1]
Pears	5.0	1.088	5.4
Strawberries	3.4	1.149	3.9
Peaches	11.1	1.111	12.3
Cantaloupes	8.8	1.149	10.1
Grapes	14.7	1.178	17.3

*Farm quantities are in pounds except where otherwise noted.
[1] Quantity measured in boxes.
Source: USDA/Economic Research Service.

Table 4
Fresh vegetables: updated baskets and conversion factors

	Retail quantity	Conversion factor	Farm quantity
	Pounds		*Pounds*
Asparagus	2.00	1.099	2.19
Bell peppers	6.47	1.087	7.04
Broccoli	6.71	1.087	7.29
Cabbage	7.51	1.075	8.08
Carrots	21.11	1.031	21.76
Cauliflower	2.18	1.087	2.37
Celery	5.34	1.075	5.74
Corn on the cob	4.38	1.087	4.76
Cucumber	6.79	1.087	7.38
Iceberg lettuce	15.37	1.075	16.53
Agaricus mushrooms	3.12	1.064	3.32
Onions	24.22	1.064	25.77
Potatoes	82.92	1.042	86.37
Romaine lettuce	7.97	1.075	8.57
Sweet potatoes	4.67	1.111	5.19
Tomatoes	20.91	1.176	24.60

Source: USDA/Economic Research Service. Conversion factors available via the ERS food consumption (per capita) data system: http://www.ers.usda.gov/data/foodconsumption/.

Table 5
Fresh fruit: updated baskets and conversion factors

	Retail quantity	Conversion factor	Farm quantity
	Pounds		*Pounds**
Apples	34.07	1.042	35.49
Cantaloupe	11.25	1.087	12.23
Cherries	2.11	1.087	2.29
Grapefruit	15.07	1.031	15.54
Grapes	15.89	1.099	17.47
Honeydew melon	1.80	1.087	1.96
Kiwifruit	0.91	1.099	1.00
Lemons	6.01	1.042	6.27
Oranges	25.02	1.031	25.79
Peaches	8.87	1.064	9.43
Pears	3.87	1.053	4.07
Plums	2.46	1.053	2.59
Strawberries	8.27	1.087	8.99
Watermelon	19.75	1.111	21.95

Source: USDA/Economic Research Service. Conversion factors available via the ERS food consumption (per capita) data system: http://www.ers.usda.gov/data/foodconsumption/.

Farm Share Calculated

Once the contents of the updated consumer and agricultural baskets have been determined, the formal equation for farm contribution, FC, at time t is

(1)
$$FC_t = \frac{Q'_{ft}P_{ft}}{Q'_{rt}P_{rt}}$$

where Q_{rt} is the vector of food quantities bought at time t, P_{rt} is the vector of unit retail prices for these foods, Q_{ft} is the corresponding vector of quantities of agricultural goods, and P_{ft} is the vector of prices received by farmers per unit for agricultural goods in Q_{ft}.

In contrast to equation 1, for the existing data series, researchers have continued to work with baskets representing what households purchased in 1982-84. Since 1982-84, it has been assumed that $Q_{ft} = Q_f$ and $Q_{rt} = Q_r$, so that equation 1 becomes

(2)
$$FC_t = \frac{Q'_f P_{ft}}{Q'_r P_{rt}}$$

Moreover, assuming consumer baskets are sufficiently similar to the baskets used by the Bureau of Labor Statistics (BLS) to calculate the Consumer Price Index (CPI),[13] equation 2 can be further expressed as

(3)
$$FC_t = \frac{Q'_f P_{ft}}{Q'_r P_{rt}} = \frac{Q'_f P_{ft}}{\left(\frac{Q'_r P_{rt}}{Q'_r P_{r0}}\right)\left(Q'_r P_{r0}\right)}$$

[13]We recognize that our baskets are not constructed in a manner identical to how BLS constructs baskets used to measure the CPI. For example, to construct its basic indexes, BLS uses a geometric mean to average over prices charged for a much wider variety of specific foods.

where $$Q'_r P_{r0}$$

is the retail cost of the consumer basket in the base year of the CPI and

$$\left(\frac{Q'_r P_{rt}}{Q'_r P_{r0}}\right)$$

is the CPI in hundredths for the commodity at time t.[14] This representation of farm contribution is particularly convenient to implement. Researchers do not need to collect prices for individual foods at retail every year. Only the vector of current farm prices, P_{ft}, and the CPI for the food group are required to update the data series. The BLS publishes an annual CPI, including separate indices for major food groups such as fresh vegetables and fresh fruits.

