Subgroup Price Indexes
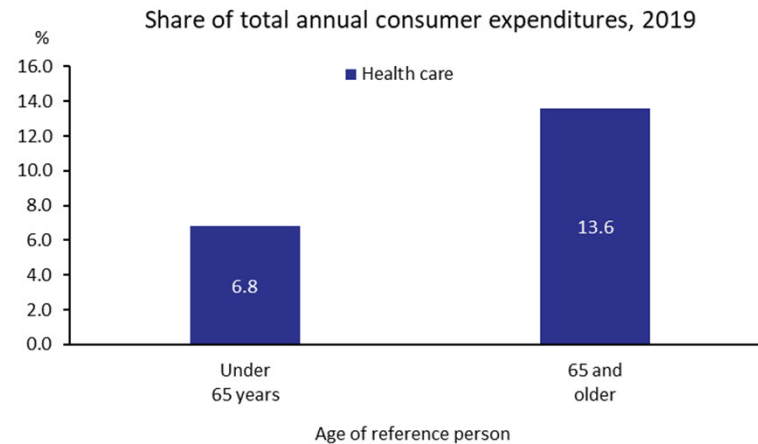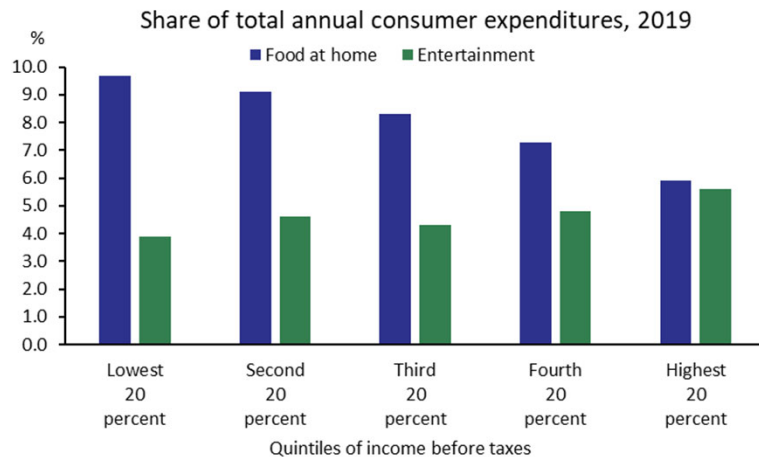
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Two sources of heterogeneity in inflation rates

1. **Different groups of people tend to purchase different baskets of goods and services.**
   - Low income households spend a higher fraction of income on food than high income households.
   - The elderly spend more of their budgets on medical care than the young.
2. **Within a given category, different people buy different qualities and brands, shop at different types of retail stores and pay different prices for the same product.**
   - A low income household might purchase a plastic patio set from Walmart whereas a high income household might purchase an aluminum one from Frontgate.
   - The same bottle of ketchup might be sold for different prices at different locations of the same store.

Share of total annual consumer expenditures, 2019

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Why do inflation differentials exist?

- Liquidity constraints prevent low-income households from taking advantage of sales and bulk discounts (Orhun and Palazzolo, 2019)

- Outlets in low-income neighborhoods may have fewer direct competitors if consumers have lower mobility and ability to shop elsewhere

- High-income households can more flexibly substitute toward alternative goods or outlets (Argente and Lee, 2020)

- There is more rapid innovation in product categories that high-income households tend to purchase which lowers prices after quality-adjustment

Rationale for producing price indexes for population subgroups

1. Adjusting Social Security benefits (mainly received by older people)
2. Indexing marginal tax rates (which increase with income level)
3. Calibrating transfer payments of various safety net programs (for which only certain groups are eligible)
4. Advancing research on income and wealth inequality, social welfare and poverty

The current BLS data collection system cannot produce a full set of subgroup price indexes

The BLS produces the CPI in 2 stages:

1. In the first stage, BLS collects data on monthly price changes for individual items from a sample of retail outlets throughout the nation. It groups those items into 241 categories or strata.
   - **Because prices are collected from retail stores, there is no way to directly link the particular price, quality and brand of items purchased and the economic or demographic characteristics of those who purchased them.**
2. In the second stage, BLS calculates the overall CPI as a weighted average of 243 elementary indexes (241 goods and services plus 2 housing components) where the weights are equal to the proportion of total consumer expenditures devoted to purchases of the goods or services in that stratum, estimated from the Consumer Expenditure Survey (CEX).
   - Weights can be calculated for specific subgroups such as low income households and the elderly.

