



United States Department of Agriculture

# WHAT ARE THE COMPONENTS OF FOOD PRICES? HOW IS U.S. FOOD INFLATION FORECASTED?

Annemarie Kuhns

USDA, Economic Research Service

The Findings and Conclusions in This Preliminary Presentation Have Not Been Formally Disseminated by the U. S. Department of Agriculture and Should Not Be Construed to Represent Any Agency Determination or Policy



# AGENDA

- Food price inflation
- Determinants of food prices
- U.S. retail food price forecasts

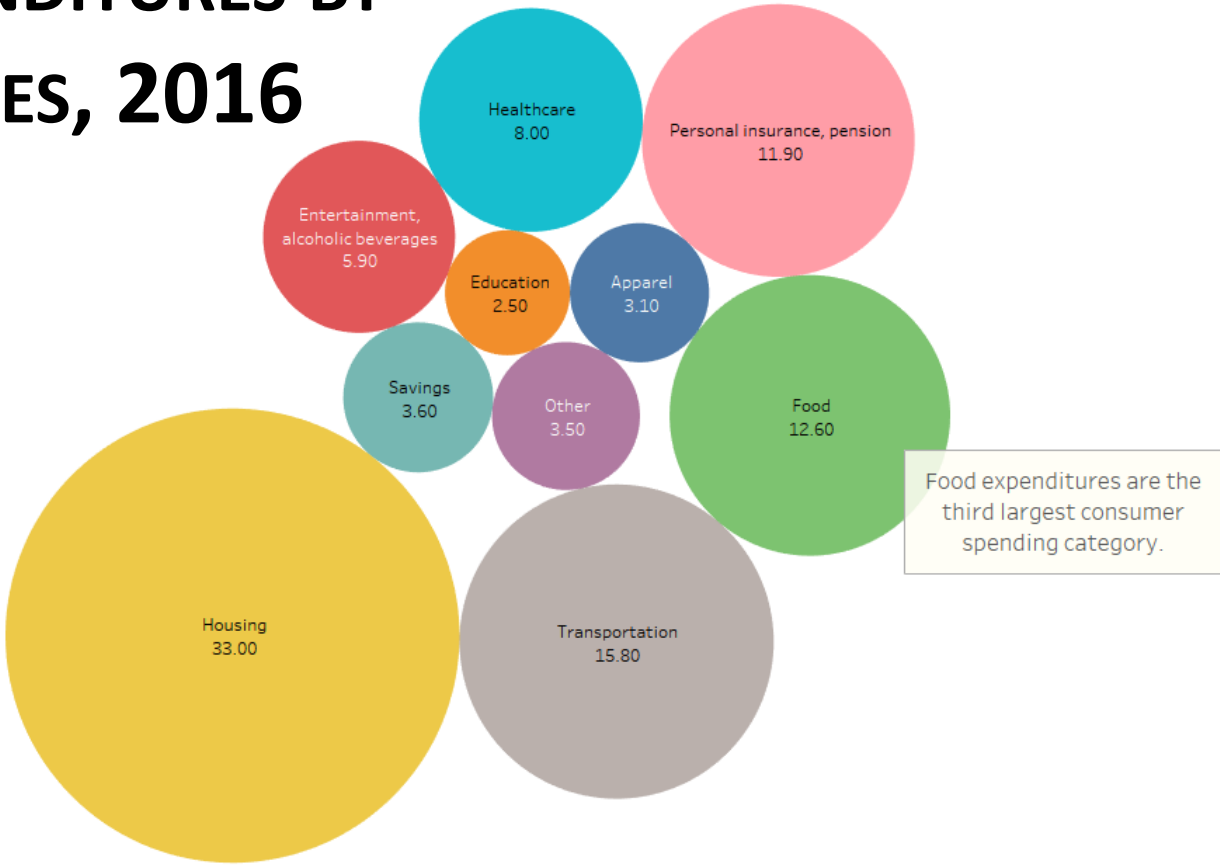


# WHY STUDY FOOD PRICE INFLATION?

- Food price inflation can affect the average consumer's household budget.
- Current food price conditions and inflation forecasts provide useful insights to farmers, food processors, wholesalers, as well as retailers



