FIFTY YEARS OF GROWTH IN AMERICAN CONSUMPTION, INCOME, AND
WAGES

Bruce Sacerdote

ABSTRACT

Despite the large increase in U.S. income inequality, consumption for families at the 25th and 50th percentiles of income has grown steadily over the time period 1960-2015. The number of cars per household with below median income has doubled since 1980 and the number of bedrooms per household has grown 10 percent despite decreases in household size. The finding of zero growth in American real wages since the 1970s is driven in part by the choice of the CPI-U as the price deflator (Broda and Weinstein 2008). Small biases in any price deflator compound over long periods of time. Using a different deflator such as the Personal Consumption Expenditures index (PCE) yields modest growth in real wages and in median household incomes throughout the time period. Accounting for the Hamilton (1998) and Costa (2001) estimates of CPI bias yields estimated wage growth of 1 percent per year during 1975-2015. Meaningful growth in consumption for below median income families has occurred even in a prolonged period of increasing income inequality, increasing consumption inequality and a decreasing share of national income accruing to labor.

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Introduction

      Nearly every week Americans are greeted with headlines such as "Millennials Earn Less Than Their Parents[1]," "America's Productivity Climbs But Wages Stagnate[2]," and "For Most Workers, Real Wages Have Barely Budged For Decades."[3] The finding of almost no real wage growth since 1975 comes from taking the Bureau of Labor Statistics' Average Hourly Earnings of Production and Non-Supervisory Workers and using the CPI-Urban to inflate wages to 2015 dollars. This exercise yields the alarming picture in Figure 1.

      Focusing only on these particular price and wage series gives policy makers, citizens and workers an incomplete picture because the choice of price deflator makes a big difference. Most economists believe that the CPI includes upward biases which compound significantly over time (See Hausman [2003] and Broda and Weinstein [2008] for a summary). Overstating price growth mechanically implies understating real wage growth (Costa 2001, Hamilton 1998 and Klenow 2003).

      In the first part of this descriptive paper I consider growth in household consumption for households with below median income. The pessimistic narrative on real wages is somewhat at odds with casual empiricism about material goods consumption. If you spend time working with high school students, you notice that even in low income areas, many of the students have cell phones and have access to cable TV and internet service at home. Access to these powerful and modern tools suggests that low income families have seen important gains in at least some areas of consumption. The quality and variety of home appliances and electronics (TVs) in the average home is surely vastly superior to what people owned in the 1970s. American homes have become more spacious and cars are both higher quality and there are more cars per family.

      Measuring consumption formally in the Census, the American Housing Survey and the Consumer Expenditure Survey confirms these casual observations. Among all households with below median incomes, the number of cars per household has risen from 1 to 1.6 during 1970-2015. And median square footage in these families' homes has risen about 8%. Consider consumption measured in 2015 dollars among two person households with below median income. I find a 62 percent increase in consumption during 1960 to 2015. This calculation uses the CPI and does not fully include increases in the quality of goods and services. After adjusting

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[1] http://www.forbes.com/sites/jmaureenhenderson/2013/11/30/millennials-earn-less-than-their-parents-and-the-recession-isnt-to-blame/#2c4f8d5f430b
[2] http://www.nytimes.com/2013/01/13/sunday-review/americas-productivity-climbs-but-wages-stagnate.html
[3] http://www.pewresearch.org/fact-tank/2014/10/09/for-most-workers-real-wages-have-barely-budged-for-decades/

CPI for the bias estimated by Hamilton (1998) and Costa (2001), I calculate a 164% increase in consumption for these households.

In the second part of the paper, I calculate real wages using either the Fed's preferred inflation measure of PCE (Personal Consumption Expenditures) or using simple adjustments to CPI using magnitudes suggested by the Boskin commission (Boskin et al 1996) and Costa (2001). This adjustment reverses the finding of wage stagnation. Using the PCE to deflate nominal wages suggests real wage growth of 24 percent from 1975-2015 or about .54% growth in real wages per year. That growth is significantly less than the 1.18% annual growth in real wages (using PCE inflation) seen in the earlier decade 1964-1975 and is significantly less than GDP per capita growth of 1.8 percent over the 1975-2015 period. But 24 percent growth from 1975-2015 is substantially better than zero growth and the PCE inflation could itself still contain upward bias. Adjusting for the Hamilton (1998) and Costa (2001) estimates of CPI bias implies real wage growth of 1 percent per year during 1975-2015 and GDP per capita growth of 2.7 percent per year. My de-biased estimates of real wage growth are quite similar to those obtained by Broda and Weinstein [2008] using an individual goods based approach to estimate CPI bias.

Relation to Prior Literature

Economists and other social scientists have performed in depth analyses documenting the rise in income inequality in the past 30 years. See Piketty and Saez (2003) and Piketty (2014). A number of authors have pointed out that accounting for tax law changes (Slemrod 1995), household size and filing status, and transfers (Burkhauser, Feng, Jenkins, and Larrimore (2012) somewhat alters the measured increase in inequality over time.

Several authors including Aguiar and Bils (2015), Krueger and Perri (2007) and Attanasio Battistin and Ichimura (2004) point out that growth in consumption inequality has not been as severe as the growth in income inequality. Transfers, taxation, consumption smoothing, and changing household composition can all cause a divergence between income inequality changes and consumption inequality changes.