[14]The CPI is reported by BLS in hundredths. For example, if the value of a CPI were 200, then we would understand prices to have doubled since the base year. To estimate the cost in current dollars of a product given its base-year price and this CPI, a researcher would multiply the base-year price by 2, not by 200.

For the current data series, ERS relies on farm prices reported by the National Agricultural Statistical Service (NASS), using an arithmetic mean of monthly NASS prices to calculate the farm value of market baskets. For instance, in 2004, the average price of a pound of fresh tomatoes at the farm gate ranged from a low of about $0.22 in June to a high of about $1.24 in November. High prices in November resulted from severe weather that interrupted tomato production in both Florida and California. The ERS price for fresh tomatoes used in estimating the farm value of the fresh vegetables market basket in 2004 was about $0.47 per pound, a simple average of the 12 prices reported by NASS for each month that year.

NASS data further reflect prices received by farmers for commodities of average quality. For example, if citrus growers export their highest quality products, then NASS prices may overstate what farmers earn for the commodities they sell in the United States. Of course, farmers are likely to receive higher prices for higher quality products, and lower prices for products of below-average quality.[15]

[15]A parallel assumption exists regarding retail prices. For example, both BLS and ACNeilsen average prices may overstate (understate) prices paid by American consumers for foods of domestic origin, if these foods tend to command a lower (higher) price than foods of imported origin.

The existing market basket data series for fresh fruits and fresh vegetables are reproduced in table 6. Estimates of the farm contribution for fresh vegetables in 2004 demonstrate how equation 3 is used to create these data. To begin, the denominator is estimated at $256 based on two pieces of information: first, the CPI for fresh vegetables was 261.2 in 2004; second, the value of the fresh vegetables at retail in the first column of table 3 had been previously estimated at $98.01 in 1982-84.[16] Next, the numerator in equation 3 is estimated at $48.77 by multiplying the quantities in the top part of the third column of table 3 by the appropriate vector of 2004 farm prices.[17] The ratio—or share—is ($48.77/$256) = 19 percent.

[16]Those years currently serve as the base years for the CPI as well as for the ERS market basket data series.

[17]Prices per pound were $0.0704 for potatoes, $0.3041 for sweet potatoes, $0.1708 for lettuce, $0.468 for tomatoes, $0.2103 for carrots, $0.1559 for celery, $0.1585 for onions, and $0.2168 for corn on the cob. These are based on monthly prices published by NASS in *Agricultural Prices,* with the exception of sweet potatoes, which are for cured Louisiana Beauregard as reported in *Fruit and Vegetable Market News*. All prices except potato prices are f.o.b. shipping point, which may include marketing services such as washing and sorting.

Farm Share Calculated for the Updated Data Series

The updated data series is based on different consumer baskets, and uses updated, often smaller, conversion factors to determine the contents of the corresponding agricultural baskets. In addition, I treat 2001 as the base year for the new data series and, in lieu of monthly average prices, use season-average prices.

Table 6
USDA market basket data series for fresh vegetables and fresh fruits[1]

	Fresh vegetables				Fresh fruits			
Year	Retail cost[2,3]	Farm value[2,4]	Farm-retail spread[2,5]	Farm share	Retail cost[2,3]	Farm value[2,4]	Farm-retail spread[2,5]	Farm share
1982	94	95	94	34	100	106	97	33
1983	98	97	98	34	94	80	100	27
1984	108	108	108	34	107	114	103	34
1985	104	93	109	31	118	111	122	30
1986	108	90	117	28	120	104	128	27
1987	122	110	128	31	136	114	146	26
1988	129	106	141	28	145	117	159	25
1989	143	123	153	29	155	109	176	22
1990	151	124	165	28	175	128	196	23
1991	154	111	177	24	200	173	213	27
1992	158	121	177	26	190	122	221	20
1993	168	127	190	26	196	135	224	22
1994	172	118	200	23	209	119	250	18
1995	193	130	226	23	227	136	269	19
1996	189	113	228	20	243	152	285	20
1997	195	119	234	21	245	137	295	18
1998	216	125	263	20	258	141	312	17
1999	209	118	256	19	294	154	359	17
2000	219	121	270	19	284	141	350	16
2001	231	130	282	19	292	146	359	16
2002	245	146	297	20	298	154	364	16
2003	251	150	302	20	309	163	376	17
2004	261	147	320	19	319	201	373	20

