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Food-at-Home Monthly Area Prices: Validating price indexes constructed from retail scanner data

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Food Prices and Forecasting

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*The analysis, findings, and conclusions expressed in this report should not be
attributed to Circana (formerly IRI).*



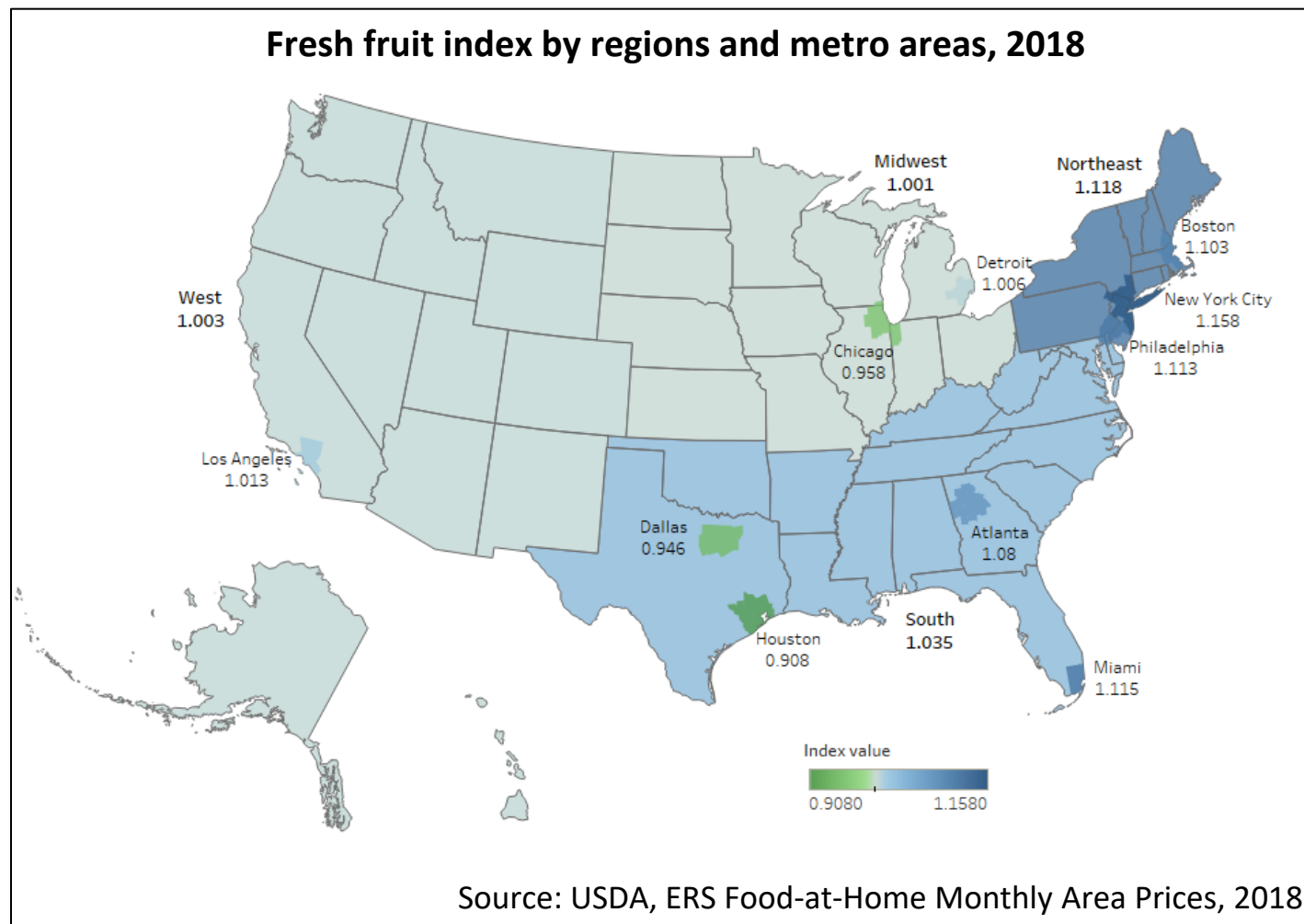
New ERS Food-at-Home Monthly Area Prices (F-MAP) data product provides food prices over time and space

- New public food price data product, developed by ERS and RTI International
- Monthly price measures covering 2012–2018; will be extended to 2022
 - Based on Circana retail scanner data
 - Unit prices standardized to dollars/100-gram basis (mean and SE)
 - Price indexes
- Prices for 90 ERS Food Purchase Groups (EFPG)
- Nationally and for 4 Census Regions and 10 major metropolitan areas
- Successor of the Quarterly Food-at-Home Price Database



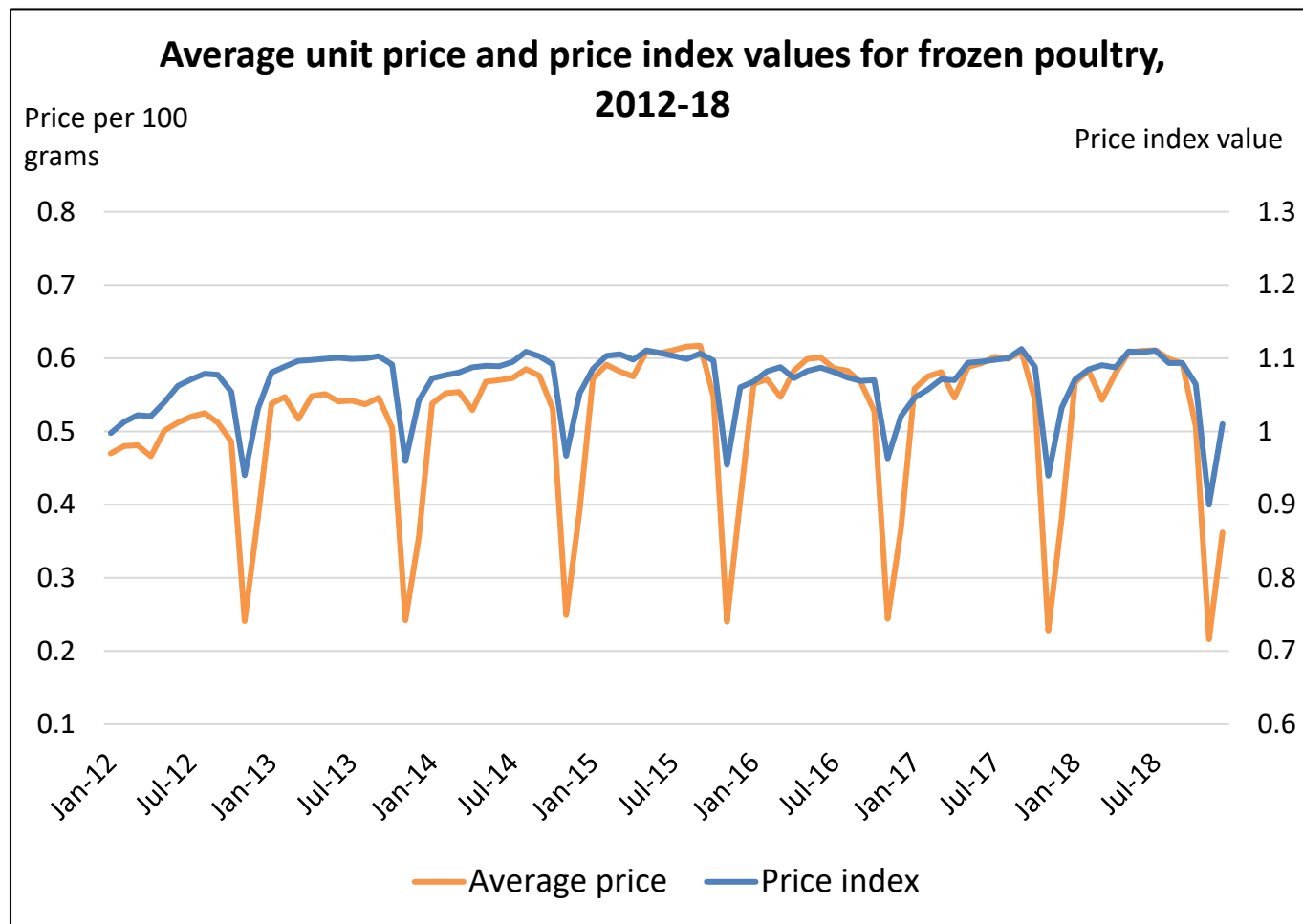
F-MAP contributes new dimensions to the landscape of federal food price datasets