Fewer papers address whether _levels_ of income, wages, consumption and well-being are rising in absolute terms over time for the non-rich. This is an equally important but even harder question to answer. Costa (2001), Broda and Weinstein (2008) and Meyer and Sullivan (2012) are among the best such papers. The latter calculates consumption based measures of poverty rates and how these have evolved over time. Meyer and Sullivan show that consumption based poverty measures have been falling since 1982 even as official income based poverty measures are relatively flat. They note that one issue with the income based poverty measure is the exclusion of transfers and taxation from income and a second issue is the use of potentially upward biased

CPI-U to deflate income.[4]   Unlike Meyer and Sullivan I focus directly on growth rates in consumption for the non-rich as opposed to changes in poverty rates.[5]   But the basic points about the importance de-biasing price indices and how this changes our view of improvements in living standards are the same.

Questions on the level of consumption are difficult because this requires some comparison of prices, quality, and good availability over time. The iPhone of today has more computing power than a 1990s mainframe computer. But is a poor person with an iPhone richer than a person who owned a mainframe 25 years ago?

A very thoughtful literature addresses the possible problems with the CPI price index, including the size and sources of the biases, possible solutions, and most importantly implications for calculating real income growth.   The Boskin Commision (1996) parsed the upward biases in CPI into 1) new goods bias: failure to quickly incorporate new goods, 2) product quality bias: failure to account for growth in product and service quality, 3) outlet bias: failure to incorporate availability of new less expensive outlets e.g. Wal-Mart, Best Buy or Amazon, and 4) substitution bias i.e. failure to account for consumer's ability to substitute away from more goods or services that become relative more expensive.

Hausman (2003) is a treatise on the subject and addresses the source of each bias, attempts to measure the bias, and discusses how different price indices can mitigate the bias. Broda and Weinstein [2010] use scanner (bar code) level consumption data to estimate that new goods bias and quality bias together contribute about .18 percentage points of upward CPI bias annually during 1994-2003. An additional .4 percentage points of upward bias comes from failure to account for substitution away from more expensive goods or varieties (Broda and Weinstein 2008)[6]. Costa (2001) and Hamilton (2001) each suggest that CPI is upward biased by about 1.6 percent per year from 1972-1994. Bils and Klenow (2001) estimate a bias of 2.2 percent per year.

The Hamilton (1998) technique of calculating CPI bias is ingenious in that it only requires a modest number of data inputs. Hamilton's insight is that food's share of the household budget over time should depend only upon income and the price of food relative to all other goods. If incomes are not rising, changes in food's budget share should be attributable to changes in the relative cost of food. In reality, PSID (Panel Study of Income Dynamics) data show food's budget share falling over time even holding the relative price of food and CPI adjusted income constant. This is a strong indication that the CPI is over adjusting and that true real incomes are indeed rising. It is easy to calculate the CPI bias as that adjustment to CPI needed to explain the

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[4] My contribution is to focus on growth rates in consumption instead of changes in poverty rates.
[5] Broda and Weinstein (2008) examine both consumption and poverty rates.
[6] These authors estimate the total CPI bias to be 1 percentage point per year. This includes .31 percentage points of substitution and quality bias in the non-housing service sector.

difference between true food budget share and predicted food budget share. Hamilton finds that CPI is overstated by 3 percent per year from 1974-1981 and 1 percent per year from 1981-1991.

Costa (2001) uses the same technique but is able to estimate CPI bias for the entire time period from 1888-1994. Costa uses both food and recreation as the index or base goods. Changes in food's (recreation's) budget share are explained by 1) changes in the price of food (recreation) relative to all other goods, 2) changes in real income, and 3) CPI bias which would cause an overstatement or understatement of real income. Costa is able to show that real incomes actually grew (not shrank) by an average of .5% per year during 1919-1935. Overall she finds that CPI bias average 1.6% per year from 1972-1994 and .6% from 1982-1994. I extend these results to 2015 and find smaller CPI bias in the most recent twenty years.

I make several contributions. First I extend the existing work to 2015. Second, I focus on the lower half of the income distribution by examining real hourly wages and consumption for families with below median income. Third I show time series for physical measures of consumption such autos and square footage of homes.

Results

I begin with a series of calculations about growth in consumption for below median households. Figure 2 uses Census Data to show vehicles owned per household 1960-2015 for families above median income (blue line), below median income (red line) and below the 25th percentile of income (green line). The lines all rise roughly in parallel. Families below the 25th percentile have seen vehicles per household rise from about .75 in 1970 (and 1980) to 1.4 in 2015. This implies almost a doubling in vehicles per household. Importantly the quality, reliability, safety and gas mileage of these vehicles have also improved immensely. For example, the average vehicle in operation in 1969 was 5.1 years old whereas in 2014 the average vehicle in operation was 11.4 years old. This is likely not because people in 2014 are so poor that they are forced to drive old cars, but rather that modern cars simply last much longer and are probably more reliable even given this extended product life.

In Figure 3, I show Census data on the prevalence of indoor plumbing by household income group. In 1960, 35 percent of households below the 25th percentile of household income did not have indoor plumbing. By 1970 this measure of deprivation shrank to 12 percent and by 2015 virtually all households at all income groupings had indoor plumbing.

Figure 4 considers bedrooms per household. There is about 10% growth in the number of bedrooms per household at all three income levels shown. For households below the 25th percentile of income, bedrooms per household rises from about 2 to 2.2. Appendix Figure 2 shows these same facts but using American Housing Survey data instead of Census data. Figure 5 switches to bathrooms per household and uses data from the Consumer Expenditure Survey. Bathrooms per household grow by about 50 percent during 1986-2015 for families with below median income.

