

Revisions to Source Data for Regional Price Parities

Updates Back to 2017

By Bettina Aten and Eric Figueroa | April 20, 2023

In December 2022, the U.S. Bureau of Economic Analysis (BEA) released new estimates of regional price parities (RPPs) for 2021 and revised estimates for 2017 to 2020. These incorporate changes to source data used to estimate RPPs, including improvements to the estimation of housing rents and utility expenditures, and the introduction of price data for electricity and natural gas from the U.S. Energy Information Administration (EIA).

The release included two additional series estimated using the RPPs: real personal consumption expenditures (PCE) for states and real personal income for states, portions, and metropolitan areas. For both, new estimates were released for 2021 and revised estimates for 2017 to 2020.

In the upcoming December 2023 release, the RPP source data revisions described above will be applied to results for the 2008 to 2016 period, and the corresponding estimates of real PCE and real personal income will be revised.

Overview of the RPPs

RPPs are price indexes that measure geographic price level differences for one period within the United States. For example, if the RPP for Washington, DC, is 120, prices there are on average 20 percent higher than the U.S. average. BEA estimates of real PCE and real personal income consist of their respective current-dollar estimates adjusted by the RPPs and converted to constant dollars using the U.S. PCE price index.

The RPPs use price and expenditure-related survey data collected by U.S. federal government agencies including Consumer Price Index (CPI) survey data from the U.S. Bureau of Labor Statistics (BLS), Public Use Microdata Sample (PUMS) data from the U.S. Census Bureau (Census) American Community Survey (ACS), PCE by state data from BEA, and price data from EIA. These data are available for distinct sets of geographies that are reconciled by allocating all of them to the county level. The reconciliation uses either housing units or income shares as the distributional assumption.

The CPI data are price observations classified into item strata consisting of detailed goods and services categories within broad expenditure classes such as food, apparel, transport, housing, education, recreation, medical, and other. They are sampled throughout the year in 32 index areas. For strata with a high relative importance, that is, with larger expenditure weights in the average U.S. consumption basket, such as motor vehicles and gasoline, BEA estimates index area means that control for differences in the detailed characteristics of the item strata. For strata with smaller weights, BEA only controls for broader characteristics.¹ Price estimates for electricity and natural gas for states are obtained from EIA.

ACS PUMS data are individual housing unit observations sampled annually for Public Use Microdata Areas (PUMAs). Tenant rents are observed directly, and area means are stratified by structure type, number of rooms, number of bedrooms, and age of the unit.

PCE by state is a household consumption measure that reflects the value of the goods and services purchased by, or on behalf of, households, by state of residence. The Economic Census from Census and the Quarterly Census of Employment and Wages from BLS are the primary data sources for the majority of the PCE series. For those remaining, additional annual state-level data sources are used, including the ACS for housing and utilities.

The RPPs are derived using a multilateral price aggregation index that combines the CPI and EIA price relatives for goods and services, the ACS PUMS price relatives and expenditures for housing rents and utilities, and expenditure weights from the PCE by state series. They are used in combination with the U.S. PCE price index to produce regional estimates of real PCE and personal income. The series are adjusted using the RPPs to control for regional price level differences and then divided by the U.S. PCE price index to obtain constant-dollar estimates.

Changes to RPP Source Data

The RPPs released in December 2022 incorporate several modifications to source data. The first is an improvement to the estimation method for rents expenditures and price levels prepared by BEA. The original method was introduced in 2021 using ACS PUMS microdata to create a more streamlined and integrated approach to estimating housing services.² The results for tenant-occupied units are based on observed rent expenditures that may or may not include utilities. Where included, an estimate of total utility costs for electricity, gas, and water is subtracted from the observed rent.³

The improved method was introduced in 2022 and uses a more detailed adjustment that includes utility expenditures on other fuels, such as heating oil or propane. These are important regionally, particularly in the northeastern states and Alaska.⁴ The adjustment is made to any observation where the payment for one or more utilities was included in the rent.⁵ Instead of removing estimated costs for all utilities, the improved adjustment only removes costs for the specific utilities included in each rent observation.

The distribution of the housing rent RPPs is similar both before and after these revisions (charts 1 and 2). There is no change to the states in quintiles with the highest and lowest price levels, and there is some movement across the others. Maine had the largest downward revision with an RPP that drops from 82.8 to 71.5 (-13.6 percent). North Dakota had the largest upward revision from 71.7 to 77.0 (7.4 percent).