# SHARE OF U.S. HOUSEHOLD CONSUMER EXPENDITURES BY MAJOR CATEGORIES, 2016

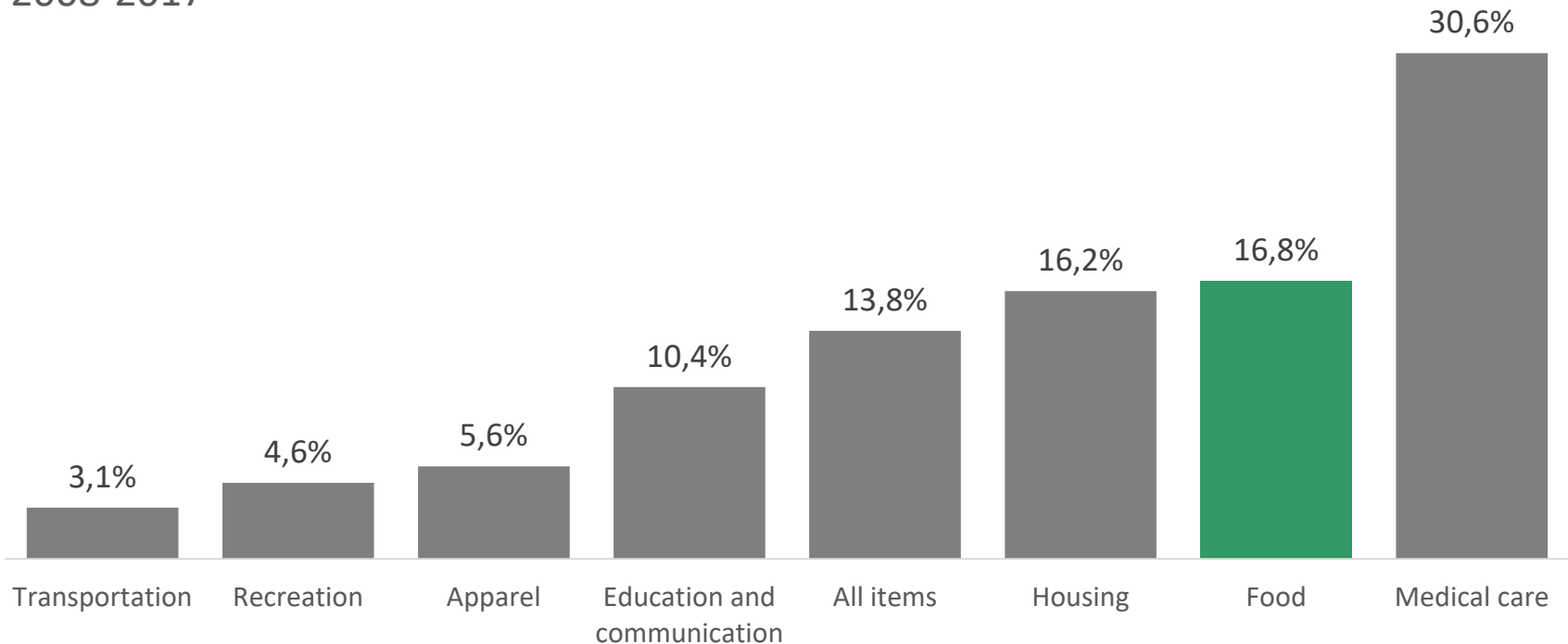


Note: "Other" includes personal care products, tobacco, and miscellaneous expenditures.  
Source: USDA, Economic Research Service using data from the U.S. Bureau of Labor Statistics.



# How U.S. Food Price Inflation Compares to Other Spending Categories

10-year Percent Change in Major U.S. Consumer Price Index Categories, 2008-2017



Source: USDA, Economic Research Service using data from the U.S. Bureau of Labor Statistics.



# HOW DOES THE U.S. MEASURE FOOD PRICE INFLATION?

- The U.S. Bureau of Labor Statistics calculates the Consumer Price Index or CPI.
- The CPI is calculated by:
  - Step 1: A base year is selected
  - Step 2: A basket of goods are selected
  - Step 3: Prices are collected for the same basket of goods