Most empirical research using a reweighting approach has found minimal differences in subgroup inflation rates

Until recently, most research has focused on producing indexes for subgroups by reweighting elementary indexes with expenditure weights that represent the budget allocations of particular demographic subgroups. **These studies generally find minimal differences in inflation rates faced by different groups.**

- Garner et al. (1996): "We conclude that the poor and the general population have faced similar trends in relative prices over the last several years"

- McGranahan and Paulson (2006): For the period 1983-2005, the inflation experiences of different subgroups are "highly correlated with and similar in magnitude to the inflation experiences of the overall urban population".

BLS publishes some subgroup price indexes

In addition to the flagship all urban consumers index (CPI-U), the BLS produces an index for urban wage and clerical workers (CPI-W) and an experimental index covering urban consumers aged 62 and older (R-CPI-E).

These three versions of the CPI differ only in terms of the expenditure weights used to aggregate the component elementary indexes - like many academic studies, they only capture differences in consumption baskets.
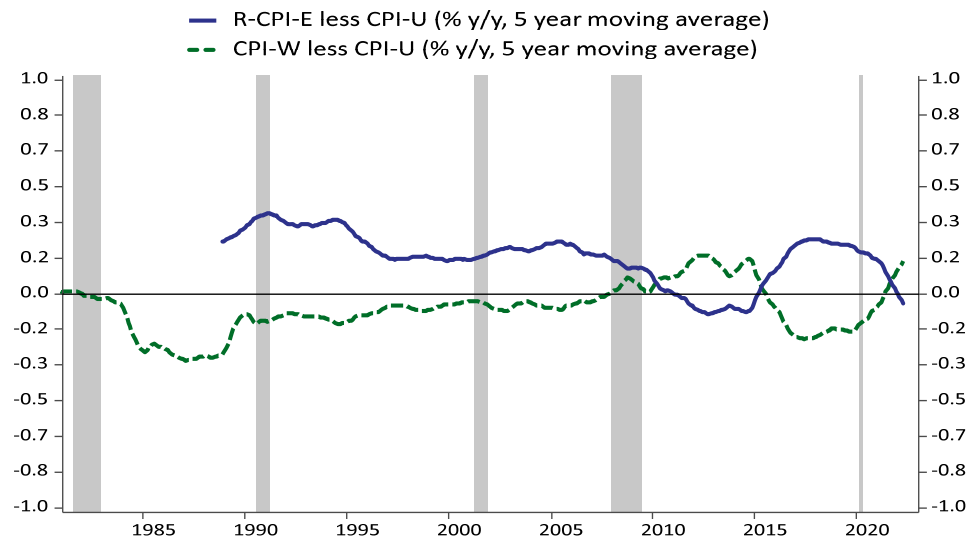

Source: Haver/MacroPolicy Perspectives LLC

More recent research has probed the second source of heterogeneity

Kaplan and Schulhofer-Wohl (2017) use scanner data from the Kilts-Nielsen Consumer Panel (KNCP) to estimate inflation rates at the household level.

