Agenda

• Introduction
• Overview of retail food price inflation
• Forecasting methodology
• Application of forecast
• Concluding remarks
Understanding Food Price Inflation

• The average share of income spent on food in 2012 was 12.8% according to the BLS’ Consumer Expenditure Survey (CE)
• Retail food prices have been volatile for the past 6 years
• Retail food prices have increased more relative to other CPI categories
12-Month Percent Change in CPI Over Time By Category

Source: BLS, CPI (1985 - 2012)

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Price Transmission Pathway From Farm to Retail

• Price transmission refers to the measurement of the effect of prices in one market on prices in another market

• Food prices are affected by commodity prices, fuel prices, and surging global demand

• Timing and magnitude of price transmission between the stages of production varies
12-Month Percent Change in Price By Stage of Production

Source: BLS PPI and CPI Data, 1984 - 2012
Monthly Percentage Change, 2012

Source: BLS CPI and PPI, 2012
Effect of Input Prices on the Stages of Production

Many input factors contribute to prices paid for food in the supermarket:

- 11 cents on the retail food dollar goes directly to the farm through the sale of commodities.
- Food processing accounts for another 22 cents on the dollar.
- Transportation and retail costs also play a role.

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Where a Dollar Spent on Food Goes

- **31%** Food Services
- **22%** Retail Trade
- **11%** Packaging
- **12%** Finance and Insurance
- **12%** Advertising, Legal, and Accounting
- **11%** Farm and Agribusiness
- **5%** Food Processing
- **4%** Energy and Transportation

*Source: ERS Food Dollar Series, 2011*

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Forecasting Framework

• Retail prices are dependent on farm and food processing prices

• Multi-stage pass through approach is used
  – **First Stage**: Forecast PPI farm and wholesale prices
  – **Second Stage**: Forecast CPI using forecasted PPI data
First Stage of Pass-Through Model

- Historic PPI Data
- MTED* Farm Forecasts
- Diesel and Electricity PPI

PPI Forecasts

*The Market and Trade Economics Division (MTED) branch of Animal Products and Cost of Production produces commodity forecasts on a quarterly and monthly basis.

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Second Stage of Pass-Through Model

- Historic CPI Data
- PPI Forecasts
- Wage and Diesel PPI

CPI Forecasts
Underlying Framework for Food Price Forecasting at ERS

- Error Correction Model (ECM): two step method
  - Stationarity and cointegration
  - Estimating the cointegrating vector
- Establishing a lag structure
- Test for structural breaks
- Locally weighted scatterplot smoothing (LOWESS) technique
  - Converts quarterly data to a monthly frequency
Output from Forecasts at ERS

Food Outlook Topic Page updated on the 25th of each month

• Analysis of the most recent month of CPI data
  – Focusing on key month-over-month and year-over-year changes

• Annual forecasts, portraying average year-over-year price changes
  – Relying on non-adjusted CPI data
  – Revisions are made as new data becomes available
## Consumer Price Indexes