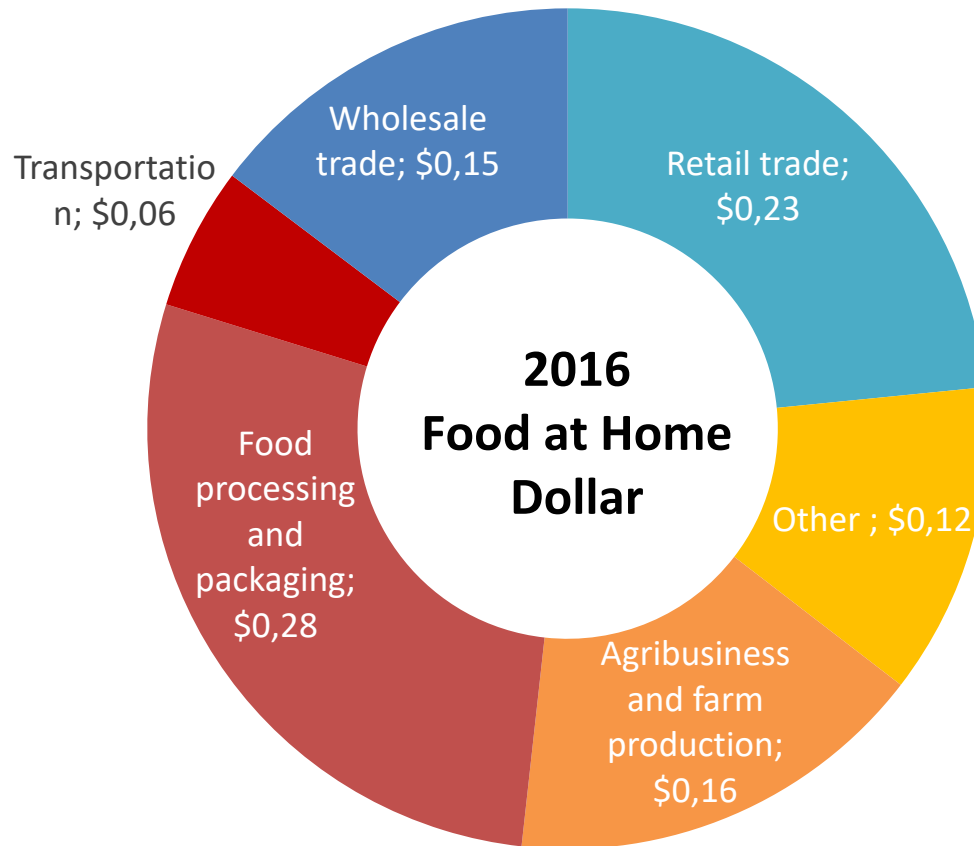




# WHAT ARE THE DETERMINANTS OF FOOD PRICES?



# THE INDUSTRY GROUP VALUE-ADDED SHARES OF THE U.S. FOOD DOLLAR

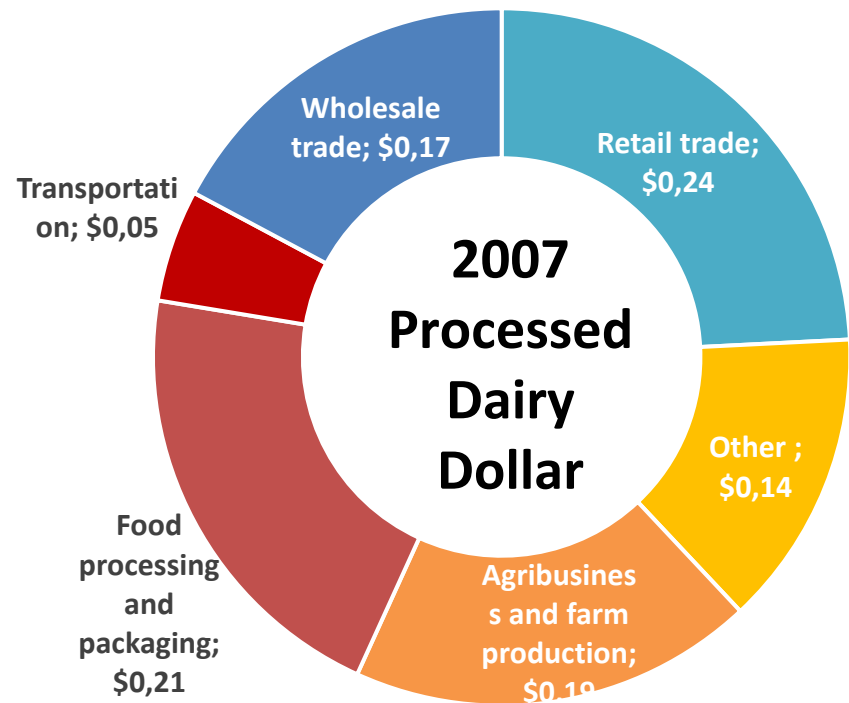
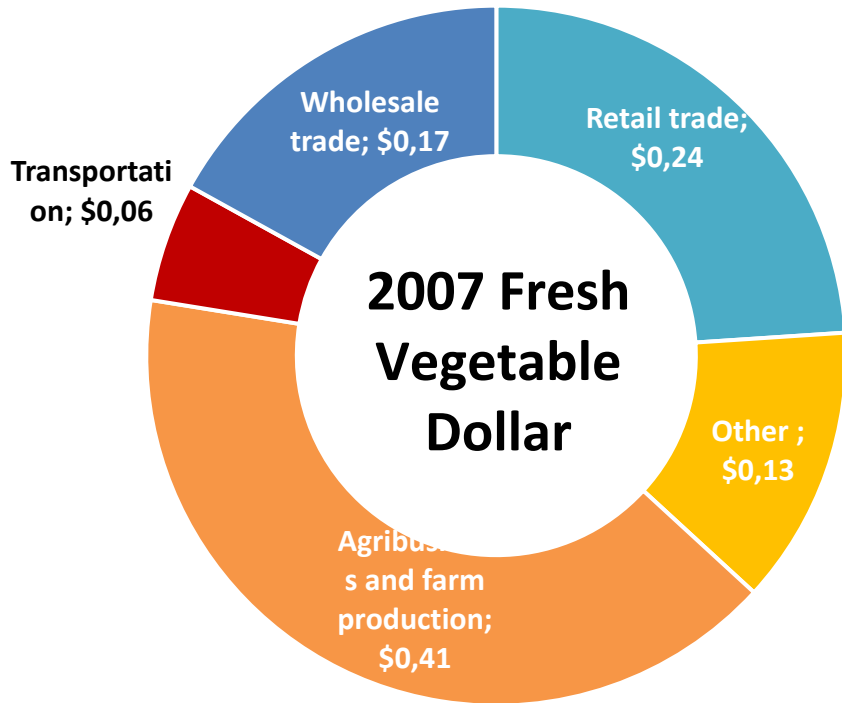


