To accurately assess changes in income and earnings over time, it is necessary to adjust for changes in prices (inflation), which affect the cost of living. There are varieties of different consumer price indices currently produced by federal statistical agencies that can be used to make this adjustment. They vary in how they answer three fundamental questions concerning inflation measurement: (1) what population is the index designed to represent (all urban consumers, all urban workers, people aged 65 and over, etc.), (2) which goods and services should have their prices included in the index, and (3) what is the most appropriate way to measure changes in prices among different goods and services?

The Consumer Price Index for All Urban Consumers (CPI-U) and Consumer Price Index Research Series using Current Methods (CPI-U-RS) are two indices used to adjust for price changes in this report.[1] Both measure changes in the cost of living for all urban consumers and are produced by BLS. However, measuring inflation is challenging and both measures may have biases that may cause them to under- or over-state changes in prices.

In 1995, Congress commissioned a group of economists, led by Michael Boskin, to write a report on potential biases in price indices. The report (Boskin et al., 1996) asserted that the CPI-U overstated inflation for three reasons: (1) the measure did not account for consumer substitution, (2) it did not fully account for changes in the quality of existing goods and services, and (3) it did not properly account for new goods and services.[2]

In response to that report, BLS modified the CPI-U methodology.[3] However, historical CPI-U estimates were not updated to reflect the improved methodology. Due to interest from researchers, the CPI-U-RS was created to adjust the historical series (back to 1978) to reflect changes that resulted from these methodological improvements.[4] After years of public consultation, in 2001, the U.S. Census Bureau began using the CPI-U-RS to adjust historical income estimates for changes in the cost of living (DeNavas-Walt, Cleveland, and Roemer, 2001). In this way, the methodological improvements implemented in the CPI-U would also be accounted for, to the extent possible, in the years prior to their implementation.[5]

In 2002, BLS introduced the Chained Consumer Price Index for all Urban Consumers (C-CPI-U). The C-CPI-U is designed to account for an additional source of bias, upper-level substitution bias. BLS provides an example of how the CPI-U and C-CPI-U would differ. "For example, pork and beef are two separate CPI item categories. If the price of pork increases while the price of beef does not, consumers might shift away from pork to beef. The C-CPI-U is designed to account for this type of consumer substitution between CPI item categories. In this example, the C-CPI-U would rise, but not by as much as an index that was based on fixed purchase patterns."[6] In practice, the information on purchasing patterns is updated more frequently in the C-CPI-U than in the CPI-U and other nonchained price indices.

The C-CPI-U is available from 2000 onward. From 2000 to 2020, the year-to-year change in the C-CPI-U has been an average of 0.27 percentage points lower than for the CPI-U. Over time, these small annual differences compound to have large impacts on the inflation-adjusted value of income.

The Bureau of Economic Analysis (BEA) also releases price indices. Once such index is the Personal Consumption Expenditures Price Index (PCEPI), which BEA describes as "[a] measure of the prices that people living in the United States, or those buying on their behalf, pay for goods and services. The PCE price index is known for capturing inflation (or deflation) across a wide range of consumer expenses and reflecting

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[1] The CPI-U is used to adjust poverty thresholds and the CPI-U-RS is used to adjust historical income series. In 2021, the Bureau of Labor Statistics (BLS) renamed the Research Series (CPI-U-RS) the Retroactive Series (R-CPI-U-RS). In this report and all other associated content, it is referred to as the CPI-U-RS.

[2] There is much ongoing research into possible biases and improvements in price index measurements. A new Consumer Price Index Manual is currently in draft form, available at <www.imf.org/en/Data/Statistics/cpi-manual>. Some academic work includes Melser and Syed (2017), Kaplan and Schulhofer-Wohl (2017), Goolsbee and Klenow (2018), and Jaravel (2019) to name just a few from recent years.

[3] Refer to Johnson, Reed, and Steward (2006) for a discussion of how these issues were addressed. Refer to Reed and Ripley (2012) for a discussion of potential sources of bias even after these changes were made in response to the Boskin Commission.

