



Economic Research Service  
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# ***Comparing Food-at-Home Monthly Area Prices (F-MAP) with the Consumer Price Index (CPI)***

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Applications of Retail Scanner Data to Calculating Monthly Area Price Measures of Food  
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*The findings and conclusions in this presentation are those of the author(s) and should not be construed to represent any official USDA or U.S. Government determination or policy.*

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# ERS calculates new panel food price indexes called **Food-at-Home Monthly Area Prices (F-MAP)**.

- Monthly price measures covering 2012–2020
  - Based on Circana InfoScan retail scanner data
  - Unit prices standardized to dollars/100-gram basis (mean and SE)
  - 6 price indexes: Laspeyres; Paasche; Törnqvist; Fisher Ideal; Gini-Elteto and Koves-Szulc (GEKS); Caves, Christensen and Diewert (CCD)
- 90 ERS Food Purchase Groups (EFPGs): classifies foods based on ingredients, nutrition, and convenience level
- National and for 14 geographic areas: 4 Census Regions and 10 major metropolitan areas



# The Consumer Price Index (CPI) and F-MAP differ in scope and methods.

## CPI

## F-MAP

Comparisons over time

Comparisons over time/ across areas

100 food categories nationally,  
6 sub-nationally

90 food categories (EFGs) 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

Average unit prices for a selection of  
specific products

Average unit prices for EFGs, which  
include all products sold at retailers

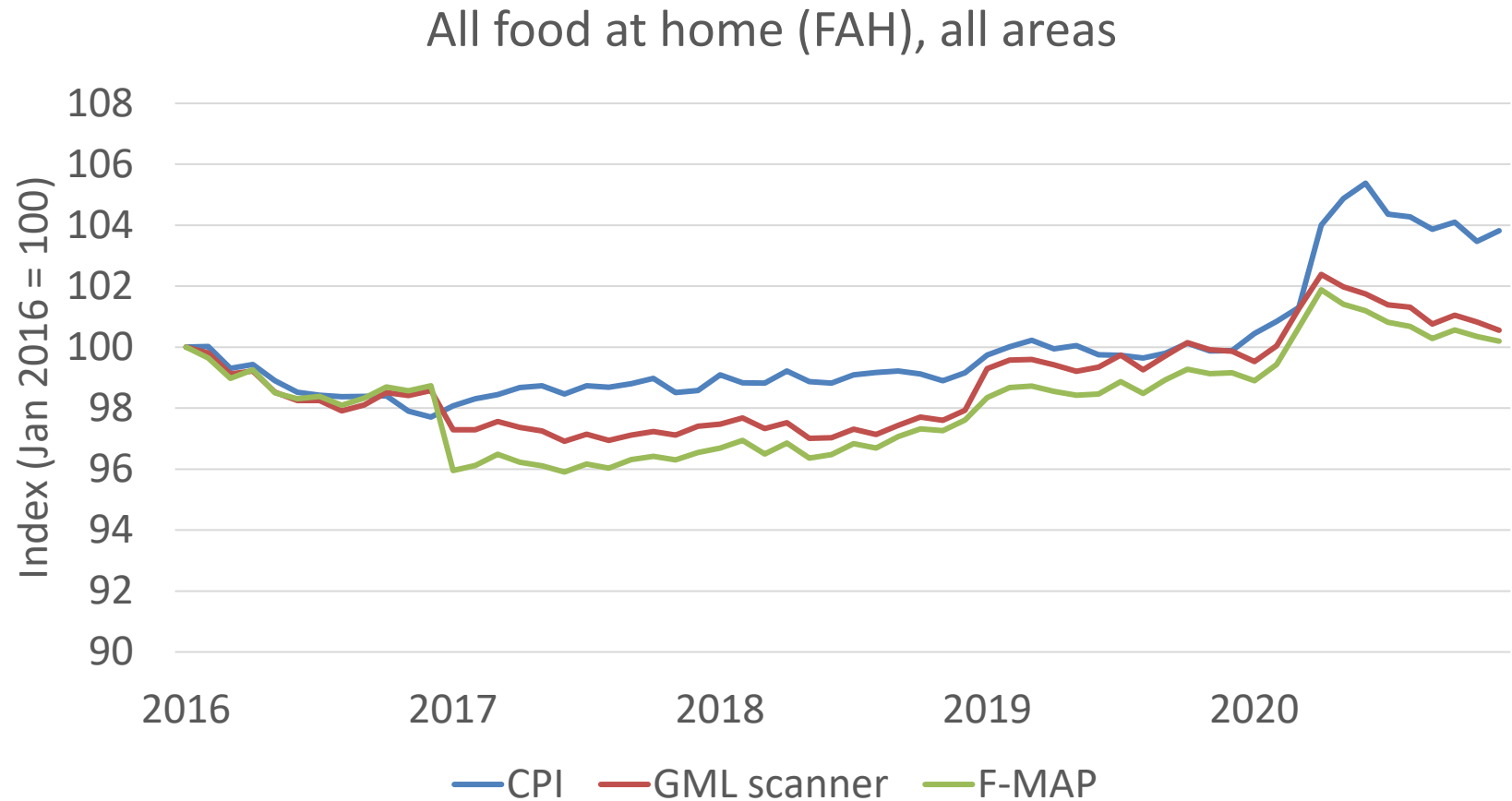


# To compare the F-MAP to CPI, an intermediate price index is constructed.

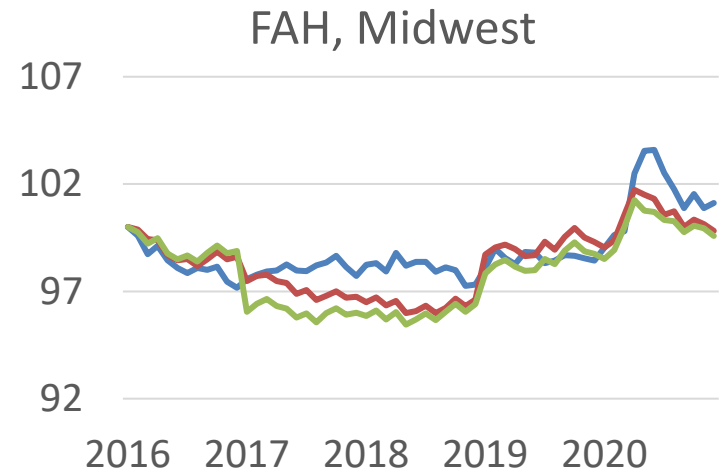
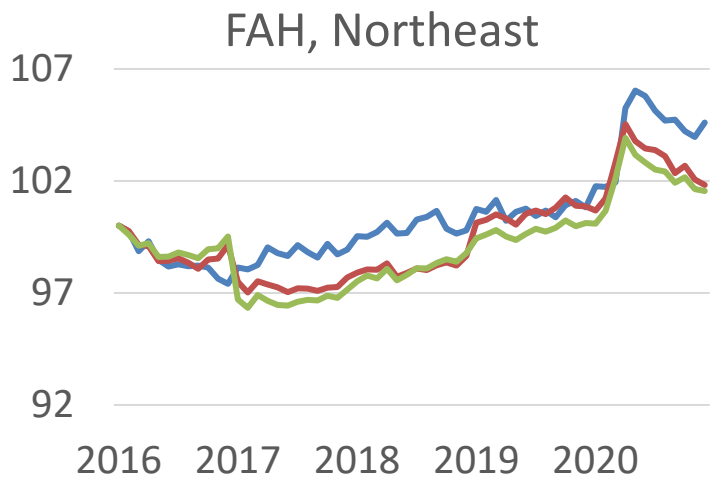
- Data sources and index construction both contribute to differences between F-MAP Laspeyres and CPI
- Construct indexes using scanner data similar to how BLS constructs CPI
  - Geometric mean index formula used to aggregate UPC-level prices in scanner data into EFPGs
  - Laspeyres index formula used to aggregate geometric mean price indexes for EFPGs into food groups that closely align with CPI food groups:
    - all food at home (FAH) • cereals and bakery products • meats • dairy products • fruits and vegetables • beveragesInfoscan weights or projection factors are used in construction of price indexes
- Intermediate price index called **Geometric Mean-Laspeyres (GML) scanner price indexes.**
- Difference between CPI and GML price indexes are due to differences in data