Note: Other includes: foodservices, advertising, legal and accounting, finance and insurance, and energy





# U.S. FOOD DOLLAR VARIES BY CATEGORY

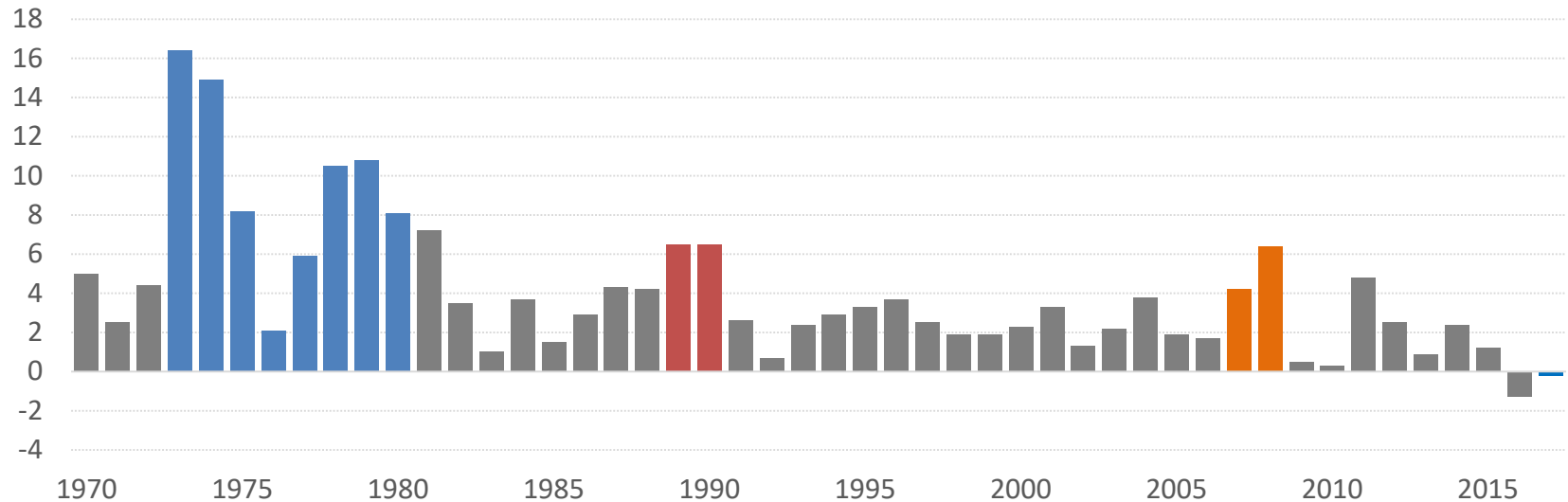


# RETAIL FOOD PRICE COMPONENTS HAVE IMPACTED FOOD PRICE INFLATION IN THE U.S.

- OPEC Oil Crisis: 1970s
- U.S. Drought: Late 1980s
- Spike in world grain, rice, and oilseed prices: 2007/2008

Consumer Price Index for Food At Home, 1970 - 2017

Percent change,  
annual



Source: USDA, Economic Research Service using data from the U.S. Bureau of Labor Statistics.