- Geographic detail
 - Prices available sub-nationally
 - Prices comparable across areas



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 - Prices comparable across areas
- Multiple price dimensions
 - Unit prices for point-in-time values
 - Price indexes for change over time



Source: USDA, ERS Food-at-Home Monthly Area Prices, 2012-18

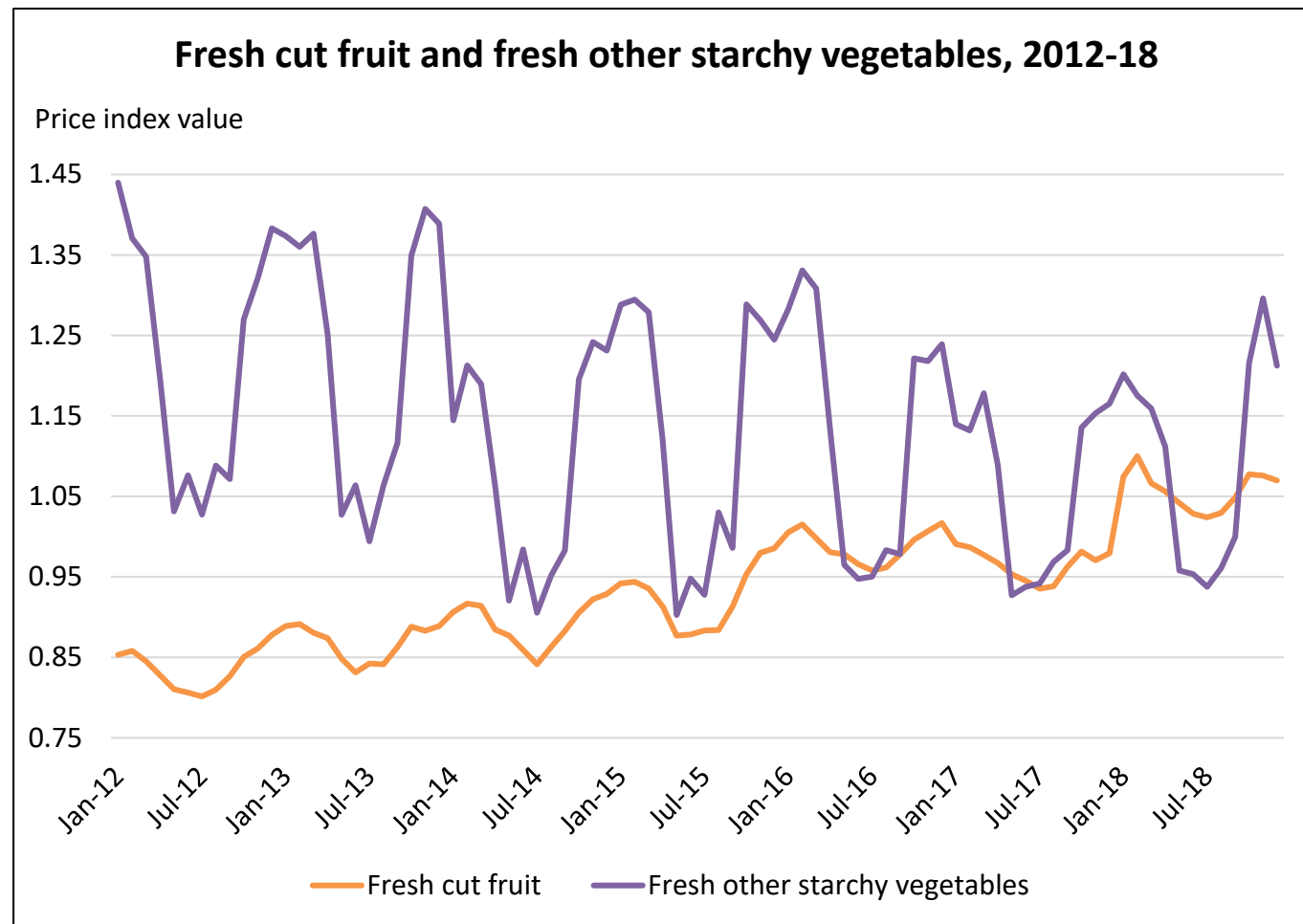


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- Monthly frequency
 - Allows tracking seasonality