Using American Housing Survey data, I calculate growth in median square feet of homes. For families below median income, square footage has risen from 1200 square feet to 1300 square feet from 1993 to 2009. This is 8 percent overall growth. Families above median incomes experienced growth of 13 percent during this same time period. This is consistent with my hypothesis that there has been consumption growth for both rich and non-rich families though the rich have seen larger increases.

Given the problems with making price adjustments over long periods of time, I prefer the above physical quantity measures of consumption over dollars of consumption. However, I only have these few limited items for which I know quantities consumed over time.

Given this limitation, I now turn to dollar based measures of consumption in the Consumer Expenditure Survey (CEX). I inflate CEX consumption measures to 2015 dollars using both standard CPI and CPI as de-biased using the Hamilton (1998)/ Costa (2001) estimates. As mentioned this method attributes decreases in food share (that cannot be accounted for by changes real income, relative prices or demographics) to *mismeasurement* in real incomes i.e. CPI bias. Appendix 1 describes the method in more detail. For the 1974-1981 period I assume CPI bias to be 3 percentage points per year as estimated by both authors. For 1982-1995 I use Costa's estimate of .6 percentage points of bias. For 1996-2006 I also use .6.[7] And for the most recent period I use my own estimate of 0 percentage points of bias.

Table 1 examines annual expenditures over time for two person households with below median income. All figures are in 2015 dollars. The first column inflates expenditures using CPI adjusted for bias following Hamilton/ Costa. The second column inflates expenditures using standard CPI. The remaining columns also use standard CPI but I use the individual CPI components for food, housing, apparel, utilities etc.

Column 1 is for all expenditures, annualized and inflated using the de-biased CPI. Note that since I am inflating all figures to 2015 dollars, debiased price inflators will leave the 2015 expenditure the same but have the effect of lowering the 1960-2006 figures; I am applying a smaller inflation factor to those earlier nominal numbers since data suggest that there was less actual price inflation than implied by CPI.

Column 1 shows total expenditures for below median income households of two people. Total expenditures rose from $14,396 in 1960 to $38,008 in 2015. This implies an annual growth rate of 1.78 percent over the whole time period.

Column 2 uses standard CPI adjustment (meaning that all years other than 2015 are multiplied by a larger inflation factor than in column 1). Using standard CPI reduces the real growth rate of

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[7] My own analysis estimates 1.7 percentage points of bias for 1996-2006. Since I have no other reason to believe that bias became worse from the early 1990s to the late 1990s, I use .6 for 1996-2006 to provide more conservative estimates of growth.

consumption (for below median households) to 1 percent per year. This is certainly less than annual GDP growth of 1.8 percent, though still meaningful growth in consumption.

Column 3 measures total spending on basic needs of food, housing, clothing, healthcare and utilities. Price adjustment is performed using the individual CPI components as published (without de-biasing). Again we see 1 percent annual growth in consumption averaged over the whole time period of 1960-2015. Not surprisingly expenditures on food and apparel in columns 5 and 6 grew less rapidly than overall consumption. Food's falling budget share is consistent with increases in real incomes for these households and or possibly relative changes in prices (for food and apparel) that are not fully captured by CPI component indices.

The steady growth I observe in consumption for below median income households (quantity based and dollar based) is at odds with the pessimistic picture of wages presented in Figure 1. Likely many explanations are at work for this divergence including the increased prevalence of two earner families, increases in transfer payments or increases in the progressivity of taxes.[8] One candidate explanation is that real wages were in fact growing during 1975-2015 and that our standard CPI price adjustment is hiding this growth.

In Figure 1, real wages fall substantially from 1975 until 1995 and then recover during 1996-2015. Figure 6 shows that this picture changes quite a bit under three alterative sets of price inflators. The green line uses the Federal Reserve's preferred measure of the Personal Consumption Expenditures price index. The main difference between this index and the CPI is that PCE contains some additional components of consumption but more importantly PCE weights the components by total consumption of that good or service in the economy. This allows for substitution across goods to influence the overall price level change.

The red line represents real wages assuming that CPI growth is always overstated by 20 percent. There is no theoretical justification for the choice of 20 percent but many estimates of CPI bias tend to be in the range of 20 percent of CPI's growth. Assuming that CPI is off by a relative amount rather than a fixed percentage point amount seems appealing particularly in the current era of low inflation.[9]

The orange line represents real wages where the CPI has been corrected for the bias measured in the Hamilton (1998) and Costa (2001) analyses. As mentioned in the introduction all three adjustments lead to conclusions of real wage growth instead of stagnation. PCE adjustment implies 0.51 percent per year of wage growth from 1975-2015. The red line which removes 20 percent of CPI growth implies real wage growth of 0.76 percent per year from 1975-2015. The Hamilton/ Costa adjustment implies 1 percentage point of wage growth per year.

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[8] Increases in hours worked per worker are likely not the explanation since hours worked are falling during this time period (Alesina, Glaeser and Sacerdote).

[9] Adjusting CPI inflation downward by 1 percentage point seems plausible in an environment of 5% inflation but extreme with the current 1.7% inflation.

Table 3 shows estimates of annualized growth rates in wages by decade. The first column shows growth in real wages using CPI deflation. This column show real wages fell by 0.8 percent per year during the ten years January 1975-January 1985 and fell by 0.6 percent per year during the ten years ended in 1995.[10] In the subsequent two decades wage growth is positive 0.8 percent per year and 0.7 percent per year respectively.

The next three columns calculate growth in real wages using a) PCE adjustment, b) an assumption of 20% upward bias in CPI growth, and c) Hamilton/ Costa adjustment to CPI. The picture looks progressively more optimistic as we move from left to right. PCE adjustment still has negative wage growth in the first two decades (75-85 and 85-95) but the decreases in real wages are smaller. Hamilton/ Costa bias adjustment implies annual real wage growth of 1.4% during 1975-1985, .2 percent per year during 1985-1995, 1.4 percent during 1995-2005 and .8 percent in the most recent decade.