# OTHER FACTORS THAT AFFECT FOOD PRICES

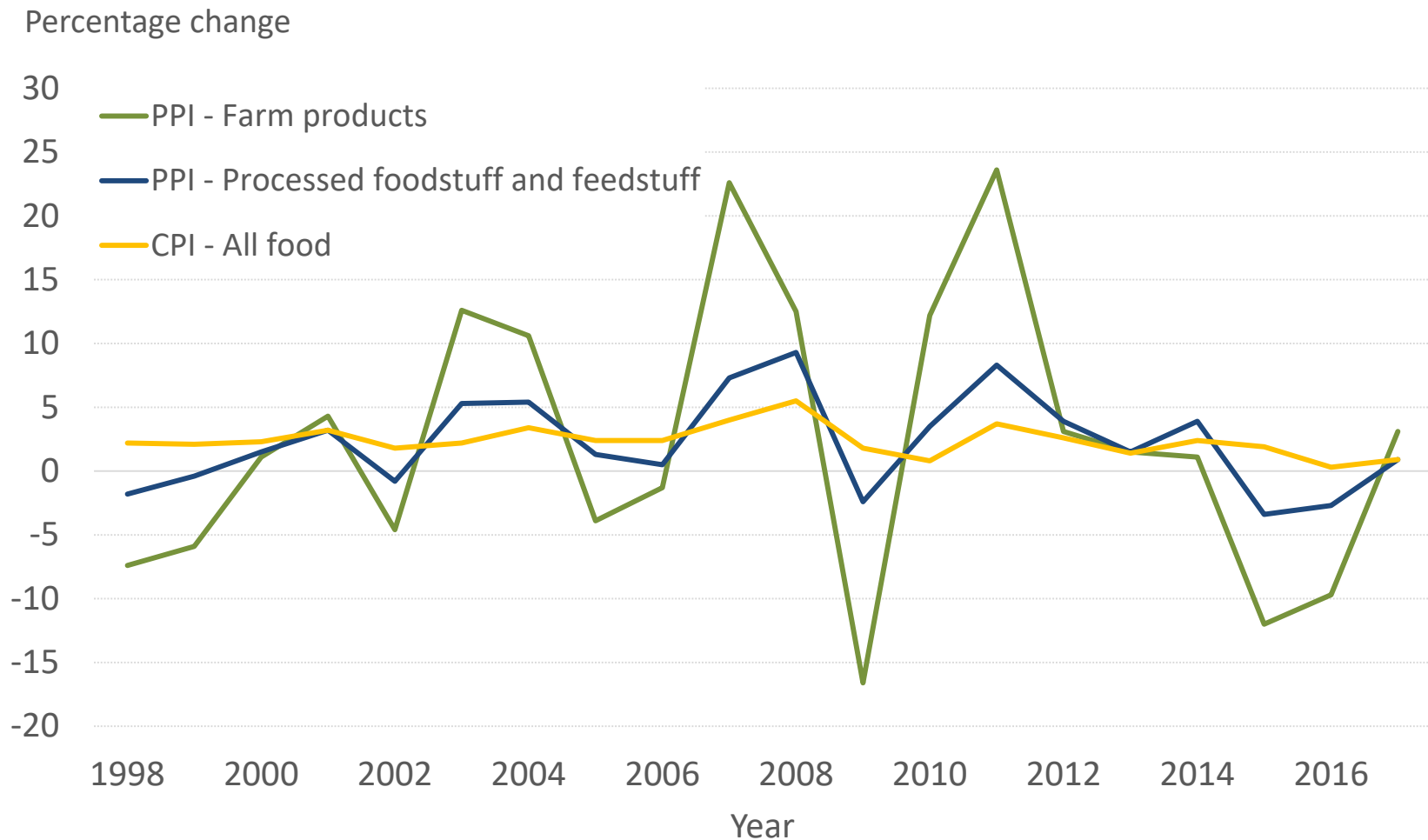
- Consumer demand
- Supply disruptions
- Changes in purchasing power



# HOW DO PRICE CHANGES AT EARLIER STAGES OF PRODUCTION PASS-THROUGH TO RETAIL?



# ANNUAL PERCENT CHANGE IN U.S. PRICE, BY STAGE OF PRODUCTION



Source: USDA, Economic Research Service using Bureau of Labor Statistics data.



# U.S. PASS-THROUGH PERCENTAGES AND TIMES

Retail Category	Time to Pass Through (Months)
Beef	1 to 2
Pork	1 to 3
Poultry	1 to 2
Eggs	3 to 5
Milk	1 to 5
Bread	1 to 6
Oranges	1 to 2
Lettuce	1 to 2

Source: Leibtag, E. "How Much and How Quick? Pass Through of Commodity and Input Cost Changes to Retail Food Prices," American Journal of Agricultural Economics 91: 1462-67, 2009.





# HOW DO WE FORECAST FOOD PRICE INFLATION?



# ABOUT OUR FORECASTS



- 12 – 18 month forecast horizon (new year is added in July)
- Forecast 7 farm, 6 wholesale, and 19 retail food categories

Available at:

<http://www.ers.usda.gov/data-products/food-price-outlook.aspx>



# U.S. FORECASTING METHOD BY CATEGORY

## Autoregressive moving average approach

- Food away from home
- Other meats
- Fish and seafood
- Processed fruits and vegetables
- Sugar and sweets
- Nonalcoholic beverages

## Vertical price transmission ECM approach

- Beef and veal
- Pork
- Poultry
- Dairy products
- Fats and oils
- Cereals and bakery products

## Vertical price transmission ARDL approach

- Eggs
- Fresh fruits
- Fresh vegetables

## Weighted Average

- All food
- Food at home
- Meats, poultry, and fish
- Meats
- Fruits and vegetables
- Fresh fruits and vegetables



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# AUTOREGRESSIVE MOVING AVERAGE APPROACH

- Used for categories subject to data limitations
- Relies on lagged and current values of the CPI being forecasted
- No corresponding PPIs are calculated for these categories



