Using ERS Food Price Forecasts to Estimate Food Expenditures for American Households

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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

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Monthly Percentage Change, 2012

Source: BLS CPI and PPI, 2012

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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
Where a Dollar Spent on Food Goes

- Food Services: 31
- Retail Trade: 11
- Packaging: 9
- Finance and Insurance: 4
- Advertising, Legal, and Accounting: 6
- Farm and Agribusiness: 12
- Food Processing: 22
- Energy and Transportation: 5

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

*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

CPI Forecasts

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

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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
<table>
<thead>
<tr>
<th>Item</th>
<th>Relative importance</th>
<th>Relative Month-to-Month</th>
<th>Year-over-Year</th>
<th>Annual 2011</th>
<th>Annual 2012</th>
<th>Annual 2013</th>
<th>Annual 2014</th>
<th>Forecast 2013</th>
<th>Forecast 2014</th>
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<td>Percent</td>
<td>Percent change</td>
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<td>100</td>
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<td>2.3</td>
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<td>7.4</td>
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<td>3</td>
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<td>4.1</td>
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<td>Fresh fruits &amp; vegetables</td>
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<td>4.5</td>
<td>4.5</td>
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<td>Fresh fruits</td>
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<td>0.6</td>
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<td>Processed fruits &amp; vegetables</td>
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<td>0.7</td>
<td>2.9</td>
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<td>Cereals and bakery products</td>
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<td>Nonalcoholic beverages</td>
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<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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## September 2013 ERS Forecasts

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

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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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<td>$10K to $15K</td>
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<td>$15K to $20K</td>
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<td>$20K to $30K</td>
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<td>$30K to $40K</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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</table>

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

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Thank you!

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