Concluding Remarks

Consumption for below median income families has seen steady progress since 1960. My preferred point estimates are based on CEX measures of consumption where the price index has been de-biased following Hamilton and Costa. These estimates suggest that consumption is up 1.7 percent per year or 164 percent over the whole time period. These estimates of growth strike me as consistent with the significant increases in quality and quantity of goods enjoyed by Americans over the last half century. And my conclusions are consistent with the findings of Broda and Weinstein (2008). Estimates of slow and steady growth seem more plausible than media headlines which suggest that median American households face declining living standards.

The bias adjusted estimates also provide a more positive outlook on real wage growth in the last 40 years than standard media headlines. PCE adjusted wages appear to have grown at .5% per year during 1975-2015 while the de-biased CPI adjusted wages grew at 1% per year over the same time period.

Importantly these estimates do not tell us anything about why wages grew more slowly than GDP or why inequality increased. CPI bias does not explain decreases in labor's share of income (Krueger 1999) or the associated rise in inequality (Pikkety and Saez 2003). Adjusting the price index downward leads to higher estimated real wage growth *and* higher estimated real GDP growth.

What I do not address here is why Americans *feel* worse off if consumption is actually rising. There are at least four important explanations that may be at work. First, I am only examining consumption within very large sections of the income distribution and there may be specific

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[10] My endpoints are January of each year which is why I refer to decades (eg 1975-1985 and 1985-1995) which appear to but do not overlap.

groups (for example less than high school educated men) for whom consumption is actually falling. Second, it's possible that the quality of some services such as public education or health care could be falling for some groups. Third, the rise in income inequality coupled with increased information flow about other people's consumption may be making Americans feel worse off in a relative sense even if their material goods consumption is rising. Fourth, changes in family structure (e.g. the rise of single parent households), increases in the prison population, or increases in substance addiction could make people worse off even in the face of rising material wealth. A deep future research agenda would be to understand how America has lost its sense of optimism about living standards and whether the problem is one of consumption, relative consumption (relative to other people) or something entirely different.

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Table 1 : Consumer Expenditure Survey Expenditures Over Time : Two Person Households Below Median Income

This table shows annual CEX expenditures for two person households with below median income. All figures are in 2015 dollars. Column 1 uses CPI inflation but with bias adjustments of Hamilton and Costa. Columns 2-5 use CPI inflation for each relevant category of expenditure.

Year	Total Expend-itures CPI w/Hamilton Adjustment	Total Expend-itures CPI Inflated	Food, Housing, Apparel Health Utilities (CPI Inflated)	Housing, (CPI Inflated)	Food, (CPI Inflated)	Apparel (CPI Inflated)
1960	14,396	22,253	12,786	4,288	6,212	511
1972	20,937	30,885	15,907	6,575	7,533	575
1986	25,580	29,203	19,458	11,447	5,454	798
1996	28,636	30,370	19,801	10,944	6,070	881
2006	34,754	34,757	20,737	12,092	5,977	900
2015	38,008	38,008	22,098	13,070	6,362	612
Ann Growth 60-15	0.0178	0.0098	0.0100	0.0205	0.0004	0.0033

Table 2 : Consumer Expenditure Survey Expenditures Over Time : Two Person Households Above Median Income

This table shows annual CEX expenditures for two person households with below median income. All figures are in 2015 dollars. Column 1 uses CPI inflation but with bias adjustments of Hamilton and Costa. Columns 2-5 use CPI inflation for each relevant category of expenditure.

Year	Total Expend-itures CPI w/Hamilton Adjustment	Total Expend-itures CPI Inflated	Food, Housing, Apparel Health Utilities (CPI Inflated)	Housing, (CPI Inflated)	Food, (CPI Inflated)	Apparel (CPI Inflated)
1960	31,311	48,399	24,067	8,861	10,968	1,558
1972	35,784	52,786	23,975	10,646	10,449	1,276
1986	50,894	58,103	33,437	20,923	8,198	2,244
1996	54,364	57,655	32,092	19,651	8,385	1,932
2006	67,126	67,132	34,195	21,404	8,403	2,130
2015	69,543	69,550	32,397	19,613	8,624	1,461
Ann Growth 60-15	0.0146	0.0066	0.0054	0.0146	-0.0044	-0.0012

Table 3 : Annualized Growth in Real Wage and Median Household Income Under Various Inflation Measures

Wage data are BLS hourly wage series for production and non-supervisory workers. CPI adjustment used CPI Urban. PCE adjustment uses deflator for Personal Consumption Expenditures. Third column adjusts CPI by assuming that CPI growth is biased upwards 20% in all years. Fourth column removes CPI upward bias by time period using Hamilton and Costa's method as described in text and in appendix 1.