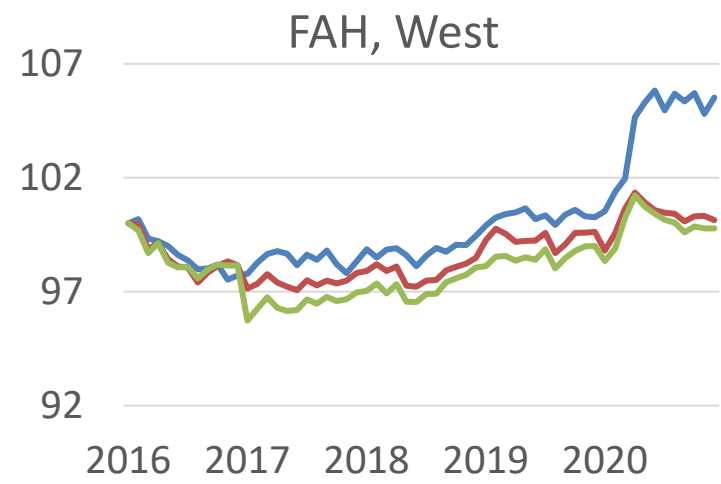
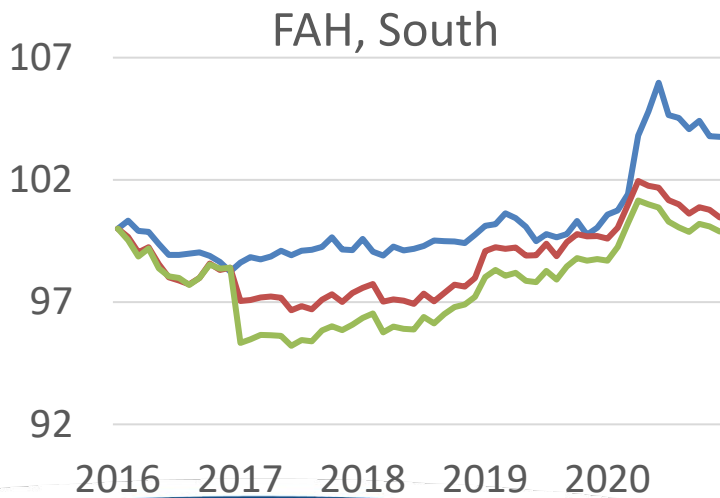
# The CPI and F-MAP generally track each other but with some important differences.