[4] More information is available at <www.bls.gov/cpi/research-series/home.htm>.

[5] Refer to Appendix A section Cost-of-Living Adjustment for a description of the methodology currently used to adjust historical income estimates for inflation.

[6] Refer to <www.bls.gov/cpi/additional-resources/chained-cpi-questions-and-answers.htm>.

changes in consumer behavior."[7] Over the period from 2000 to 2020, year-to-year changes in the PCEPI have been largely consistent with the changes in the C-CPI-U. Over that period, the average year-to-year change in prices as measured by the C-CPI-U was 1.79 percent, as compared to 1.77 percent in the PCEPI, 2.06 percent in the CPI-U, and 2.07 percent in the CPI-U-RS.

Both the C-CPI-U and the PCEPI are deemed "superlative" indices, as both account for consumer substitution among goods and services as relative prices change. Since the PCEPI includes purchases from nonprofit institutions

in addition to households, the C-CPI-U is the superlative price index that most closely matches the sampling frame of the CPS ASEC and other Census Bureau household surveys.[8]

Figure D-1 and Table D-1 show historical income adjusted using the C-CPI-U compared to the CPI-U-RS from 2000 onward. For 2000, the income estimate in 2020 dollars adjusted using the

CPI-U-RS is $63,292, compared to $59,852 when adjusted using the C-CPI-U, a difference of 5.7 percent.

Since the C-CPI-U only exists from 2000 onward, an alternative price index must be used to adjust income for prior years. Figure D-1 and Table D-1 show historical income adjusted using two different methods for the pre-2000 period: the CPI-U-RS and the PCEPI. The CPI-U-RS is the method used currently by the Census Bureau for income estimates and is more reflective of the price changes experienced by households. The PCEPI has historically more closely matched the C-CPI-U and, like the C-CPI-U, is a chained, superlative price index.

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[7] Refer to <www.bea.gov/data/personal-consumption-expenditures-price-index>.

[8] The item weights in the C-CPI-U and CPI-U are derived from household survey data in the Consumer Expenditure Survey, which is conducted by the Census Bureau on behalf of BLS. The PCE item weights are derived from surveys such as the Census Bureau's annual and monthly retail trade surveys, the Service Annual Survey, and the Quarterly Services Survey. Refer to McCully, Moyer, and Stewart (2007) for more information on the differences between the BLS's price indices (CPI-U and C-CPI-U) and BEA's price indices (PCEPI).

Figure D-1.
Historical Median Income Using Alternative Price Indices: 1967 to 2020
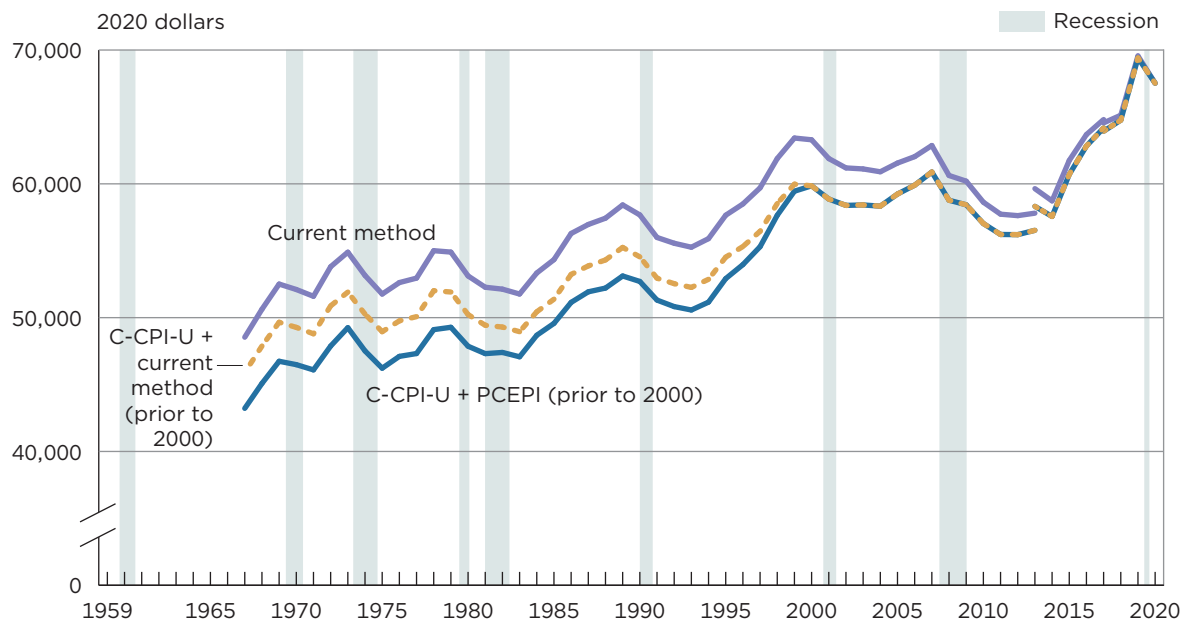
Notes: Inflation-adjusted estimates may differ slightly from other published data due to rounding. Details on the alternative price indices shown and historical footnotes are available in Appendix Table D-1. Information on confidentiality protection, sampling error, nonsampling error, and definitions is available at <https://www2.census.gov/programs-surveys/cps/techdocs/cpsmar21.pdf>.