Growth in Hourly Wages of Production and Non-supervisory Workers

Decade Ending In…	Real Wage Growth Using CPI	Real Wage Growth Using PCE Adjustment	Real Wage Growth Assuming CPI Inflation 20% Overstated	Real Wage Growth Removing Hamilton and Costa Estimates of CPI Bias
1985	-0.008	-0.001	0.006	0.014
1995	-0.006	-0.002	0.001	0.002
2005	0.008	0.014	0.013	0.014
2015	0.007	0.009	0.011	0.008

Growth in Median Household Income

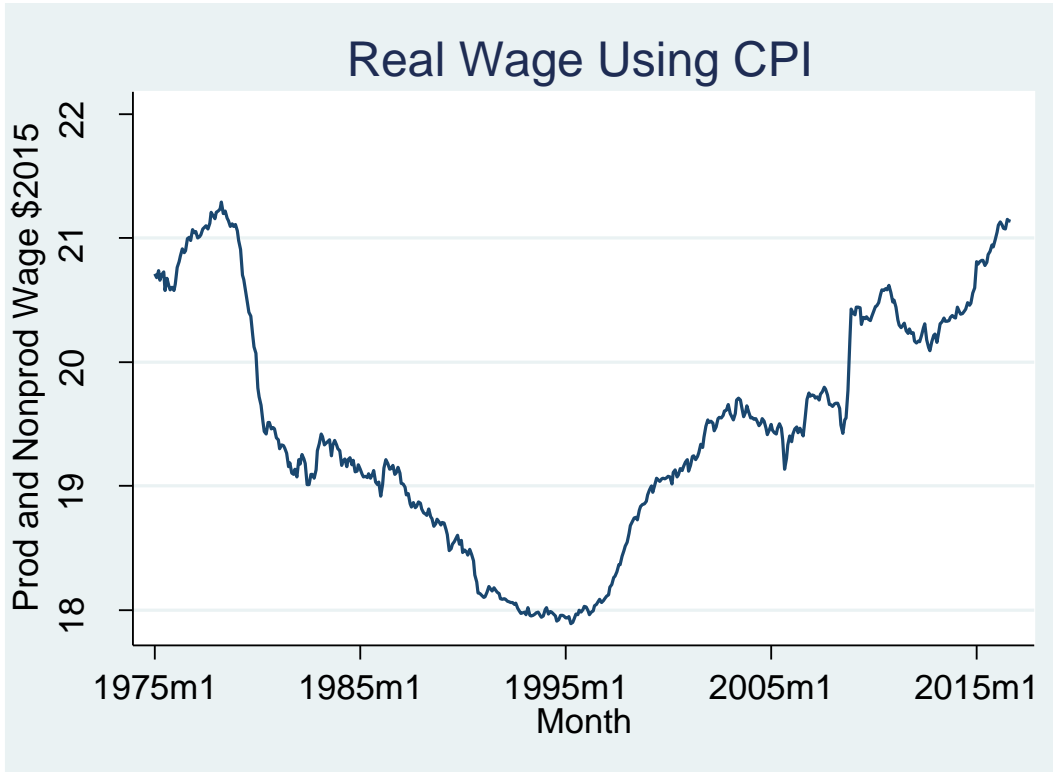| Decade Ending In…	Real HH Income Growth Using CPI	Real HH Income Growth Using PCE Adjustment	Real HH Income Growth Assuming CPI Inflation 20% Overstated	Real HH Income Growth Removing Hamilton and Costa Estimates of CPI Bias
1985				
1995	0.001	0.006	0.008	0.01
2005	0.007	0.012	0.011	0.013
2015	-0.001	0.002	0.004	0.001

Figure 1

Real Wage Using CPI

Figure 2

Vehicles per Household Over Time: Above Median Household Income, Below Median and Below 25th Percentile. Census and American Community Survey Data.
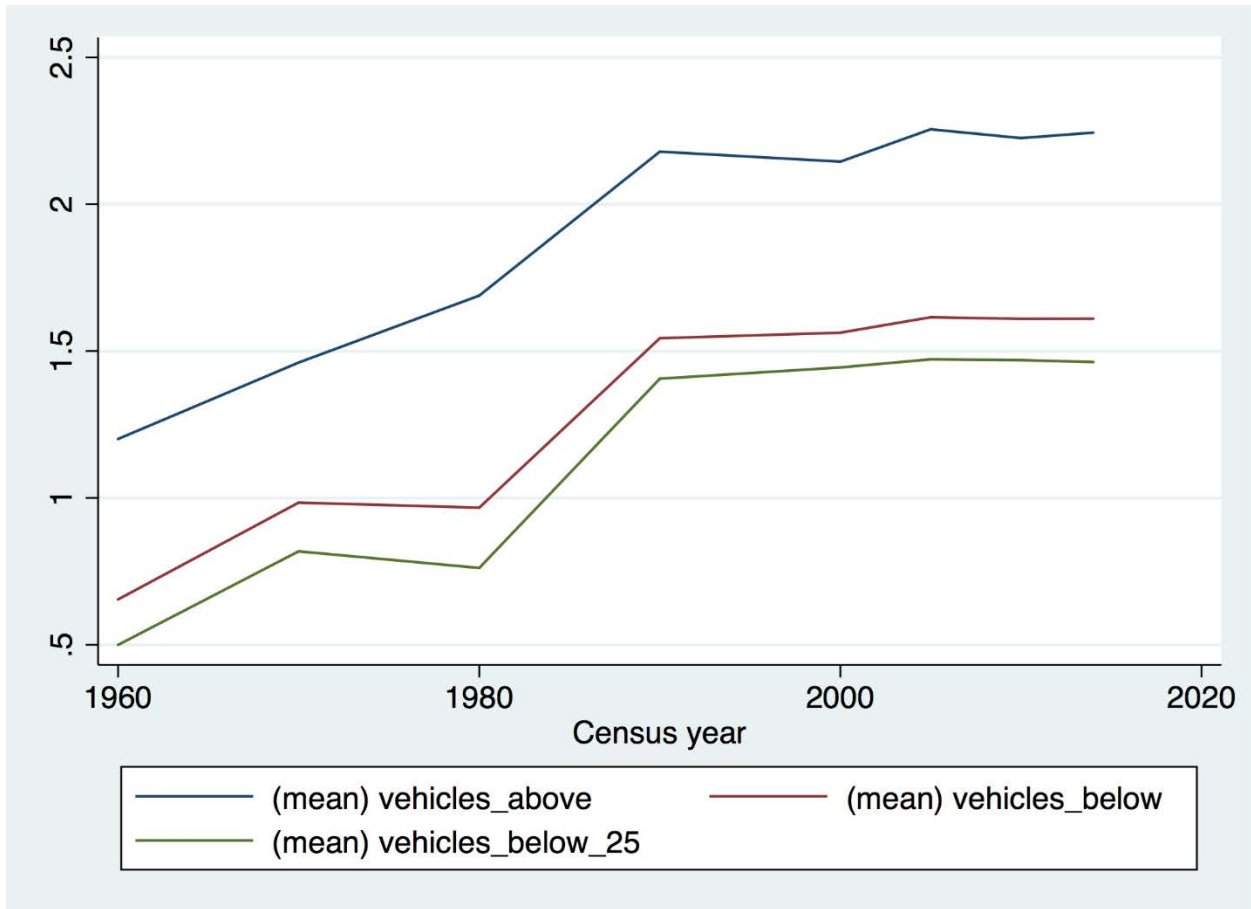
Figure 3