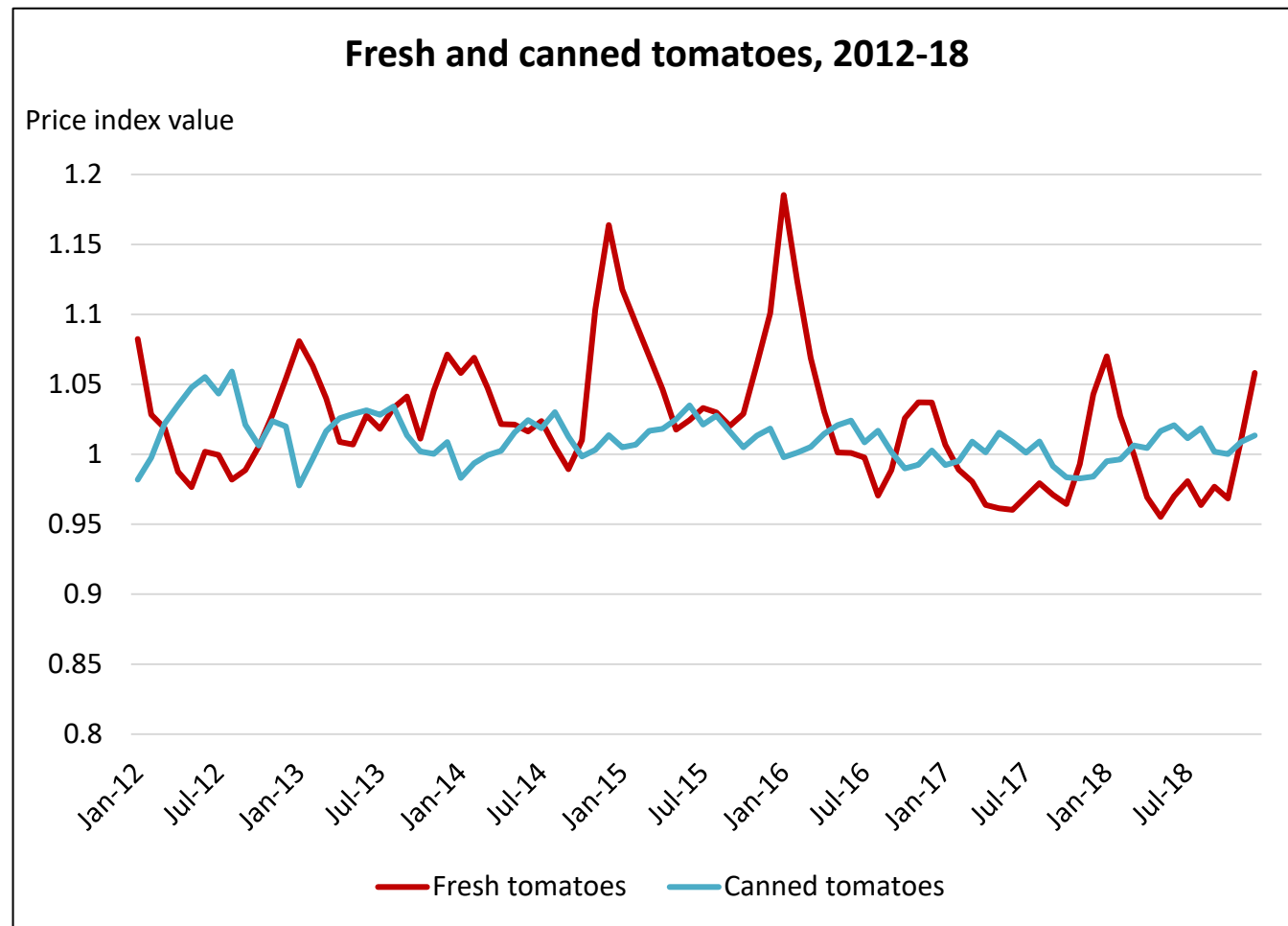


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 - Price indexes for change over time
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 - Allows tracking seasonality
- Prices for ERS Food Purchase Groups (EFPGs)
 - Facilitate food and nutrition research



Source: USDA, ERS Food-at-Home Monthly Area Prices, 2012-18



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ERS Food Purchase Groups (EFPGs)

- EFPGs classify foods based on ingredients, nutrition, and convenience level
- Based in part on *Dietary Guidelines for Americans*
- EFPGs are hierarchical and flexible and F-MAP price data can be aggregated to Tier 1 or Tier 2 categories

Tier 1	Tier 2	Tier 3
Grains	Whole grain	Bread • Rice & pasta • Breakfast grains • Flour, bread mixes, & frozen dough
	Non-whole grain	Bread • Rice & pasta • Breakfast grains • Flour, bread mixes, & frozen dough
Vegetables	Potatoes	Fresh • Canned
	Other starchy	Fresh • Fresh cut • Frozen • Canned
	Tomatoes	Fresh • Canned
	Other red & orange vegetables	Fresh • Fresh cut • Frozen • Canned
	Dark green vegetables	Fresh • Fresh cut • Frozen • Canned
	Beans, lentils, peas & legumes	Fresh/dried • Frozen • Canned
Fruits	Whole fruit	Fresh • Fresh cut • Frozen • Canned • Dried
	100% fruit/vegetable juice	Fresh • Frozen • Canned/shelf-stable
Dairy	Whole milk, yogurt & cream	Milk • Cream & sour cream • Yogurt
	Not whole milk, cream & yogurt	Milk • Cream & sour cream • Yogurt
	Cheese	Cheese & cream cheese • Processed cheese
Meat & protein foods	Red meat	Fresh • Frozen • Canned
	Poultry	Fresh • Frozen • Canned
	Fish & seafood	Fresh • Frozen • Canned
	Nuts, seeds & nut/seed butters	Nuts & seeds • Nut/seed butters & spreads
	Processed meats	
	Egg & egg substitutes	
	Tofu & meat substitutes	
	RTE foods	
Prepared meals, snacks & salads	Frozen/refrigerated RTH foods	
	Shelf-stable RTH foods	
	Shelf-stable meal kits	
	Fats, oils & salad dressings	Fats & oils • Salad dressings
Other foods	Gravies, sauces, condiments & spices	Condiments, gravies & sauces • Dried spices
	Desserts, sweets & candies	Sweeteners • Jellies/jams • Candy • Baked goods • Cake/cookie mixes • Ice cream & milk-based • All other desserts
	Beverages	Sweetened coffee/tea • Unsweetened coffee/tea • Flavored milk • Low-calorie drinks • Other caloric beverages • Alcohol • Water
	Breakfast cereals	Whole grain • All other
	Savory snacks	Whole grain • All other
	Vitamins and supplements	
	Baby formula	
	Infant formula	




Primary F-MAP price index is multilateral Gini-Eltetö-Köves-Szulc (GEKS) index

- Multilateral price index methods are best practice for high frequency transaction data such as scanner data
- Adopted and used for components of CPI calculations by statistical agencies around the world including Australia, United Kingdom, Belgium, and the Netherlands
- F-MAP research series includes 5 additional price indexes for 2016-18 base period:
 - Bilateral: Laspeyres, Paasche, Fisher Ideal, Törnqvist
 - Multilateral: Caves-Christensen-Diewert (CCD)



F-MAP data publicly available for 2012-18 with additional years forthcoming

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Food-at-Home Monthly Area Prices

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Food-at-Home Monthly Area Prices

The Food-at-Home Monthly Area Prices (F-MAP) data product provides monthly food price data over time, across food groupings, and across geographic areas. F-MAP includes monthly prices for 90 food-at-home (FAH) categories across 15 geographic areas of the United States. The F-MAP contains two types of price measures for each food group, geographic area, and month combination: a mean unit value price and a price index. The mean unit value is a per quantity price, where quantity is measured by weight in grams. Price indexes are a unitless measure of the cost of a basket of goods and are used to measure price changes over time.