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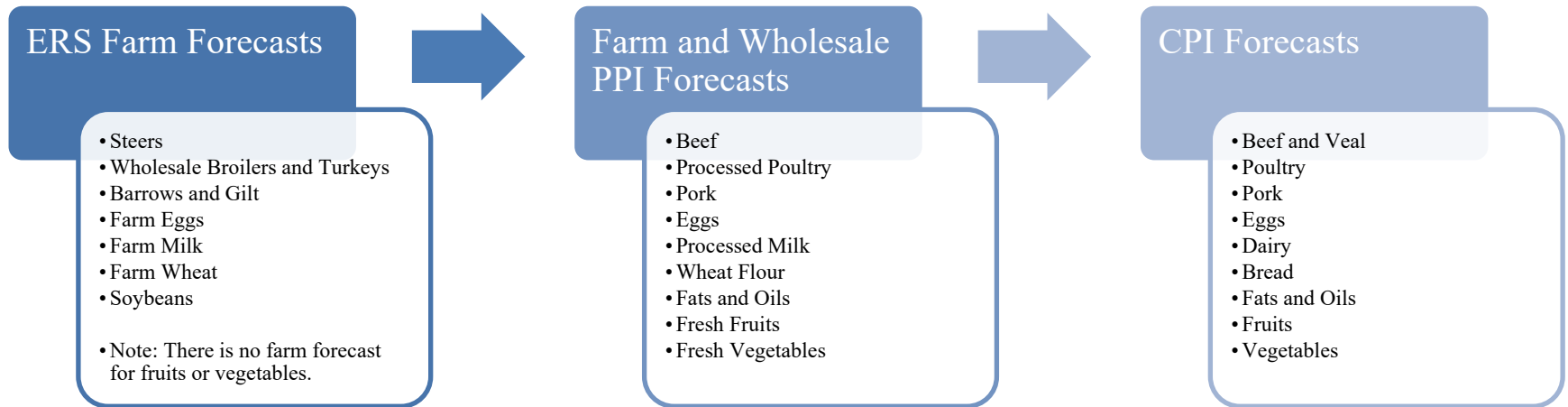
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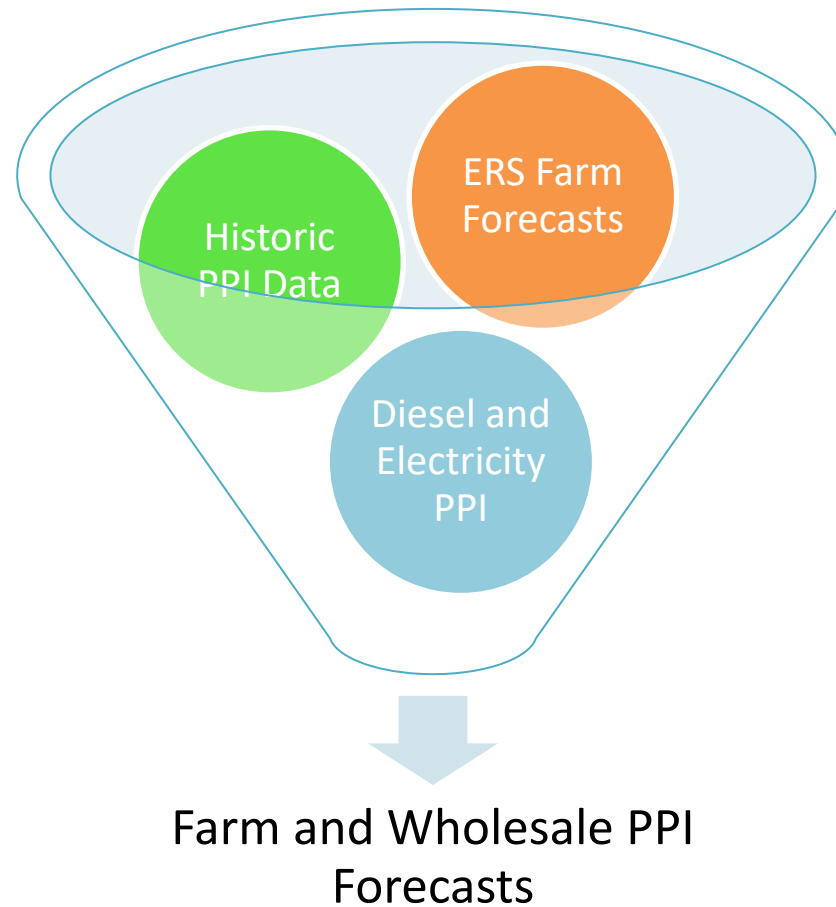