Households With Indoor Plumbing Over Time: Above Median Household Income, Below Median and Below 25th Percentile. Census and American Community Survey Data.

Figure 4

Bedrooms Per Household: Above Median Household Income, Below Median and Below 25th Percentile. Census and American Community Survey Data.
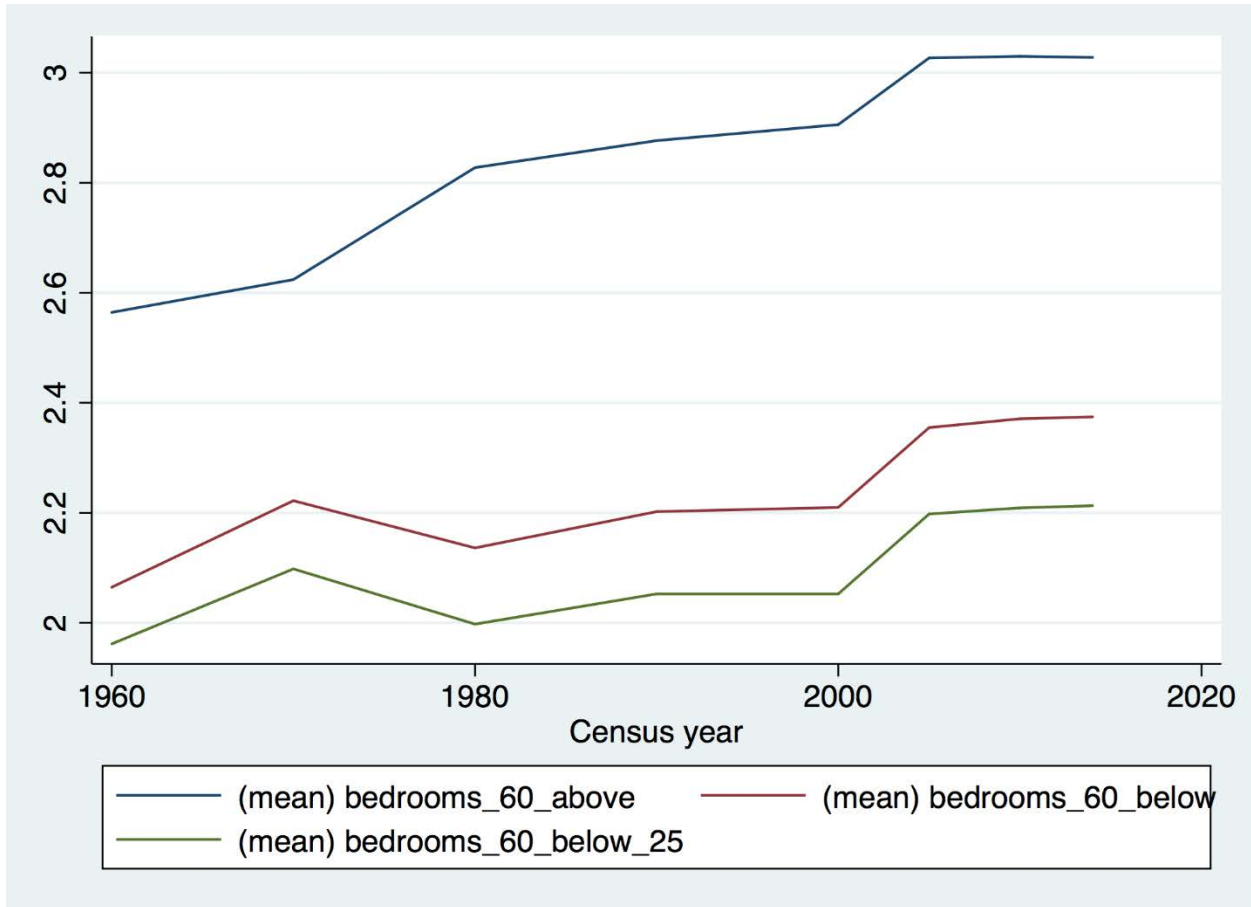
Figure 5