<https://www.ers.usda.gov/data-products/food-at-home-monthly-area-prices/>



The Consumer Price Index and F-MAP differ in scope and methods

CPI	F-MAP
Comparisons over time	Comparisons over time/throughout areas
100 food categories nationally, 6 sub-nationally	90 food categories (EFPs) nationally and sub-nationally
Outlets selected through stratified probability surveys	Opt-in census of retailers
Representative sample of products	All products at participating retailers
Modified geometric mean and Laspeyres index	4 bilateral and 2 multilateral price indices



Several steps necessary to examine the consistency between price information between CPI and F-MAP

Align ERS Food Product Groups to CPI food categories

Broad food groups

- cereals and bakery products
- meats
- dairy products
- fruits and vegetables
- beverages
- other foods

Broad geographies

- Northeast
- Midwest
- South
- West

Narrow scope and methods

Create new price indexes following CPI methods using retail scanner data
Call these *Retail Scanner Price Indexes (RSPIs)*

Compare simple statistics

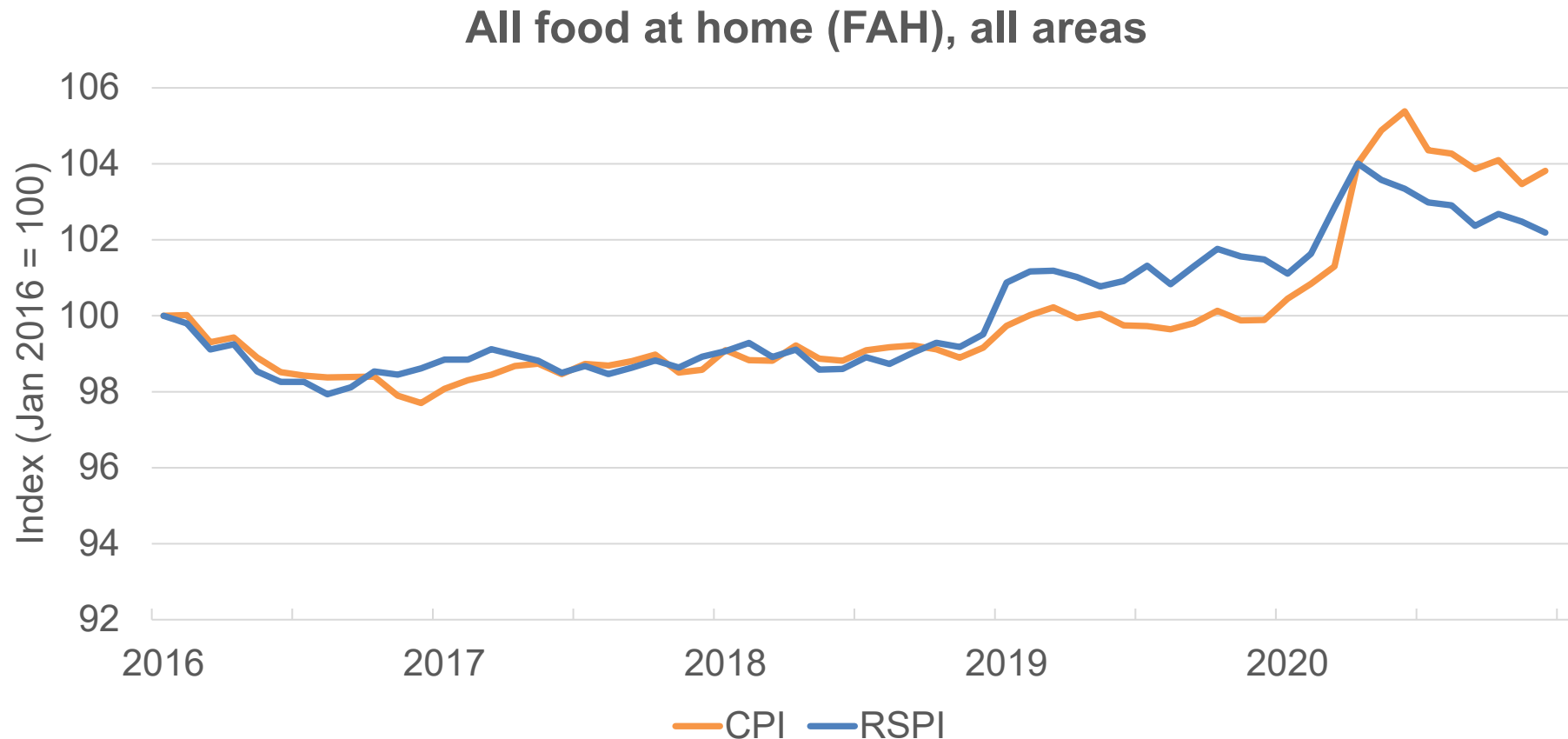
Visual inspection
Correlation
Month-to-month movements