# VERTICAL PRICE TRANSMISSION APPROACH

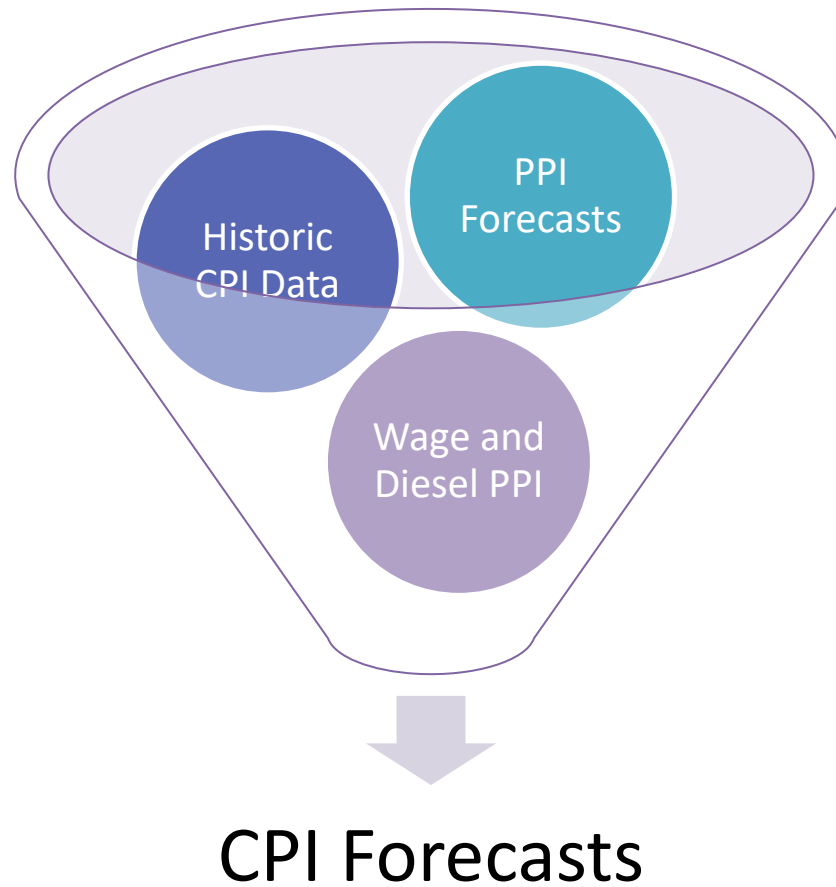
- Incorporates input prices at each stage of production



# FIRST STAGE



# SECOND STAGE



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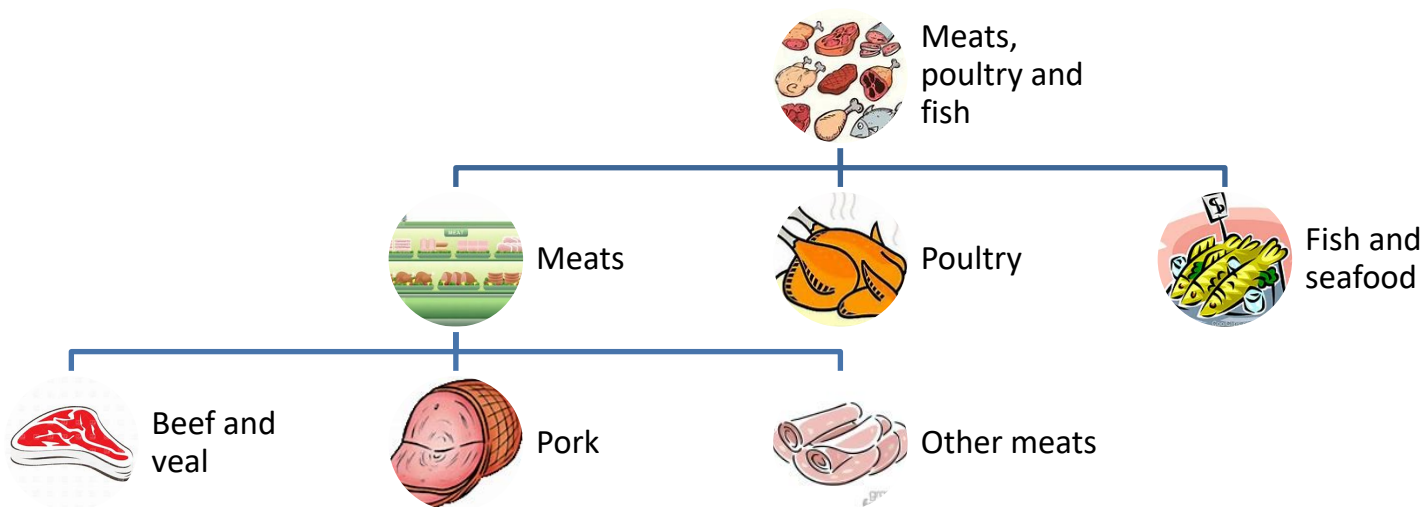
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# WEIGHTED AVERAGE APPROACH

- Applied to forecasts for broader groups



- Weights are drawn from BLS relative importance shares



# PUBLICATION ON FOOD PRICE FORECASTING METHODOLOGY

Provides a detailed outline of U.S. forecasting methodology, along with measures to test the precision of the estimates.