They find that annual inflation at the household level has an interquartile range of 6.2 to 9.0pp. Most of the heterogeneity (2/3) comes from variation in prices paid for identical goods followed by differences in the mix of goods within broad-categories. Only 7pp comes from differences in consumption bundles.
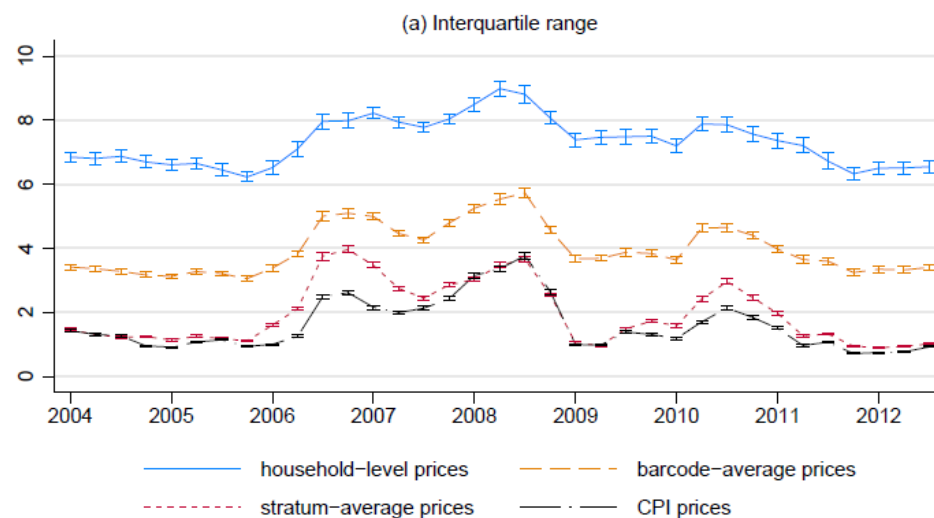
Source: Kaplan and Schulhofer-Wohl (2017)

Kaplan and Schulhofer-Wohl (2017) continued

Households with low incomes, more household members, or older household heads experience higher inflation on average, whereas those in the Midwest and West experience lower inflation.

From 2004 Q3 to 2013 Q3, average inflation cumulates to 33 percent for households with incomes below $20,000 but to just 25 percent for households with incomes above $100,000.

Cumulative inflation between 2004q3 and 2013q3 (pp)		
CPI-U	CPI-W	R-CPI-E
23.2	24.2	23.1

Other recent research also finds evidence of significant inflation inequality

Jaravel (2019) also uses KNCP scanner data and finds that annual inflation was about 0.65pp lower for households earning above $100,000 a year when compared with households making $30,000 or less per year over the period 2004-2015.

Based on this differential, Wimer, Collyer and Jaravel (2019) estimate that US income inequality and poverty rates may have been significantly underestimated over the same period. For example, using his series for the lowest income quintile, 3 million additional people are found to have been living below the poverty line in 2018 compared with official numbers based on official CPI estimates.

Recent studies finding evidence of significant inflation inequality have exploited Nielsen data which are dominated although not limited to food at home categories. It is possible that more significant heterogeneity exists in categories such as medical care and housing, although research by Larsen and Molloy (2021) did not detect large differences in rent inflation across income groups over the period 1985-2019.

Panel recommendations

Recommendation 6.1: Because of the urgency of issues related to income and wealth inequality, social welfare, and poverty, developing price indexes for population subgroups along the income distribution should be a high priority for BLS. Identifying data sources that would ultimately allow production of price indexes by income quintile or, if possible, decile is a key part of this work.

Recommendation 6.2: Even though the marginal cost of such exercises is not high, valuable CPI program resources should not be devoted to developing additional subgroup price indexes that simply entail a re-weighting of upper-level expenditure categories.

How can the BLS link prices paid to household characteristics?

1. One possibility would be to obtain prices, not just expenditure information, directly from consumers through a survey like the CEX.
   - However, the survey's current sample size does not allow for this and response rates have been falling over time.
2. Instead, the BLS should investigate and exploit commercial datasets and perhaps even set up an internal home scan project.

Recommendation 6.3: To identify and obtain the data necessary to estimate accurate subgroup price indexes, no one size will fit every category of goods and services. BLS will have to be creative and flexible in finding and blending different data sources. Exploiting commercial datasets on a range of household purchases will be essential.

Example of scanner data

NielsenIQ consumer panelists use in-home scanners to record all of their purchases intended for personal, in-home use. Consumers provide information about their households and what products they buy, as well as when and where they make purchases.

Demographic variables include household income range, size, composition, presence and age of children, marital status, type of residence, race, and Hispanic origin. Male and female heads of household also report age range, birth date, hours employed, education, and occupation. For other family members, birth date, employment, and relationship/sex are reported.

How It Works
What you can expect as a panel member.

You Receive
access to our exclusive NCPMobile app

You Scan
barcodes on all the items you buy and provide other purchase details too

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You Share
your shopping data with NCP

You Earn
points to redeem for gift cards, merchandise and more!