# These data- and formula-driven differences vary across regions...

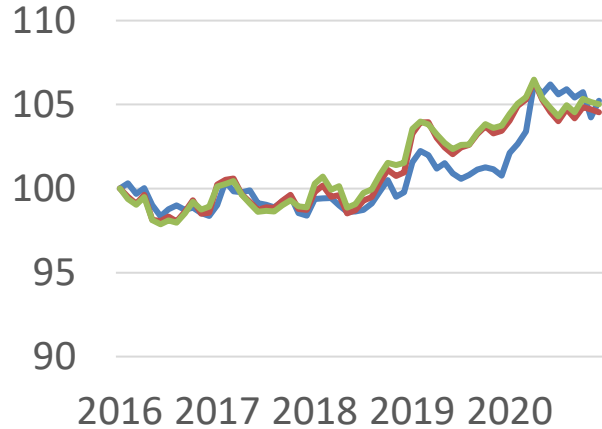


- BLS
- GML scanner
- F-MAP

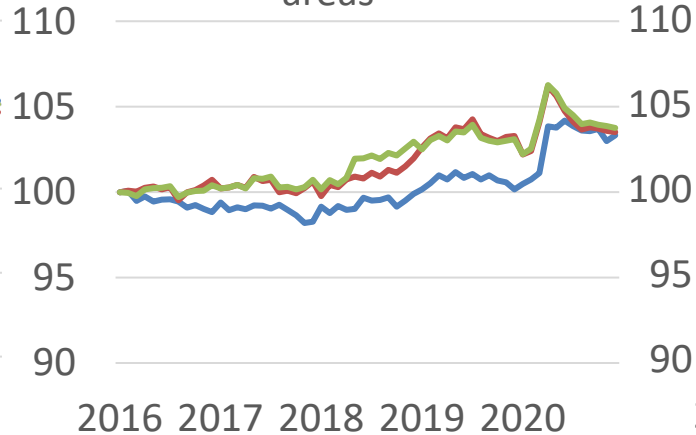


# ...as well as products.

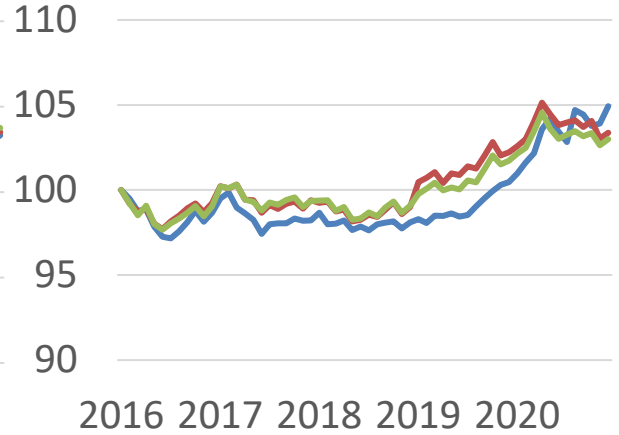
Beverages, all areas



Cereals & bakery products, all areas

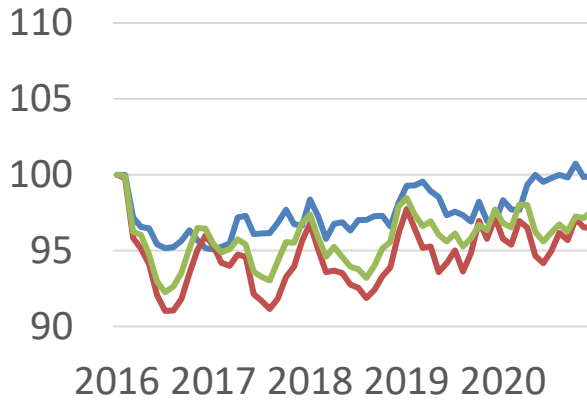


Dairy products, all areas

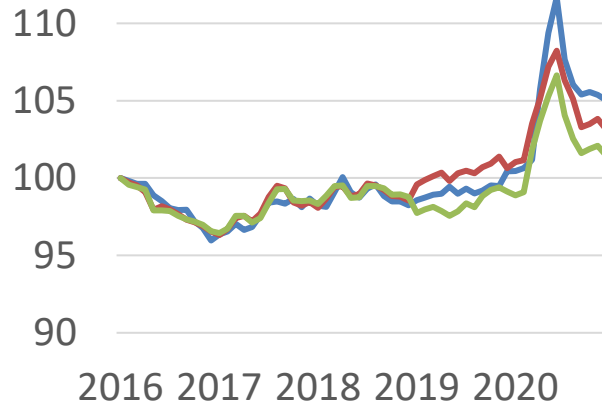


— BLS — GML scanner — F-MAP

Fruits & vegetables, all areas



Meat, all areas





# We isolate the contributions of data and formula effects using a two-stage regression.

- Two-stage regression

- Stage 1: OLS regression of F-MAP Laspeyres ( $P^{FMAP}$ ) on CPI ( $P^{CPI}$ )

$$P^{FMAP} = \alpha + \beta P^{CPI} + u^1$$

- Stage 2: Regress residuals ( $u^1$ ) on GML scanner index ( $P^{GML}$ )