Case study

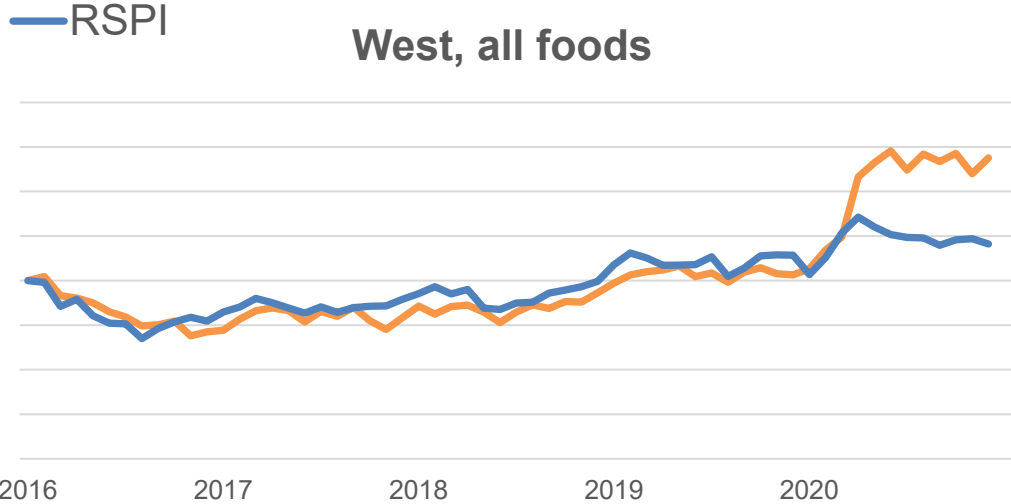
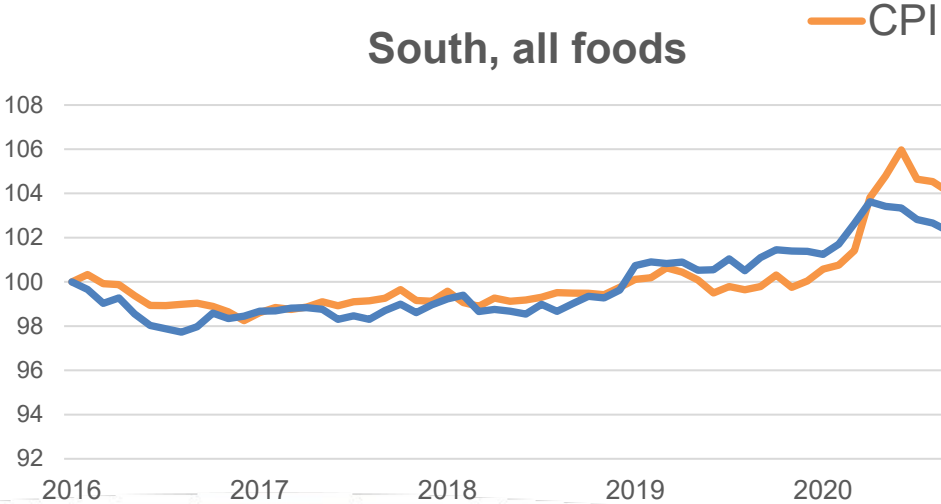
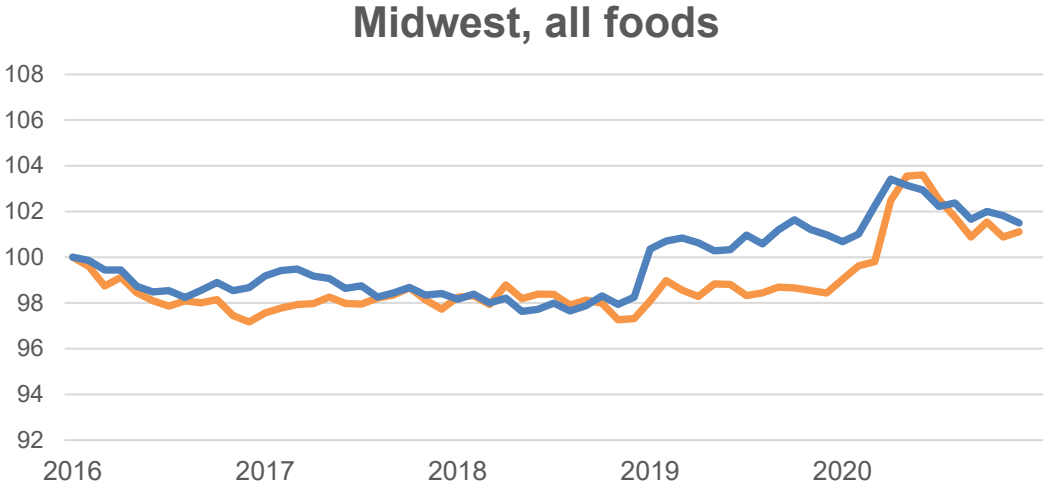
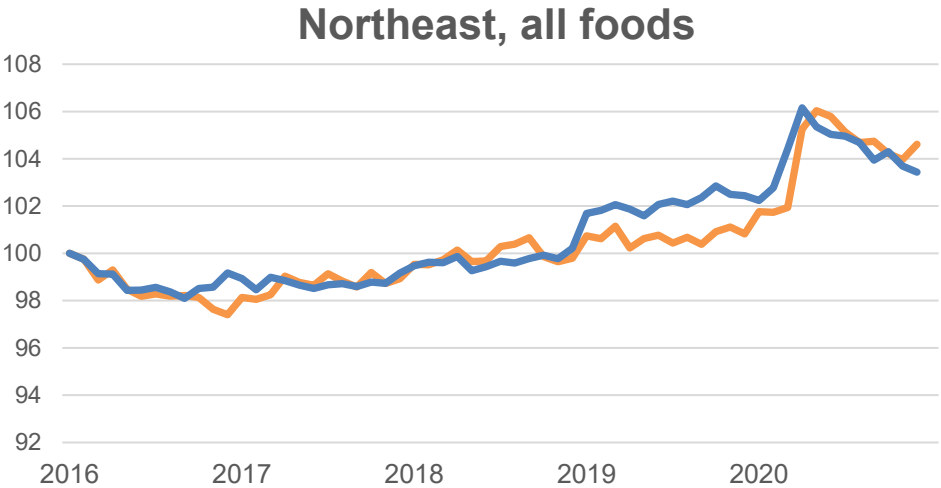
Estimate demand using CPIs and RSPIs with same expenditure data
Compare estimated price and expenditure elasticities of demand



The CPI and Retail Scanner Price Indexes (RSPI) generally track each other but with some important differences