Chart 1. RPPs for Housing Rents in 2019, by State: Previously Published

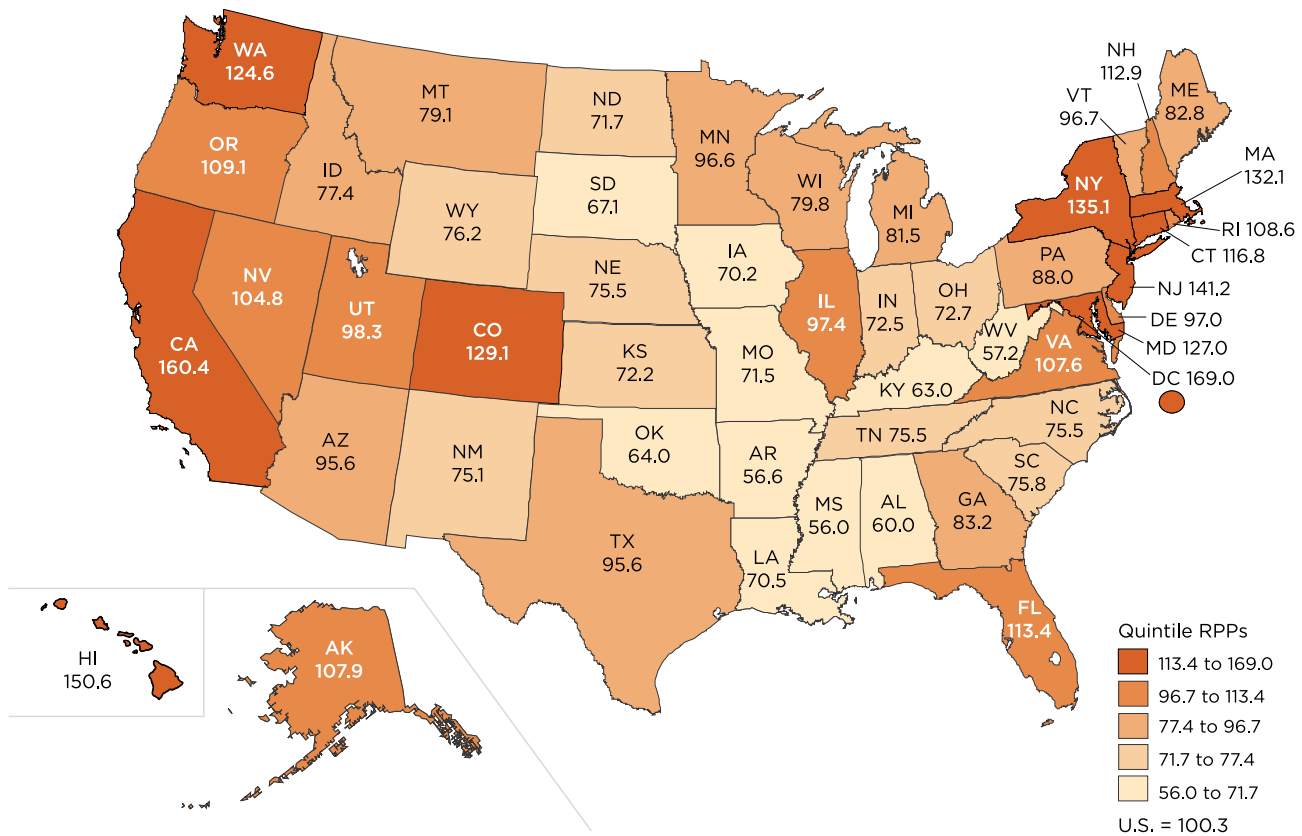
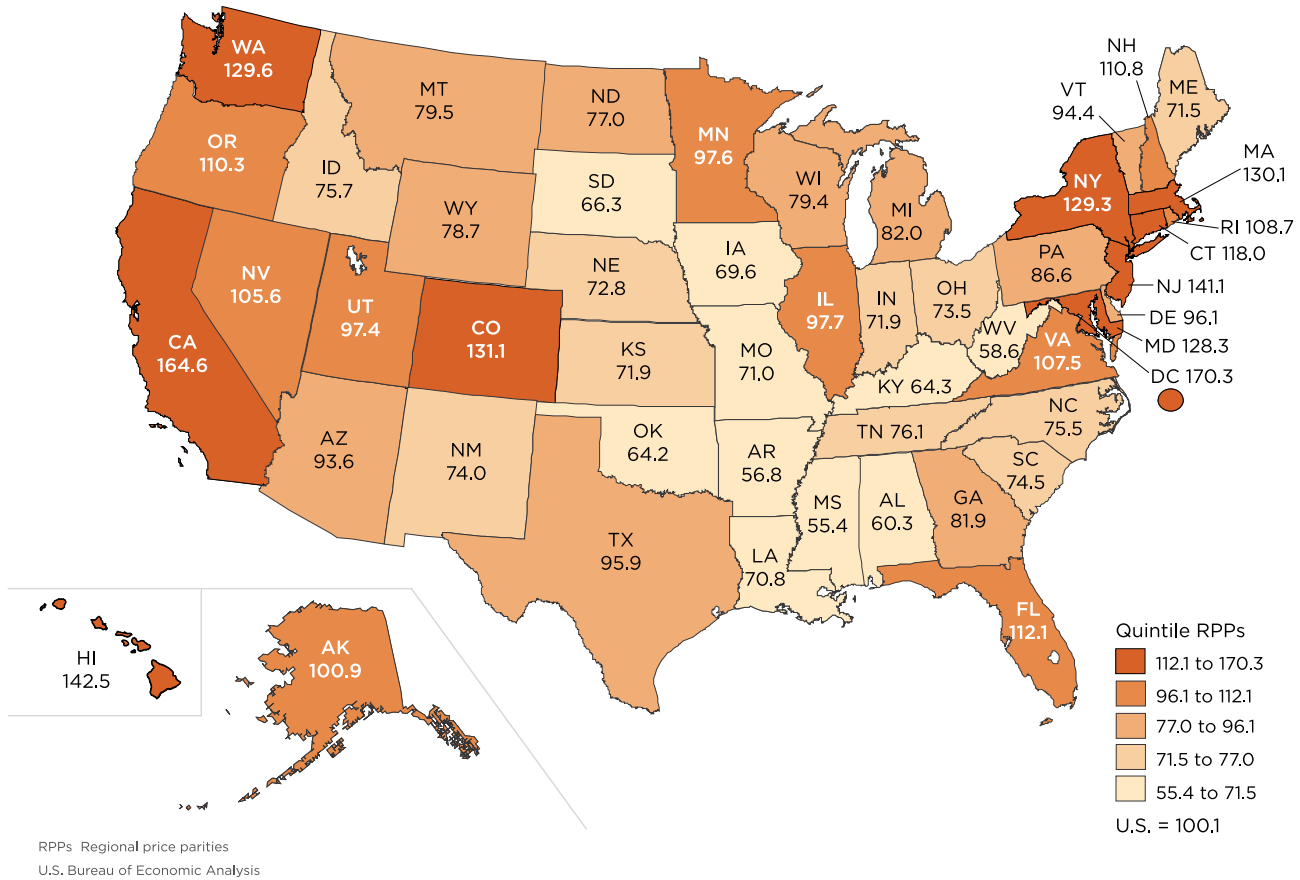