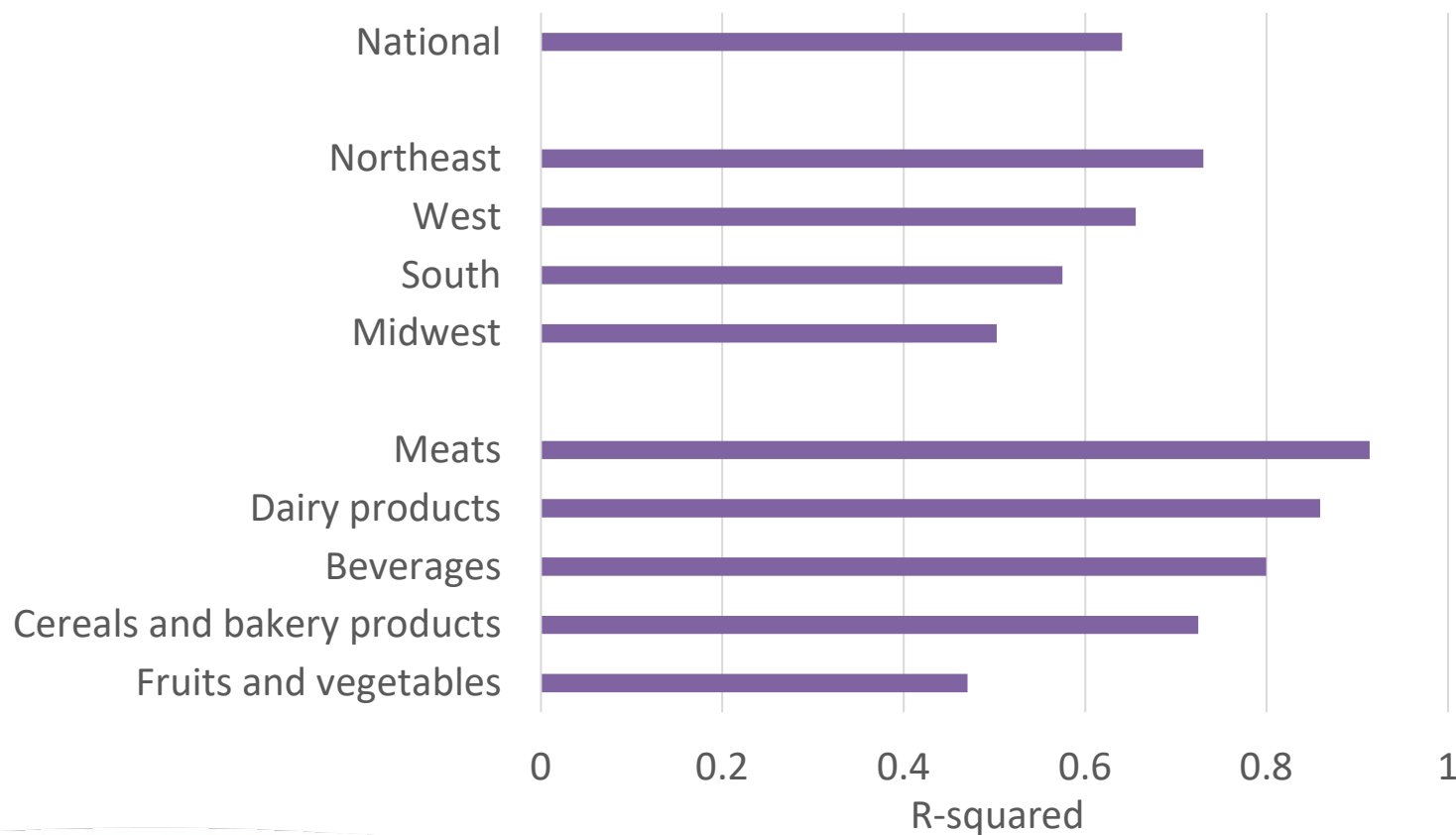
$$u^1 = \alpha + \beta P^{GML} + u^2$$

- $R^2$  from stage 2 is data effect
    - $1-R^2$  is formula effect
- Estimate regressions separately for national FAH, 4 regional FAH, 6 national major food/beverage indices
- Compare 2016 forward because of lagged weights used in construction in GML scanner price indexes