# THANK YOU!

## Contact Information:

**Annemarie Kuhns**

[amkuhns@ers.usda.gov](mailto:amkuhns@ers.usda.gov)

+1 (202)-694-5351



# RESOURCES FOR FOOD PRICE TRENDS RESEARCH

- ERS CPI Forecasts:

<http://www.ers.usda.gov/data-products/food-price-outlook.aspx>

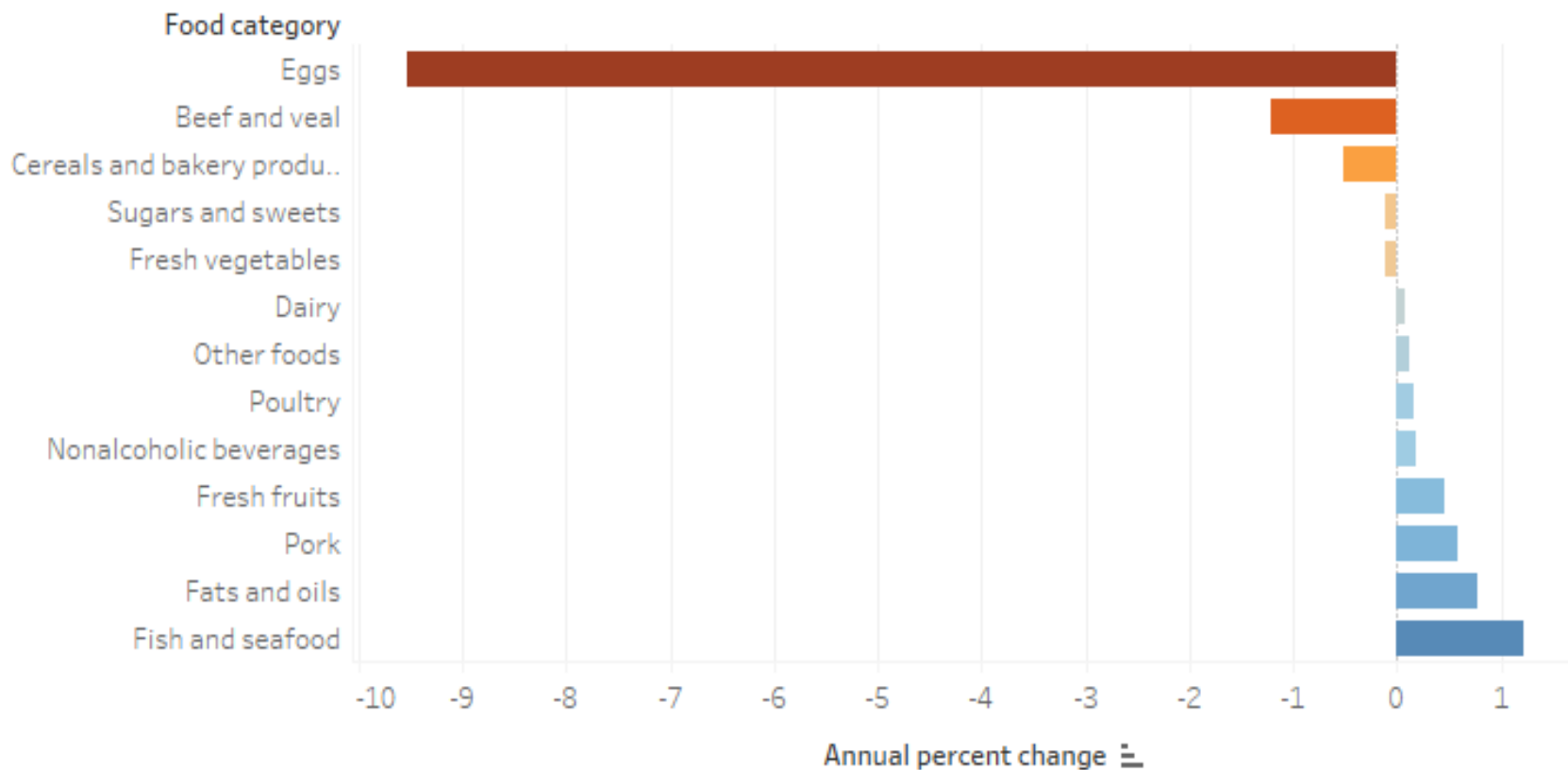
- IMF World Commodity Prices

<http://www.imf.org/external/np/res/commod/index.asp>



# U.S. INFLATION VARIES BY FOOD CATEGORY

ANNUAL PERCENT CHANGE IN FOOD PRICES BY CATEGORY, 2017



Source: USDA, Economic Research Service using Bureau of Labor Statistics data.



# WHAT CAN WE DO TO MEASURE PASS-THROUGH?

- Select data that are representative of the food supply chain.
- Use a autoregressive analysis that accounts for various factors affecting retail food prices as well as lag terms.
- The results aid in the development and analysis of the forecast models by measuring rate and timing of pass-through.

Source: Leibtag, E. "How Much and How Quick? Pass Through of Commodity and Input Cost Changes to Retail Food Prices," *American Journal of Agricultural Economics* 91: 1462-67, 2009.