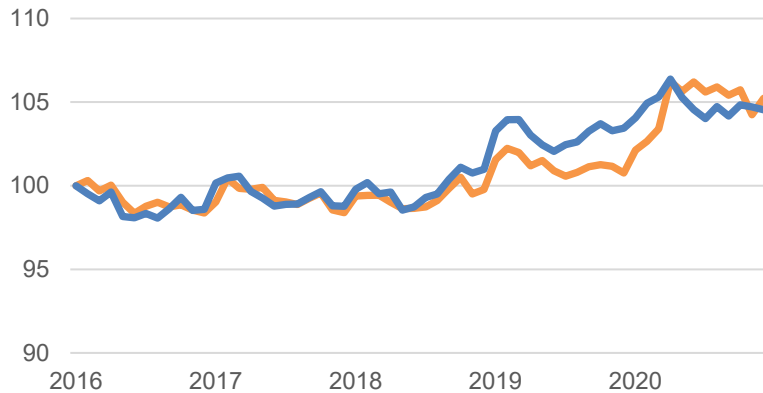


These differences vary across regions

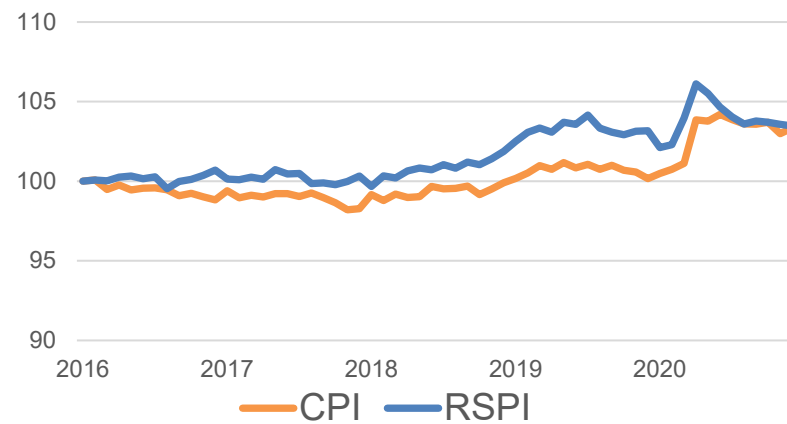


As well as product groups

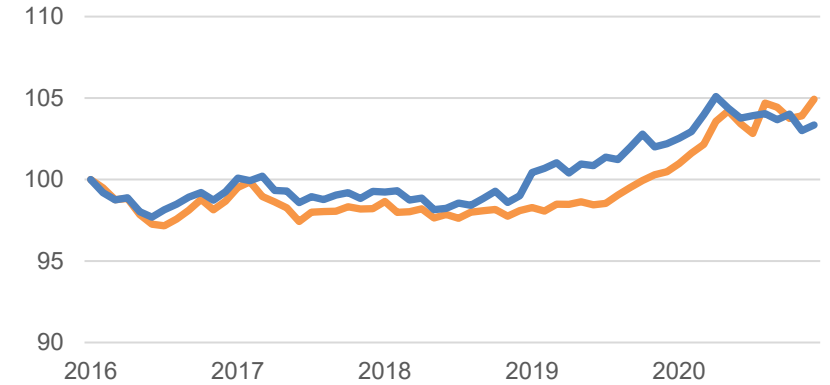
Beverages, all regions



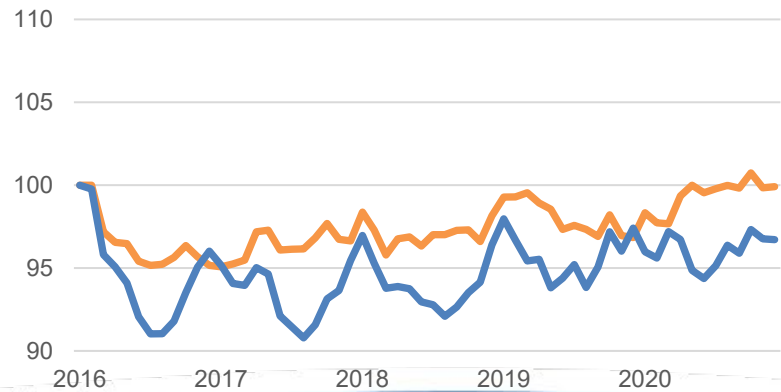
Cereals & bakery, all regions



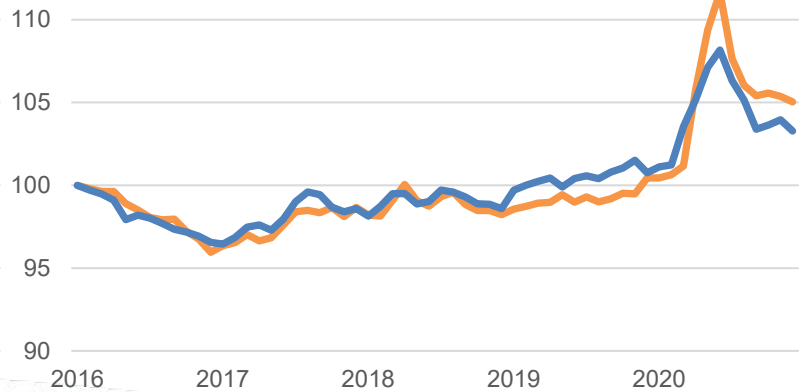