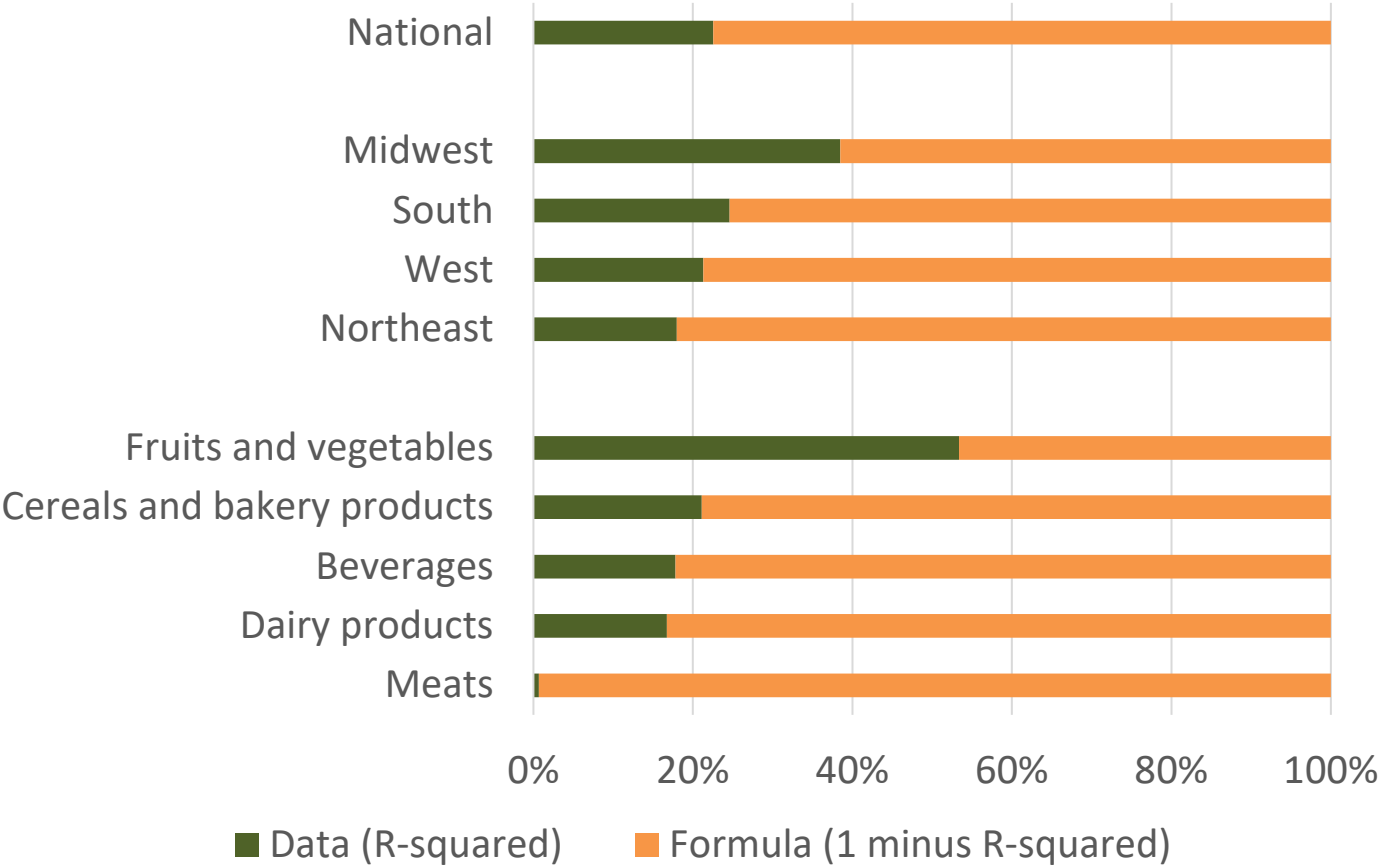
# Variation in the CPI explained by FMAP varies by region and food category.