Source: U.S. Census Bureau, Current Population Survey, 1968 to 2021 Annual Social and Economic Supplements (CPS ASEC).

For 1967, the estimate of median household income in 2020 dollars using the CPI-U-RS and shown in the principal figures and tables in this report is $48,537. When adjusted using the C-CPI-U from 2000 onward and the PCEPI for prior years, the estimate is $43,219, 11.0 percent lower. Using the C-CPI-U from 2000 onward and the CPI-U-RS for the period prior to 2000, real median household income in 1967 is $45,899, 5.7 percent less than the estimate using the CPI-U-RS for the entire period and 5.8 percent higher than the estimate using the C-CPI-U/PCEPI.

Given the additional bias corrected for by the C-CPI-U and the close correspondence between the PCEPI and C-CPI-U in the years both are available, the Census Bureau is considering the adoption of the C-CPI-U series using the PCEPI prior to 2000 as the price index used to adjust historical income tables for changes in the cost of living over time.

The Census Bureau would like to receive views and evidence on the relative technical merits of income series deflated by the C-CPI-U/PCEPI index as compared to our current CPI-U-RS-based adjustment. Please send comments on this issue to:

Charles Hokayem
Chief, Income Statistics Branch
Social, Economic, and Housing
Statistics Division
U.S. Census Bureau
<charles.hokayem@census.gov>

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Table D-1.
Historical Median Income Using Alternative Price Indices: 1967 to 2020
(Information on confidentiality protection, sampling error, nonsampling error, and definitions is available at <https://www2.census.gov/programs-surveys/cps/techdocs/cpsmar21.pdf>)