[1] Calculated for a market basket of foods bought at retail in a base period, currently 1982-84.
[2] Indices relative to the 1982-84 base.
[3] For fresh vegetables, the retail cost index is the BLS-estimated CPI for fresh vegetables. For fresh fruits, BLS estimates of the CPI are adjusted to remove the effect of changes in the price of bananas, which are not included in the consumer basket since they are not commonly grown in the United States.
[4] A measure of the absolute value of the farm contribution. For fresh vegetables, for example, the value of goods in the agricultural basket is estimated to have been $33.28 in 1982 and $48.77 in 2004, so the farm value index in 2004 was estimated as ($48.77/$33.28) x100 = 146.53.
[5] A measure of the absolute difference between the cost of a consumer basket at retail and a corresponding agricultural basket at the farm gate. For fresh vegetables, for example, the spread between the value of the consumer basket at retail and the farm value of agricultural goods was $256-$48.77 = $207.23 in 2004. This compares with $98.01-$33.28 = $64.73 in 1982. The value of the farm-retail spread index in 2004 is then estimated to be ($207.23/$64.73) x100 = 320.15.
Source: USDA/Economic Research Service. Market basket data series: http://www.ers.usda.gov/Briefing/FoodPriceSpreads/.

For 2001 (the base year), I value the consumer baskets at what households in the Consumer Expenditure (CE) Survey sample spent on the food group, on average, in that year. For fresh vegetables, that was $162. For the cost of this same basket at retail in other years, it is necessary to scale that year's CPI for fresh vegetables by its 2001 value. This scaling is necessary because 1982-84 remains the base period for the CPI as reported by BLS. For example, since the CPI for fresh vegetables was 261.2 in 2004, compared with 230.6 in 2001, I estimate the price of the fresh vegetables market basket in 2004 to be

$$(\$162)\left(\frac{261.2}{230.6}\right) = \$183.50$$

at retail.[18]

Season-average prices are also used to estimate the value of agricultural baskets in lieu of monthly-average prices. Season-average prices are the mean of prices received by farmers, weighted by quantity marketed, not by

[18]The CPI can be scaled about the base year of 2001 by dividing its value in other years by its value in 2001. However, for fresh fruits, bananas are among the entry level items which BLS uses to construct the fresh fruit CPI, while bananas are excluded from the consumer basket. To improve the correspondence between the CPI and the consumer basket, I first estimate the cost of the consumer basket for fresh fruits in 2001 and other years, using the same process described for fresh vegetables, as if bananas were included in the basket. Next, I use the CPI for bananas and expenditures on bananas in 2001 by CE households to estimate the contribution of bananas to the basket in the first part. The difference is taken to be the cost of the consumer basket for fresh fruits at retail.

month. These prices may be less than monthly-average prices if, in any given month, farm prices tend to be inversely related to the amount marketed. For example, as reported by Lucier and Jerardo, the season-average price for fresh tomatoes in 2004 was $0.372 per pound, compared with the arithmetic mean of monthly prices reported by NASS, about $0.47, that is currently being used. As with the smaller conversion factors, using season-average prices could lower estimates of farm shares, if all else were constant.[19]

[19]Season-average prices have also been adjusted to remove marketing services embodied in f.o.b. shipping point prices (see footnote 17).

Farm share estimates based on the updated data series are shown in table 7. To illustrate how these data are calculated using the updated baskets, season-average prices, equation 3, and the CPI by food group, consider how farm contribution is calculated for fresh vegetables for 2004. To begin, as described earlier, the denominator in equation 3 is estimated at

$$(\$162)\left(\frac{261.2}{230.6}\right) = \$183.50$$

For the numerator, I value the farm commodities in table 4 using season-average prices provided by Lucier and Jerardo. For 2004, that value is $43.10. The 2004 farm contribution for fresh vegetables is then $43.10/$183.50 = 23.5 percent.