Stage 1 regression results



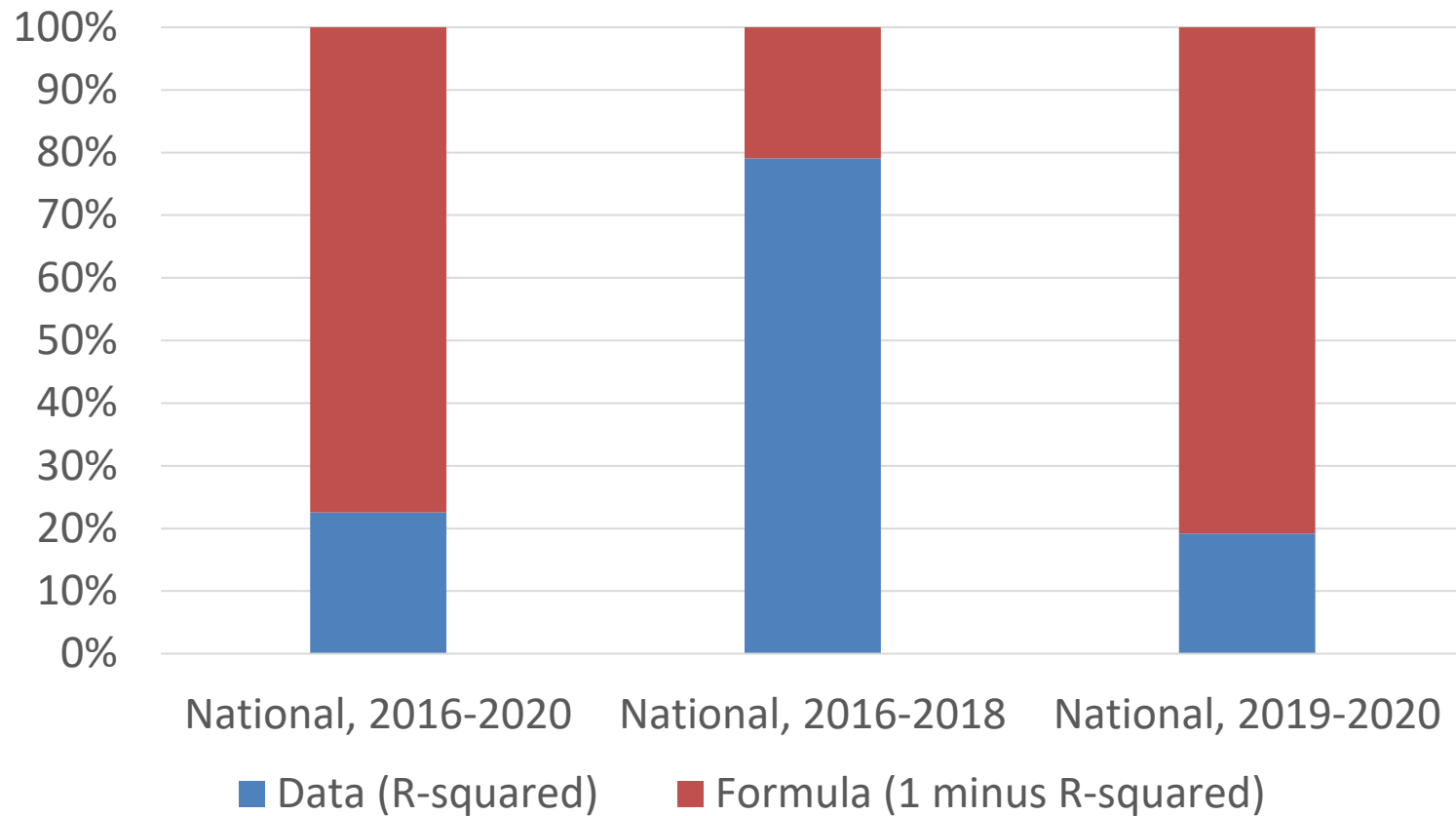
# The different formulas explain most of the discrepancies, but its effect varies by region and category...

Stage 2 regression results



# ...and even over time!

## Stage 2 results, by time period



# Limitations and Next Steps

- Current analysis examines short-run relationships → Cointegration analysis to examine long-run relationships among indexes
- Current analysis is only for 4 regions → extend analysis to 10 MSAs x 6 FAH categories
- Do these differences matter when applied in analysis? → Estimate reduced-form demand equations using CPI and F-MAP and examine differences in price elasticities



Thanks!

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