Chart 2. RPPs for Housing Rents in 2019, by State: Revised



A second change made to the rents and utilities data was the incorporation of the ACS-based results for reference year 2020. Due to pandemic-related delays encountered at Census, BEA could not access the 2020 ACS PUMS in time for the December 2021 release.⁶ Instead, BEA used 2019 ACS PUMS results for the estimation of the 2020 RPPs. For the December 2022 release, BEA was able to access the 2020 ACS PUMS and used those results to estimate the RPPs.

The final change is the adoption of price data for electricity and natural gas from EIA. Previously, the RPPs used CPI or ACS PUMS microdata to develop these estimates. However, CPI results are only available for a limited number of metropolitan areas and regions, and both sources required processing at BEA to develop state-level results. The EIA price levels, on the other hand, are published for all states and are publicly available on the [EIA website](#).

Impacts on RPPs

The impact of these changes on the 2019 state RPPs are related to the housing revisions discussed above. Maine had the largest downward revision in its all items RPP, and North Dakota had the largest upward revision (table 1). Both results reflect similar movements seen in their housing rents RPPs. Rents have a strong impact on a state's overall RPP because they make up a large share of household expenditures and have a wide range of price levels.

Revisions shown for 2020 are larger because the previously published results used 2019 housing inputs. As discussed above, this was necessary due to Census' delayed release of 2020 ACS results.

Table 1. Previously Published and Current Regional Price Parities in 2019 and 2020, by State