Table 7
Farm value shares for fresh vegetables and fresh fruits based on market baskets representative of what American households bought for at-home consumption between 1999 and 2003

Year	Fresh vegetables[1]	Fresh fruits[2]
	Percent	
1997	29.7	30.0
1998	27.7	28.2
1999	26.1	28.8
2000	25.5	25.7
2001	27.4	27.9
2002	26.5	29.1
2003	26.1	28.0
2004	23.5	26.6

[1] Calculated using the quantities in table 4. Farm prices are from Lucier and Jerardo.
[2] Calculated using the quantities in table 5. Farm prices for melons are from Lucier and Jerardo. Fruit prices are from Perez and Pollack. Farm prices for grapefruit based on an 85-pound box from Florida. Prices for lemons based on a 76-pound box from Arizona. Prices for oranges based on a 75-pound box of California Navels.
Source: USDA/Economic Research Service.

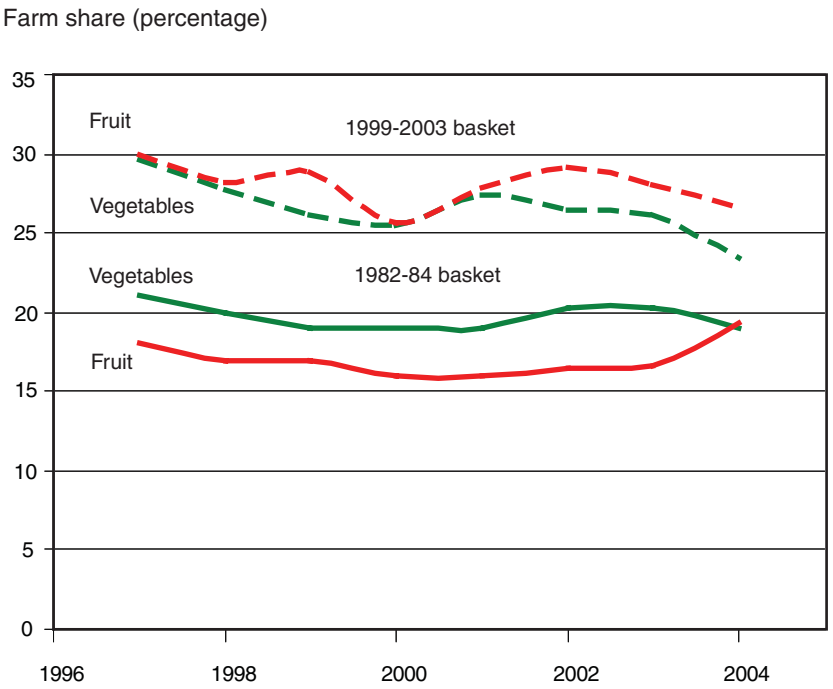
Farm Share Declined Less Than Expected

Farm share estimates based on the updated consumer baskets and the existing data series differ, as shown in table 6, table 7, and figure 1. For 2004, the estimated farm shares are 19 percent for fresh vegetables and 20 percent for fresh fruits, under the current data series. However, using the updated consumer baskets, those same shares are estimated to be 23.5 percent for fresh vegetables and 26.6 percent for fresh fruits. Both estimates are below farm shares reported by the current series for 1982 (34 percent and 33 percent, respectively), but do suggest that the existing series has subsequently overstated the decrease in farm share.

Estimates of farm contribution based on the existing and updated consumer baskets differ, in part, because the latter includes types of fresh vegetables and fresh fruits for which farmers receive relatively high prices. For example, many of the items added to the updated consumer basket for fresh vegetables have relatively high farm prices. The updated basket adds asparagus (with a relatively high farm value in 2004 of $1.22/lb), bell peppers ($0.34/lb), broccoli ($0.33/lb), agaricus mushrooms ($1.14/lb), and romaine lettuce ($0.19/lb). By contrast, celery ($0.15/lb), corn on the cob ($0.21/lb), iceberg lettuce ($0.17/lb), and onions ($0.11/lb) are among the items contained in the updated basket in smaller quantities as compared with the 1982-84 consumer basket. The inclusion of more high-value

Figure 1

Farm share has averaged more than 25 percent of the retail price of fresh fruits and fresh vegetables over most of the past decade, based on the updated baskets, which is greater than estimates based on the existing baskets



Source: Source: USDA/Economic Research Service.