| Year | Current dollars | | CPI-U-RS/current method | | Chained CPI-U (2000–2020) | | | |
| | | | | | PCEPI (1967–1999) | | CPI-U-RS/current method (1967–1999) | |
	Estimate	Margin of error[1] (±)	Estimate	Margin of error[1] (±)	Estimate	Margin of error[1] (±)	Estimate	Margin of error[1] (±)
2020	67,521	782	67,521	782	67,521	782	67,521	782
2019	68,703	904	69,560	916	69,412	914	69,412	914
2018	63,179	691	65,127	712	64,760	708	64,760	708
2017[2]	61,136	530	64,557	559	63,930	554	63,930	554
2017	61,372	550	64,806	582	64,177	576	64,177	576
2016	59,039	716	63,683	774	62,826	764	62,826	764
2015	56,516	527	61,748	577	60,703	567	60,703	567
2014	53,657	645	58,725	706	57,563	692	57,563	692
2013[3]	53,585	1,076	59,640	1,197	58,318	1,170	58,318	1,170
2013[4]	51,939	453	57,808	505	56,527	494	56,527	494
2012	51,017	344	57,623	388	56,203	378	56,203	378
2011	50,054	413	57,732	476	56,216	464	56,216	464
2010[5]	49,276	535	58,627	636	57,034	619	57,034	619
2009[6]	49,777	350	60,200	424	58,435	412	58,435	412
2008	50,303	225	60,624	272	58,775	264	58,775	264
2007	50,233	230	62,865	288	60,883	279	60,883	279
2006	48,201	340	62,033	438	59,897	423	59,897	423
2005	46,326	254	61,553	339	59,238	326	59,238	326
2004[7]	44,334	322	60,901	443	58,332	424	58,332	424
2003	43,318	309	61,113	436	58,423	417	58,423	417
2002	42,409	229	61,190	330	58,389	315	58,389	315
2001	42,228	212	61,889	311	58,865	296	58,865	296
2000[8]	41,990	218	63,292	327	59,852	309	59,852	309
1999[9]	40,696	312	63,423	487	59,449	456	59,976	461
1998	38,885	379	61,891	602	57,651	561	58,528	569
1997	37,005	281	59,697	454	55,301	421	56,453	429
1996	35,492	294	58,494	485	53,963	447	55,315	459
1995[10]	34,076	324	57,655	548	52,917	503	54,522	518
1994[11]	32,264	242	55,905	419	51,159	383	52,867	396
1993[12]	31,241	240	55,263	425	50,571	389	52,260	402
1992[13]	30,636	239	55,559	433	50,826	396	52,540	409
1991	30,126	238	55,992	443	51,312	406	52,949	419
1990	29,943	252	57,677	485	52,705	443	54,543	459
1989	28,906	261	58,425	529	53,114	481	55,250	500
1988	27,225	219	57,433	462	52,210	420	54,312	437
1987[14]	26,061	203	56,964	442	51,931	403	53,868	418
1986	24,897	212	56,291	480	51,140	436	53,232	454
1985[15]	23,618	211	54,334	484	49,569	442	51,381	458
1984[16]	22,415	168	53,337	399	48,685	364	50,438	377
1983	20,885	157	51,764	387	47,074	352	48,951	366
1982	20,171	150	52,130	387	47,400	352	49,297	366
1981	19,074	165	52,272	451	47,311	408	49,431	426
1980	17,710	150	53,116	449	47,864	405	50,229	425
1979[17]	16,461	128	54,899	428	49,280	384	51,916	405
1978	15,064	100	55,004	366	49,104	327	52,015	346
1977	13,572	84	52,954	327	47,317	292	50,076	309
1976[18]	12,686	77	52,621	321	47,106	287	49,761	304
1975[19]	11,800	79	51,762	346	46,220	309	48,949	327
1974[19, 20]	11,197	71	53,154	336	47,513	300	50,265	318
1973	10,512	66	54,893	344	49,251	309	51,910	325
1972[21]	9,697	61	53,806	338	47,878	301	50,882	320
1971[22]	9,028	58	51,596	329	46,095	294	48,792	311
1970	8,734	53	52,103	314	46,488	280	49,272	297
1969	8,389	51	52,510	319	46,740	284	49,656	302
1968	7,743	46	50,628	301	45,083	268	47,877	285
1967[23]	7,143	43	48,537	291	43,219	259	45,899	275

Footnotes provided on the next page.

[1] A margin of error (MOE) is a measure of an estimate's variability. The larger the MOE in relation to the size of the estimate, the less reliable the estimate. This number, when added to and subtracted from the estimate, forms the 90 percent confidence interval. MOEs shown in this table are based on standard errors calculated using replicate weights.

[2] Implementation of an updated CPS ASEC processing system.