Dairy Products, all regions



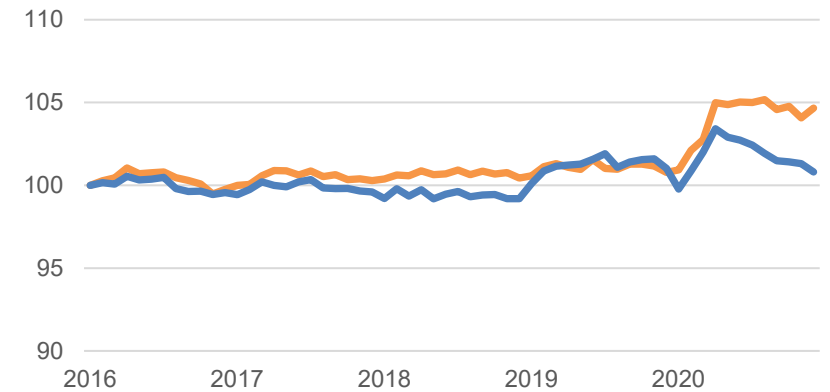
Fruits & vegetables, all regions



Meat, all regions

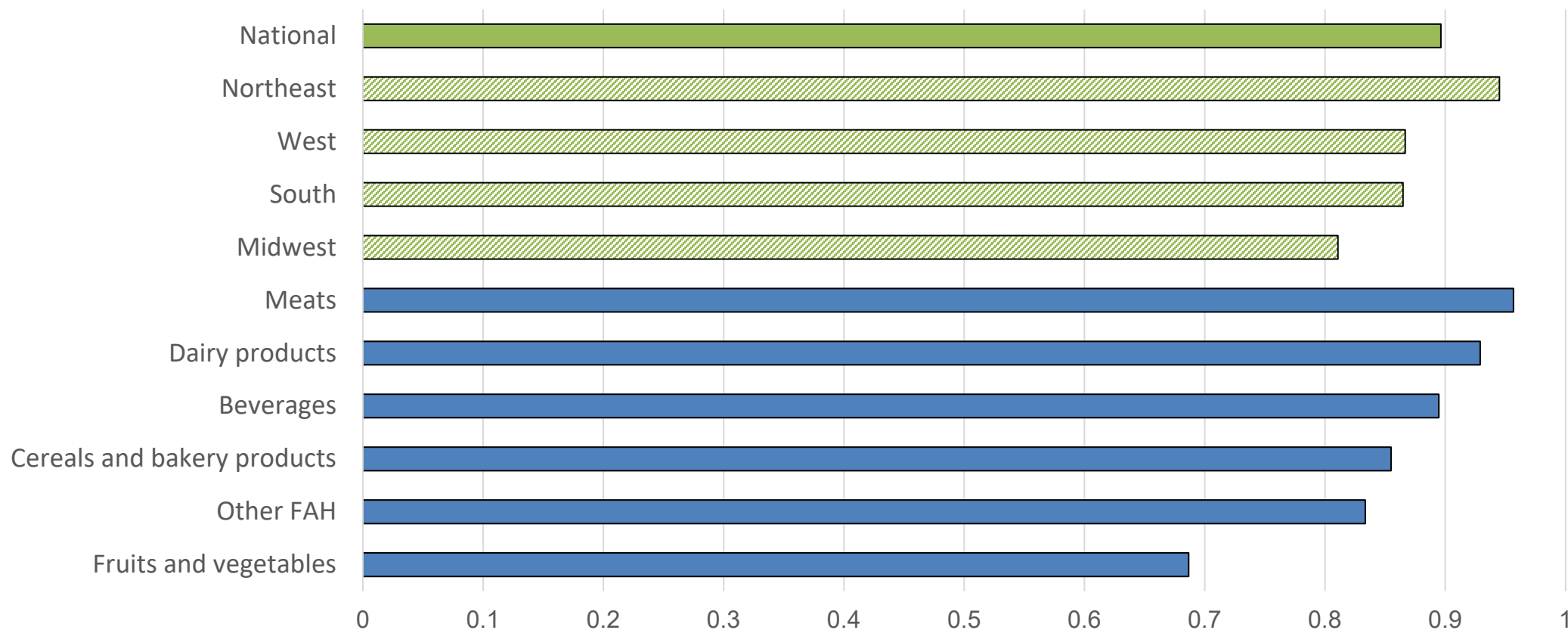


Other FAH, all regions



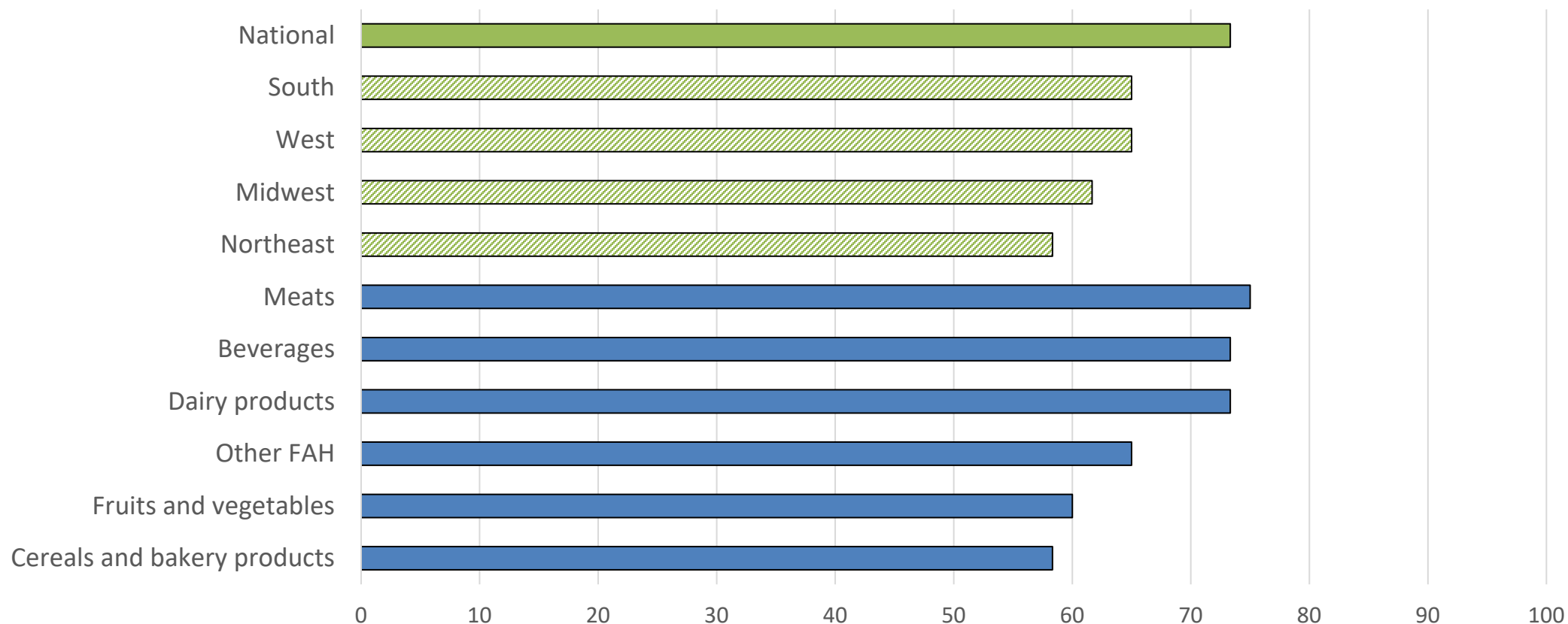
The CPI and RSPI are highly correlated with notable exceptions