Bathrooms Per Household: Above Median Household Income, Below Median and Below 25th Percentile. Census and American Community Survey Data.
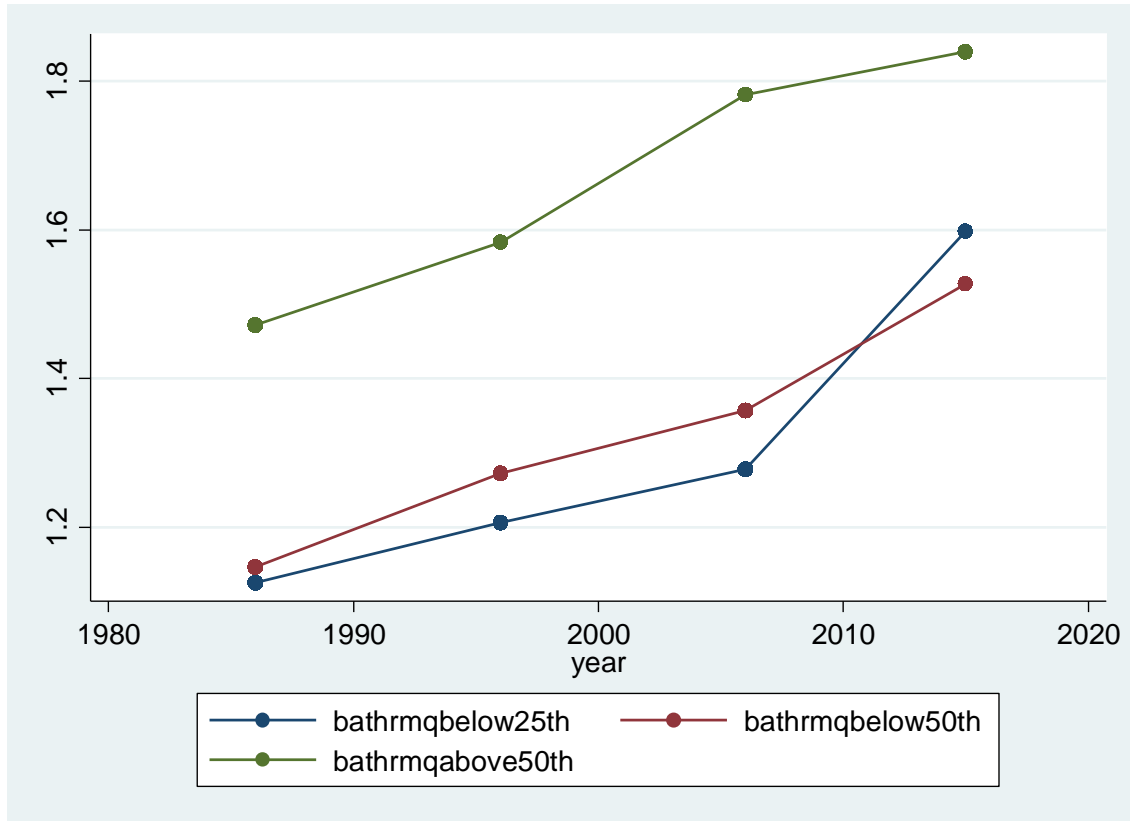
Figure 6

Real Hourly Wages in 1975 dollars with Four Different Inflation Adjustments

Lines from bottom to top are: wages deflated by CPI (blue line), deflated by PCE (green line), deflated assuming CPI 20% overstated (red line), deflated assuming Hamilton/ Costa estimates of CPI bias (orange line)
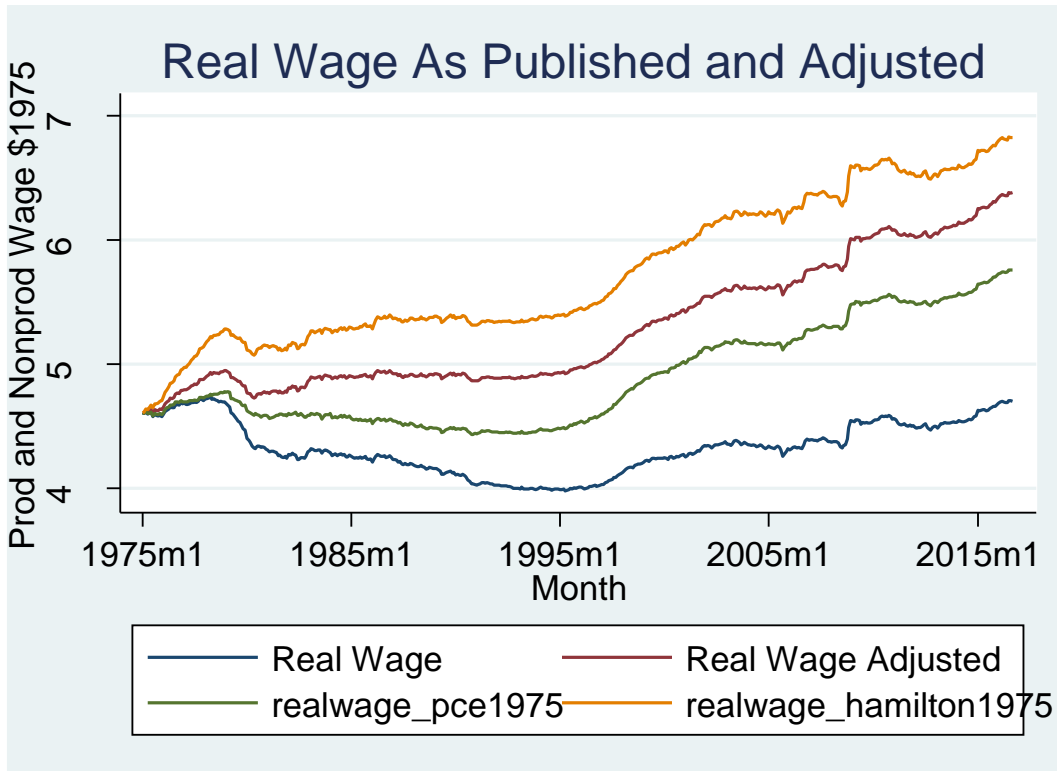
Figure 7