[3] The 2014 CPS ASEC included redesigned questions for income and health insurance coverage. All of the approximately 98,000 addresses were eligible to receive the redesigned set of health insurance coverage questions. The redesigned income questions were implemented to a subsample of these 98,000 addresses using a probability split panel design. Approximately 68,000 addresses were eligible to receive a set of income questions similar to those used in the 2013 CPS ASEC, and the remaining 30,000 addresses were eligible to receive the redesigned income questions. The source of these 2013 estimates is the portion of the CPS ASEC sample that received the redesigned income questions, approximately 30,000 addresses.

[4] The source of these 2013 estimates is the portion of the CPS ASEC sample that received the income questions consistent with the 2013 CPS ASEC, approximately 68,000 addresses.

[5] Implementation of 2010 Census-based population controls. Beginning with 2010, standard errors in this table were calculated using replicate weights. Before 2010, standard errors were calculated using the generalized variance function.

[6] Median income is calculated using $2,500 intervals. Beginning with 2009 income data, the Census Bureau expanded the upper income intervals used to calculate medians to $250,000 or more. Medians falling in the upper open-ended interval are plugged with "$250,000." Before 2009, the upper open-ended interval was $100,000 and a plug of "$100,000" was used.

[7] Data have been revised to reflect a correction to the weights in the 2005 CPS ASEC.

[8] Implementation of a 28,000-household sample expansion.

[9] Implementation of 2000 Census-based population controls.

[10] Full implementation of 1990 Census-based sample design and metropolitan definitions, 7,000-household sample reduction, and revised editing of responses on race.

[11] Introduction of 1990 Census sample design.

[12] Data collection method changed from paper and pencil to computer-assisted interviewing. In addition, the 1994 CPS ASEC was revised to allow for the coding of different income amounts on selected questionnaire items. Limits either increased or decreased in the following categories: earnings limits increased to $999,999; social security limits increased to $49,999; supplemental security income and public assistance limits increased to $24,999; veterans' benefits limits increased to $99,999; child support and alimony limits decreased to $49,999.

[13] Implementation of 1990 Census population controls.

[14] Implementation of a new CPS ASEC processing system.

[15] Recording of amounts for earnings from longest job increased to $299,999. Full implementation of 1980 Census-based sample design.

[16] Implementation of Hispanic population weighting controls and introduction of 1980 Census-based sample design.

[17] Implementation of 1980 Census population controls. Questionnaire expanded to allow the recording of up to 27 possible values from a list of 51 possible sources of income.

[18] First year medians were derived using both Pareto and linear interpolation. Before this year, all medians were derived using linear interpolation.

[19] Some of these estimates were derived using Pareto interpolation and may differ from published data, which were derived using linear interpolation.

[20] Implementation of a new CPS ASEC processing system. Questionnaire expanded to ask 11 income questions.

[21] Full implementation of 1970 Census-based sample design.

[22] Introduction of 1970 Census sample design and population controls.

[23] Implementation of a new CPS ASEC processing system.

Note: Inflation-adjusted estimates may differ slightly from other published data due to rounding. Details of the Consumer Price Index for All Urban Consumers (CPI-U) are available at <www.bls.gov/cpi /questions-and-answers.htm>. The CPI Research Series Using Current Methods (CPI-U-RS) is described at <www.bls.gov/cpi/research -series/r-cpi-u-rs-home.htm>. The Chained Consumer Price Index for All Urban Consumers (C-CPI-U) is described at <www.bls.gov/cpi /additional-resources/chained-cpi.htm>. The Personal Consumption Expenditure Prices Index (PCEPI) is described at <www.bea.gov /data/personal-consumption-expenditures-price-index>. The current method for historical income adjustment uses the CPI-U-RS from 1978 to the present and the CPI-U-X1 from 1967–1977. The CPI-U-X1 was an experimental series that preceded the CPI-U-RS and shows what the inflation rate in the CPI-U might have been, if the current rental equivalence method of measuring the cost of homeownership had been in place prior to 1983.

Source: U.S. Census Bureau, Current Population Survey, 1968 through 2021 Annual Social and Economic plements (CPS ASEC).