Correlation between CPI and RSPI, 2016-20



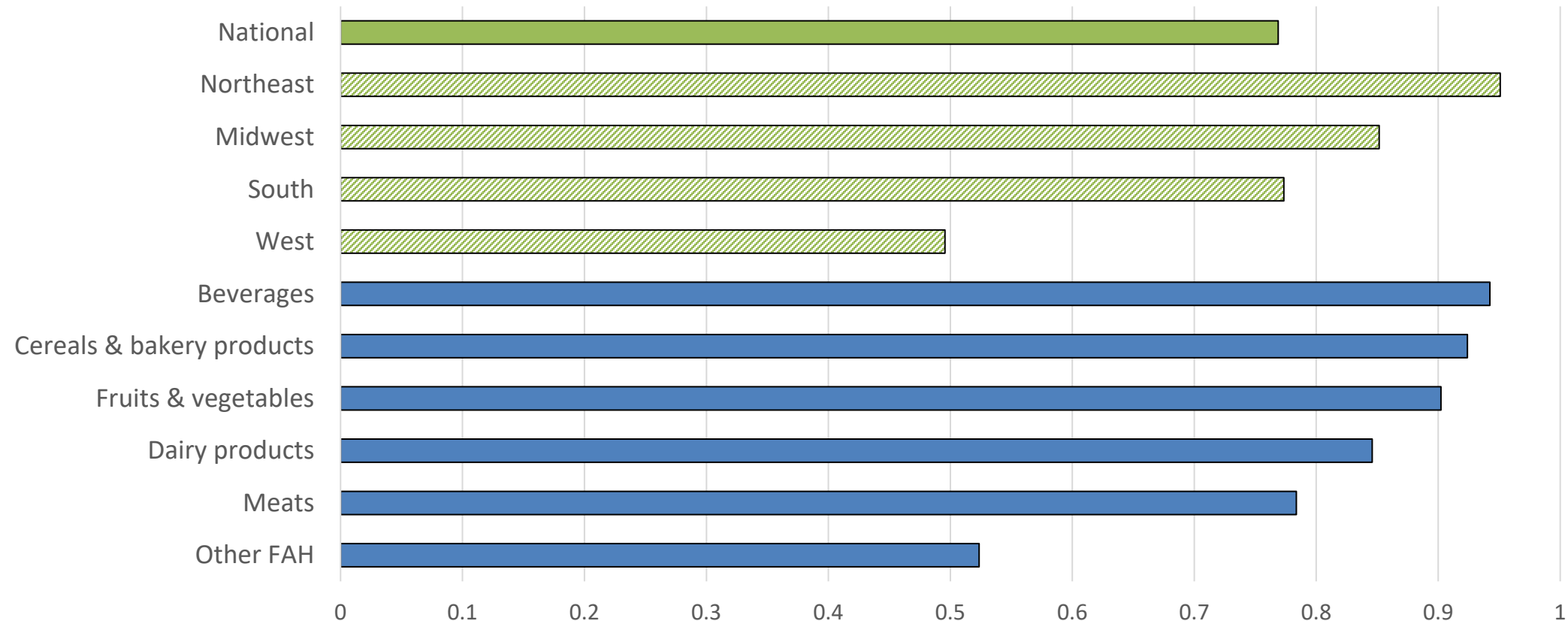
The CPI and RSPI trended in the same direction most months

Percentage of months CPI and RSPI moved in the same direction, 2016-20



The RSPI understates inflation relative to the CPI

Change in RSPI given 1 percent change in CPI, 2016-20



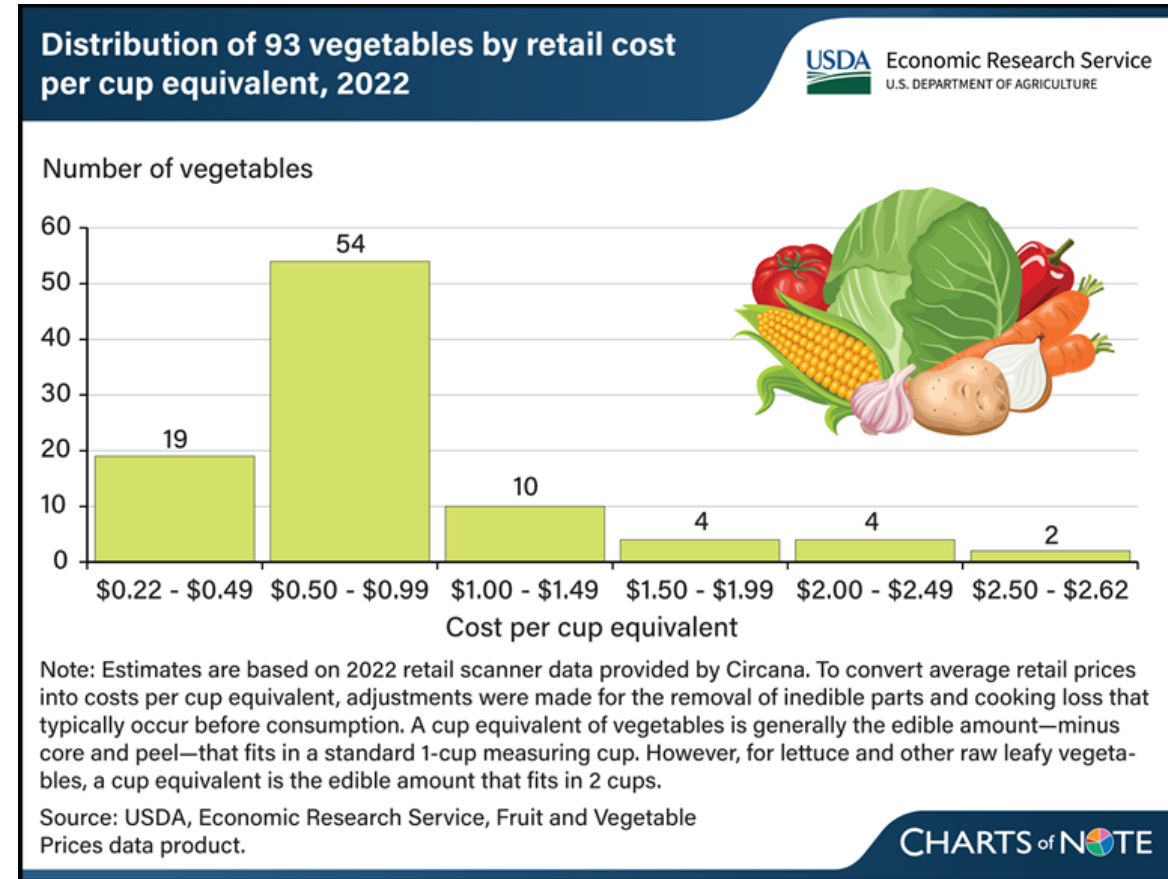
Next steps

- How do these differences in price measures affect estimates used in a policy analysis?
- Price information from CPIs and scanner data often used in estimating price and expenditure elasticities of demand and simulating food tax and subsidy scenarios
- Estimate demand system and compare two sets of price and expenditure elasticities of demand based on CPIs and RSPIs
- Quantify whether using the different price measures have an economically meaningful impact on estimated price and expenditure elasticities



Other ERS data products to support food price research

- **Fruit and Vegetable Prices:**
Average retail price per pound and per cup for more than 150 commonly consumed fruits and vegetables
- **Purchase to Plate National Average Prices:**
Price estimates for foods found in USDA dietary survey data
- **Price Spreads from Farm to Consumer:**
Prices paid by consumers and prices received by farmers for corresponding commodities
- **Food Dollar Series:** Annual expenditures of U.S. consumers on domestically-produced food





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Thanks!

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