State	Previously published		Current		Percent difference	
	2019	2020	2019	2020	2019	2020
United States	100.0	100.0	100.0	100.0	0.0	0.0
Alabama	89.1	89.3	88.3	87.5	-0.9	-2.0
Alaska	103.4	103.2	102.8	100.8	-0.6	-2.4
Arizona	98.4	99.1	97.8	99.3	-0.6	0.3
Arkansas	88.4	89.2	87.7	88.4	-0.8	-0.9
California	109.9	110.4	111.0	111.9	1.0	1.4
Colorado	102.0	102.9	102.4	103.9	0.4	1.0
Connecticut	102.9	103.4	103.7	104.9	0.8	1.4
Delaware	98.9	97.9	98.8	96.5	-0.1	-1.4
District of Columbia	109.1	111.5	109.5	111.3	0.4	-0.2
Florida	99.9	100.7	99.8	100.7	-0.1	0.0
Georgia	94.8	94.5	94.3	94.4	-0.6	-0.1
Hawaii	111.3	112.0	111.6	112.7	0.3	0.6
Idaho	92.9	91.2	92.5	91.0	-0.5	-0.3
Illinois	99.8	100.5	99.5	100.6	-0.2	0.1
Indiana	93.4	92.5	92.8	91.9	-0.6	-0.7
Iowa	91.9	91.0	91.7	90.3	-0.2	-0.9
Kansas	93.1	92.4	92.8	92.2	-0.4	-0.1
Kentucky	90.0	89.8	89.5	89.0	-0.5	-0.8
Louisiana	91.8	92.7	91.2	91.0	-0.7	-1.9
Maine	96.5	96.8	94.9	97.7	-1.7	1.0
Maryland	104.8	106.5	105.2	106.4	0.3	0.0
Massachusetts	106.7	107.4	107.4	109.1	0.7	1.6
Michigan	95.1	94.0	95.3	94.6	0.2	0.5
Minnesota	98.7	98.6	99.0	97.8	0.3	-0.8
Mississippi	87.6	87.8	86.5	85.8	-1.3	-2.2
Missouri	93.0	92.5	92.6	92.2	-0.5	-0.3
Montana	94.1	92.4	94.2	91.6	0.1	-0.9
Nebraska	93.4	92.9	92.4	92.5	-1.1	-0.5
Nevada	98.9	97.1	98.8	97.1	-0.1	0.1
New Hampshire	103.4	103.7	104.1	105.3	0.7	1.5
New Jersey	110.9	111.2	111.2	110.7	0.3	-0.5
New Mexico	93.2	91.6	92.7	91.6	-0.5	0.1
New York	109.5	110.2	109.6	110.1	0.1	-0.1
North Carolina	92.2	91.8	91.9	91.4	-0.3	-0.4
North Dakota	92.2	92.0	93.4	92.2	1.2	0.2
Ohio	93.2	91.7	93.3	92.1	0.1	0.4
Oklahoma	90.4	91.3	89.6	89.8	-1.0	-1.6
Oregon	103.5	102.6	103.9	103.4	0.4	0.8
Pennsylvania	97.9	97.6	98.1	97.8	0.2	0.2
Rhode Island	101.6	101.8	102.4	102.0	0.8	0.1
South Carolina	92.1	91.6	91.6	91.0	-0.6	-0.7
South Dakota	92.3	91.5	91.9	90.7	-0.4	-0.9
Tennessee	91.9	92.2	91.2	90.5	-0.8	-1.7
Texas	99.1	99.5	98.5	98.7	-0.6	-0.8
Utah	97.4	95.3	97.1	95.2	-0.3	-0.1
Vermont	99.0	99.3	99.5	102.1	0.5	2.7
Virginia	100.3	101.0	100.2	101.1	-0.1	0.1
Washington	107.1	107.4	108.0	107.9	0.9	0.5
West Virginia	88.3	88.0	88.3	87.4	0.0	-0.7
Wisconsin	94.5	93.2	94.5	92.7	0.0	-0.6
Wyoming	93.4	92.3	93.8	91.4	0.4	-0.9
Maximum	111.3	112.0	111.6	112.7	1.2	2.7
Minimum	87.6	87.8	86.5	85.8	-1.7	-2.4
Range	23.7	24.2	25.1	26.9	2.9	5.1

Note. Percent difference was calculated from unrounded data.

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1. For more information, see [“Methodology for Regional Price Parities, Real Personal Consumption Expenditures, and Real Personal Income.”](#)
 2. For more information, see [“Improved Measures of Housing Services for the U.S. Economic Accounts”](#) in the May 2021 *Survey of Current Business*.
 3. The old adjustment (prior to 2022) was only made to observations where expenditures on both electricity and gas were included in the contract rent. The amount removed was based on the average utility cost in similar housing units that paid utilities separately. Similar units were defined as those sharing the same housing characteristics and located in the same ACS PUMA.
 4. In 2019, Maine had the largest share of occupied housing units using fuels other than electricity or gas for home heating, followed by Vermont, New Hampshire, Connecticut, and Alaska. For more information, see table CP04, [Comparative Housing Characteristics](#), on the Census website.
 5. In the 2021 ACS PUMS microdata, these units make up just over 40 percent of the total of tenant-occupied units.
 6. For more information, see [“2020 ACS 1-Year Experimental Data Release”](#) on the Census website.



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