vegetables partly offsets the effects of using newer, smaller conversion factors and season-average prices to calculate farm share.[20]

The existing and updated series also yield different estimates of farm contribution due to differences in the estimated costs of their consumer baskets at retail. As shown in equation 3, the cost of a consumer basket in any year equals the product of the CPI in hundredths and the basket's cost at retail in the base year of the series. By this method, in 2003, the cost of the 1982-84 consumer basket for fresh vegetables is estimated at $245.52, because the CPI for fresh vegetables was 250.5 in 2003 and the retail price of the fresh vegetables in the first column of table 3 had been previously estimated at $98.01 in 1982-84. By contrast, households in the CE sample spent $172 on fresh vegetables in 2003, on average. In fact, the value of the denominator in equation 3 has exceeded the average of what households in the CE spent for fresh vegetables for well over 10 years. The CPI has been widely considered to provide an upper-bound estimate for the change in consumer prices. However, since 1999, BLS has been using a methodology that promises to reduce this bias.[21]

The farm share of retail food prices is decreasing, but the extent of the decrease may differ if estimates are based on what households are currently buying for at-home consumption. The current market basket data series, based on what foods households purchased at retail in 1982-84, does not incorporate changes in how fresh fruits and fresh vegetables are being marketed. In fact, farmers appear to have an opportunity to provide a different mix of fresh vegetables and fresh fruits. Moreover, farmers receive higher prices for many of the items being supplied in greater quantities. However, these findings may not apply to all commodity groups, such as dairy products and meats. It is therefore necessary to evaluate how we estimate farm contribution for these other commodity groups as well.

[20]When estimation is based on the updated baskets, as opposed to the 1982-84 baskets, the value of the numerator in equation 3 is slightly smaller. For 2004, the former is $43.10 and the latter is $48.77. The reason is that I use smaller conversion factors and season-average prices to calculate farm value for the updated series. However, the difference would have been greater, if the updated baskets did not also contain more high-value vegetables.

[21]See box, "Methodology for Calculating CPI," p.9.

References

Bureau of Labor Statistics. *Handbook of Methods*. U.S. Department of Labor. http://www.bls.gov/opub/hom/home.htm.

Food Consumption (per capita) Data System. U.S. Department of Agriculture, Economic Research Service. http://www.ers.usda.gov/data/foodconsumption.

Cromartie, J. "Population Growth and Demographic Change, 1980-2020." *FoodReview*, Spring 2002, pp. 10-12.

Guthrie, J., B. Lin, and E. Frazao. "Role of food prepared away from home in the American diet, 1977-78 versus 1994-96: Changes and consequences." *Journal of Nutrition Education and Behavior*. 34 (2002): 140–150.

Kaufman, P., C. Handy, E. McLaughlin, K. Park, and G. Green. *Understanding the Dynamics of Produce Markets*. U.S. Department of Agriculture, Economic Research Service. Agricultural Information Bulletin No. 758, August 2000.

Kaufman, P. "Food Retailing." In J. Harris, P. Kaufman, S. Martinez, and C. Price (eds.). *The U.S. Food Marketing System, 2002*. U.S. Department of Agriculture, Economic Research Service. Agricultural Economic Report No. 811, August 2002.

Kleckner, D. "A Presidential View. High Price-Spread Is Farmers' Low Point," American Farm Bureau Federation, October 1999. http://www.fb.org/views/prescol/index99.html.

Lucier, G., and A. Jerardo. *Vegetables and Melons Situation and Outlook Yearbook*. VGS-2005. U.S. Department of Agriculture, Economic Research Service. July 2005.

Perez, A. and S. Pollack. *Fruit and Tree Nuts Situation and Outlook Yearbook*. FTS-2005. U.S. Department of Agriculture, Economic Research Service. October 2005.

Reed, J., E. Frazao, and R. Istkowitz. *How Much Do Americans Pay for Fruits and Vegetables?* Agricultural Information Bulletin No. 790. U.S. Department of Agriculture, Economic Research Service. July 2004.

U.S. Department of Agriculture, Economic Research Service. Market basket data series. http://www.ers.usda.gov/Briefing/FoodPriceSpreads.

Wilson, P., and G. Thompson. "Time Integration: Agribusiness Structure for Competitive Advantage." *Review of Agricultural Economics*. 25 (Spring/Summer 2003): 30-43.