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<td>All food</td>
<td>100</td>
<td>0.2</td>
<td>1.4</td>
<td>3.7</td>
<td>2.6</td>
<td>1.5 to 2.5</td>
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<td>Food away from home</td>
<td>39.9</td>
<td>0.2</td>
<td>2</td>
<td>2.3</td>
<td>2.8</td>
<td>2.0 to 3.0</td>
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<td>Food at home</td>
<td>60.1</td>
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<td>1</td>
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<td>Meats, poultry, and fish</td>
<td>12.9</td>
<td>0.7</td>
<td>2.2</td>
<td>7.4</td>
<td>3.6</td>
<td>1.5 to 2.5</td>
<td>2.5 to 3.5</td>
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<td>Meats</td>
<td>8.3</td>
<td>0.6</td>
<td>1.3</td>
<td>8.8</td>
<td>3.4</td>
<td>1.0 to 2.0</td>
<td>2.5 to 3.5</td>
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<td>Beef and Veal</td>
<td>3.9</td>
<td>-0.1</td>
<td>1.6</td>
<td>10.2</td>
<td>6.4</td>
<td>2.0 to 3.0</td>
<td>2.5 to 3.5</td>
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<tr>
<td>Pork</td>
<td>2.5</td>
<td>1.4</td>
<td>1.7</td>
<td>8.5</td>
<td>0.3</td>
<td>0.5 to 1.5</td>
<td>2.0 to 3.0</td>
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<tr>
<td>Other meats</td>
<td>1.9</td>
<td>0.9</td>
<td>-0.1</td>
<td>6.4</td>
<td>1.7</td>
<td>-0.5 to 0.5</td>
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<tr>
<td>Poultry</td>
<td>2.4</td>
<td>1.4</td>
<td>5.5</td>
<td>2.9</td>
<td>5.5</td>
<td>3.5 to 4.5</td>
<td>3.0 to 4.0</td>
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<td>Fish and seafood</td>
<td>2.1</td>
<td>0.5</td>
<td>3</td>
<td>7.1</td>
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<td>Eggs</td>
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<td>-1</td>
<td>9.2</td>
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<td>Dairy products</td>
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<td>6.8</td>
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<td>0.0 to 1.0</td>
<td>2.5 to 3.5</td>
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<td>Fats and oils</td>
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<td>0.3</td>
<td>-1.1</td>
<td>9.3</td>
<td>6.1</td>
<td>-1.0 to 0.0</td>
<td>1.5 to 2.5</td>
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<tr>
<td>Fruits and vegetables</td>
<td>9</td>
<td>1</td>
<td>3.6</td>
<td>4.1</td>
<td>-0.6</td>
<td>2.0 to 3.0</td>
<td>2.5 to 3.5</td>
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<tr>
<td>Fresh fruits &amp; vegetables</td>
<td>6.9</td>
<td>1.5</td>
<td>4.5</td>
<td>4.5</td>
<td>-2</td>
<td>2.5 to 3.5</td>
<td>2.5 to 3.5</td>
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<tr>
<td>Fresh fruits</td>
<td>3.7</td>
<td>0.6</td>
<td>1.4</td>
<td>3.3</td>
<td>1</td>
<td>2.0 to 3.0</td>
<td>2.5 to 3.5</td>
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<tr>
<td>Fresh vegetables</td>
<td>3.2</td>
<td>2.4</td>
<td>8.1</td>
<td>5.6</td>
<td>-5.1</td>
<td>2.5 to 3.5</td>
<td>2.0 to 3.0</td>
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<tr>
<td>Processed fruits &amp; vegetables</td>
<td>2.1</td>
<td>-0.3</td>
<td>0.7</td>
<td>2.9</td>
<td>3.8</td>
<td>1.0 to 2.0</td>
<td>2.5 to 3.5</td>
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<tr>
<td>Sugar and sweets</td>
<td>2.1</td>
<td>-1.1</td>
<td>-2.7</td>
<td>3.3</td>
<td>3.3</td>
<td>-2.0 to -1.0</td>
<td>2.0 to 3.0</td>
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<tr>
<td>Cereals and bakery products</td>
<td>8.6</td>
<td>0</td>
<td>1.3</td>
<td>3.9</td>
<td>2.8</td>
<td>1.5 to 2.5</td>
<td>2.0 to 3.0</td>
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<tr>
<td>Nonalcoholic beverages</td>
<td>6.6</td>
<td>0.3</td>
<td>-1</td>
<td>3.2</td>
<td>1.1</td>
<td>-1.0 to 0.0</td>
<td>2.5 to 3.5</td>
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<tr>
<td>Other foods</td>
<td>12</td>
<td>-0.9</td>
<td>-0.4</td>
<td>2.3</td>
<td>3.5</td>
<td>0.0 to 1.0</td>
<td>2.0 to 3.0</td>
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</table>

<sup>1</sup> The relative importance of each category is based on its share of total food expenditures.