Real Wages in 2015 dollars with Four Different Inflation Adjustments

These are the same data as in Figure 7 but instead of deflating to 1975, I inflate to 2015 dollars. Mechanically that means that 2015 data point will be the same for all series but that the bias corrected real wages in earlier years are lower ; those wages truly were lower in real terms than suggested by standard CPI adjustment if standard CPI adjustment was inflating them too much.

Lines from top to bottom are: wages deflated by CPI (blue line), deflated by PCE (green line), deflated assuming CPI 20% overstated (red line), deflated assuming Hamilton/ Costa estimates of CPI bias (orange line)
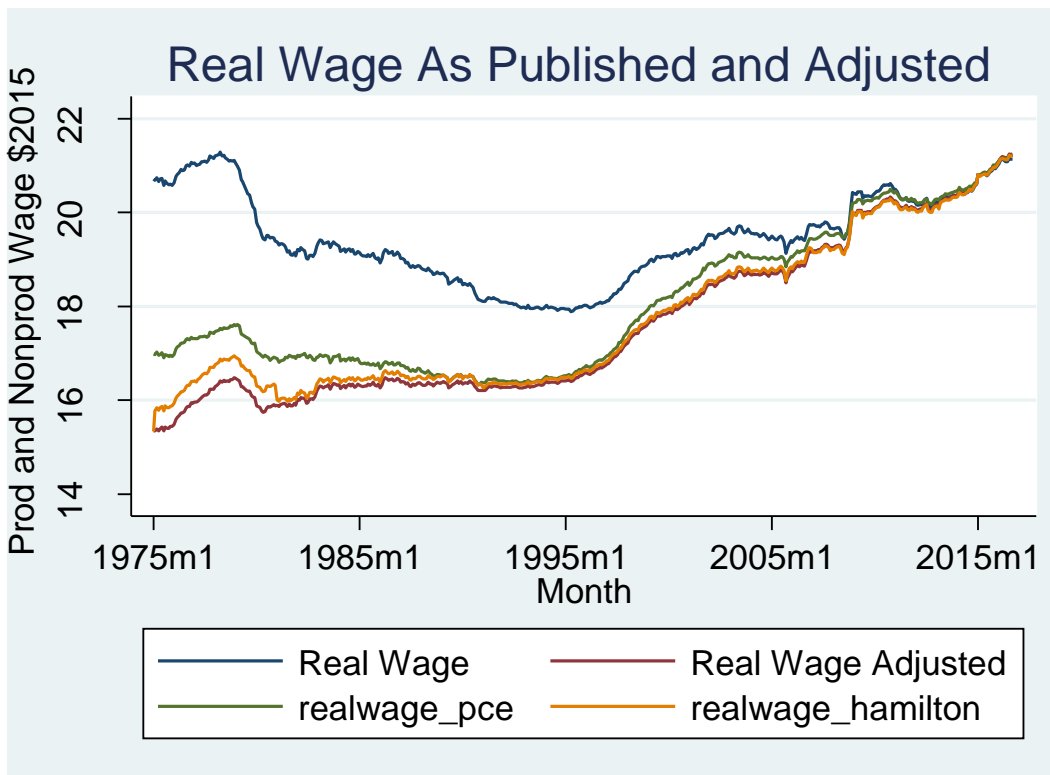
Appendix 1

Changes in Food Share and Implied CPI Bias Using Hamilton/ Costa Approach

Hamilton starts with the premise that changes food's share of consumption should be explained by changes in relative food prices and changes in real income. Unexplained changes in food share can be attributed to changes in real income not captured by CPI, ie by CPI bias. Column (2) labeled unexplained growth in food share is from a household level regression of food share on household characteristics and real income. Following Hamilton I translate this into implied CPI Bias using his equation (9) CPI Bias= - (δ_t - γ ($\pi_{ft} - \pi_{nt}$) / β . δ_t is the year dummy (unexplained change in food share) from a regression of food share on household characteristics and income. γ is the responsiveness of food share to the relative prices of food and non food $\pi_{ft} - \pi_{nt}$ and β is the responsiveness of food share to income.

	Actual Food Share	Cumulative Unexplained Growth in Food Share	Gap Between Food and Non Food CPI	Estimate of the Cumulative Bias Since 1960	Estimate Annual Bias Over Between Rows
1960	0.277				
1972	0.244	-0.019	-0.005	0.183	0.014
1986	0.197	-0.082	-0.021	0.815	0.036
1996	0.203	-0.079	-0.024	0.780	-0.003
2006	0.174	-0.098	-0.026	0.969	0.017
2015	0.180	-0.095	0.048	0.967	0.000

Estimated CPI Bias For Figure Using Hamilton/ Costa Approach

	Estimate of CPI Bias	Source
1974-1981	0.030	Hamilton And Costa
1981-1991	0.006	Costa
1996-2006	0.006	Sacerdote Estimate of .017 Lowered to be conservative
2007-2015	0.000	Sacerdote

Appendix 2

Bedrooms Per Household American Housing Survey Data

Graphs use survey weights in AHS. Upper line is for households with above median income and lower line is for households with below median income.