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# September 2013 ERS Forecasts

<table>
<thead>
<tr>
<th>Item</th>
<th>Month-to-Month</th>
<th>Year-over-Year</th>
<th>Forecast</th>
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<tbody>
<tr>
<td><strong>Consumer Price Indexes</strong></td>
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<tr>
<td><strong>Percent change</strong></td>
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<tr>
<td>All food</td>
<td>0.2</td>
<td>1.4</td>
<td>1.5 to 2.5</td>
</tr>
<tr>
<td>Food at home</td>
<td>0.2</td>
<td>1</td>
<td>1.0 to 2.0</td>
</tr>
<tr>
<td>Meats, poultry, and fish</td>
<td>0.7</td>
<td>2.2</td>
<td>1.5 to 2.5</td>
</tr>
<tr>
<td>Fruits and vegetables</td>
<td>1</td>
<td>3.6</td>
<td>2.0 to 3.0</td>
</tr>
</tbody>
</table>

*Source: ERS Food Outlook, September 2013*
Food Acquisition by Income Level

• According to the CE, the lowest income households spend between 9.9% to 11.3% of their income on food-at-home

• Those earning over $70K spent an average of 6.5% of their income on food-at-home

• Due to consumption patterns, increases in certain food categories have a greater impact on lower income households
  – Meats, Poultry, Fish, and Eggs
  – Fruits and Vegetables
Food Spending At Home
By Percentage of Income and Income Level

Source: BLS Consumer Expenditure Survey, 2012
2012 Food-at-home Expenditures (%)
By Income Level and Food Category

Source: BLS Consumer Expenditure Survey, 2012
Call for Food Expenditure Forecasts by Income Level

• The Food Marketing Institute recognized a need for impact analysis of food price inflation on food expenditures by income level

• ERS Food Outlook forecasts can be applied to the BLS’ Consumer Expenditure Survey to fill this need
Integrating ERS Forecasts with BLS’ Consumer Expenditure Data

• Apply expected changes to the annual food expenditures for households across income levels
• Used 2013 and 2014 ERS forecasts to extend 2012 Consumer Expenditure Survey expenditures
• Mean forecasts are applied to each food-at-home category by income level to arrive at inflation adjusted expenditures, holding income level and preferences constant
Impact of Predicted Inflation on 2013 and 2014 Food Expenditures
By Income Level

<table>
<thead>
<tr>
<th>Income Level</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
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<tbody>
<tr>
<td>Less than $5K</td>
<td>11.3</td>
<td>11.44</td>
<td>11.76</td>
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<tr>
<td>$5K to $10K</td>
<td>6.5</td>
<td>6.6</td>
<td>6.78</td>
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<tr>
<td>$10K to $15K</td>
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<td>$15K to $20K</td>
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<tr>
<td>$20K to $30K</td>
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<td>$40K to $50K</td>
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<td>$50K to $70K</td>
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<tr>
<td>Over $70K</td>
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Source: ERS calculations using BLS 2012 CE data

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Summary Results

Holding income constant, the share of income spent on food from 2012 to 2014:

• Increased for lowest income households by 0.41 percentage points
• Increased for households earning the highest salaries by 0.28 percentage points
• The disparity was much larger during the food price surge of 2007 - 2008
Resources for Food Price Trends Research

• ERS CPI Forecasts

• New ERS Reports
  http://www.ers.usda.gov/Publications/EIB75/
  http://www.ers.usda.gov/Publications/ERR105/

• BLS CPI, PPI, and Average Price Data
  http://data.bls.gov/PDQ/outside.jsp?survey=ap

• AMS Fruit and Vegetable Report

• IMF World Commodity Prices
Amber Waves magazine presents current ERS economic and policy research on agriculture, food, rural America, and the environment for policymakers, academics and the public.

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Thank you!

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