Debt by a Thousand Cuts: Stagnating Incomes and Rising Household Debt Levels

By Steven Pressman, Colorado State University and Robert Scott, Monmouth University

1. Introduction

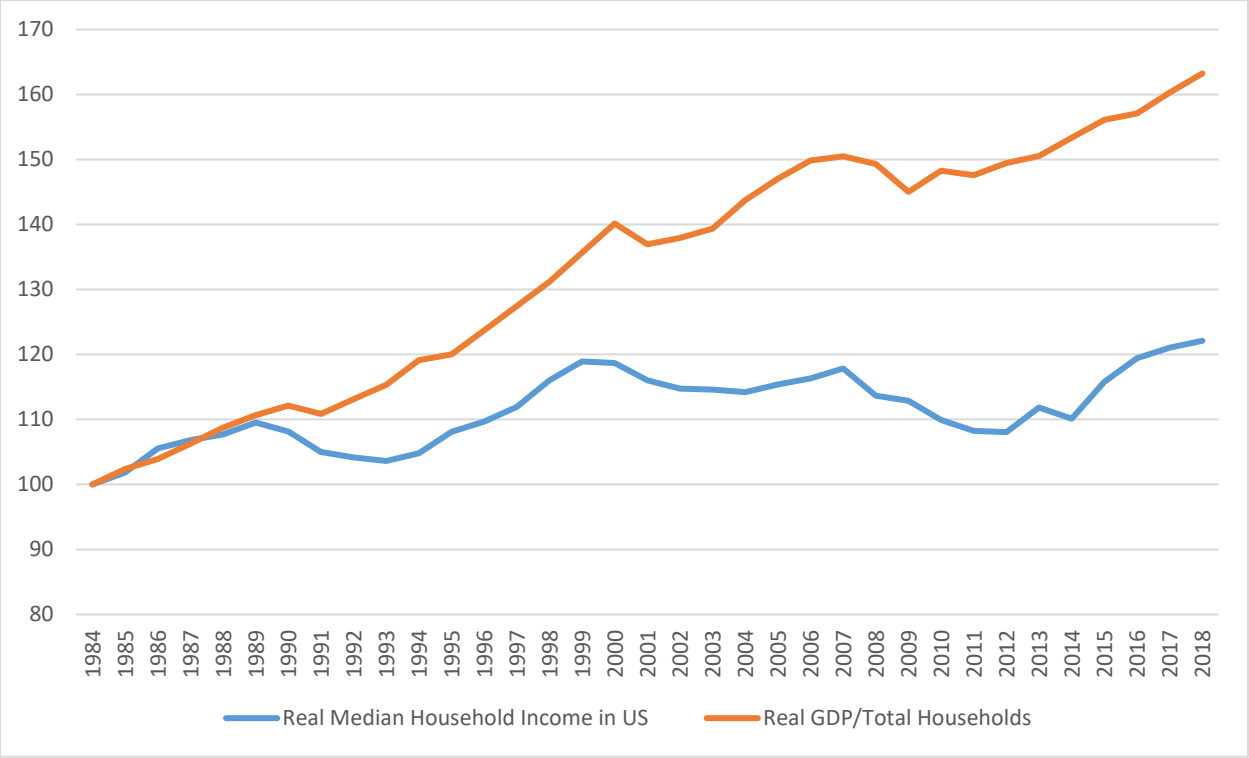
Throughout the 1970s and 1980s, household debt relative to Gross Domestic Product in the United States was around 50%. By 1989 it approached 60%. At the end of 2007 the ratio reached an all-time high, 98.6%. It is currently around 75%. While the household-debt/GDP ratio has fallen since the Great Recession, it remains much higher than the 1980s and 1990s. More important, the composition of this debt has changed. During the 1970s and 1980s most household debt came from assets purchased on credit, particularly housing. Another key change is that the 2005 bankruptcy law changes made discharging debt more difficult (or impossible) (see White, 2007).

Rising debt levels have put a financial burden on US households. They have had to use current income to pay for current expenses and also pay interest on past debt. As we have documented (Pressman and Scott, 2009; Scott and Pressman, 2011), this has led to underestimates of poverty rates and income inequality in the US; and these estimation problems have increased over time. Debt also creates future financial problems. It keeps people from accumulating the savings necessary for retirement. Moreover, the only debt to grow during the Great Recession was student loan debt and its rate of growth is the highest among all forms of consumer debt. College debt (now held by 46 million Americans) cannot be discharged in bankruptcy; any money owed will be taken out of Social Security payments if college loans are not repaid by the time people begin collecting government retirement benefits.

Little has been written about the causes of this phenomenon. Some authors blame globalization and/or automation for reducing wages (Leduc and Liu, 2019). Others blame government policies that have reduced the bargaining power of workers (Krueger 2018), reductions in the social safety net (Pressman and Scott 2018) or risks shifted on to individual households that are not well equipped to navigate and mitigate these risks (Hacker 2006).

Another problem has been stagnating incomes that force households to borrow in order to maintain their standard of living. Real median wages have flat-lined since around 1980, even though worker productivity has risen (Bivens and Mishel, 2015). According to official government figures, median household income increased by just a small amount since the end of the 20th century. Most gains over the past two decades took place during the past 2-3 years; before that, real median household income had fallen from its peak of $61,526 (2018 dollars) in 1999. In 2016, it reached $61,779 (in 2018 dollars), barely exceeding its 1999 figure. For 2018, median household income was $63,179. This represents a gain of 2.69% over two decades, just 0.14% per year using a geometric average. Moreover, a good part of this increase in median household income has been due to more people working in each household. It has not been the result of higher wages.

Figure 1: Comparing real median household income in the United States (chained 2012 billions of dollars) to real Gross Domestic Product/total households, 1984-2018.



Source: Federal Reserve Economic Data (FRED) (2019).

This paper seeks to add to the stagnating household income story. Our contribution is an argument

that things are much worse than standard numbers indicate.[1]

There are many reasons data will never be perfect, starting with the imperfect human beings who collect it (or who design the machines that collect it) from other imperfect human beings. People lie on their taxes. They lie to pollsters and government officials who survey them to collect data. Even when trying to answer questions honestly and correctly, we do make mistakes. Then there is the problem of sampling error that exists in even the most well-intentioned and well-designed surveys.

This paper focuses on a different set of issues, systemic problems with how the government measures real median income. The magnitude of these problems make it clear that things are much *worse* for median households than official figures indicate. Our major finding is that household incomes have not grown over the past two decades, but have declined and declined substantially. Moreover, household living standards, which take account of rising household needs as the US economy evolves, have fallen even more than household incomes. This sharp drop in incomes and living standards is one important reason for the rise in household debt. Even worse, rising debt then leads to a further drop in household living standards, leading households to take on even more debt.

Before getting to this, a brief overview of how the government calculates real median household income seems in order. Early each year the Census Bureau contacts a sample of US households and asks about their income during the preceding year. They request information about earnings, alimony and child support, pension income, interest and dividends, disability benefits (such as worker's compensation), Social Security

[11] Rose (2018, Table 1) summarizes several studies that look at the change in real median household income between 1979 and 2014, a time period over which the CPS estimates a gain of 7%. These other studies show a much larger increase (30 to 51%) due to decisions regarding the use of a price deflator that shows more income growth and less inflation as well as a decision to add the value of non-cash benefits (Medicare and Medicaid as well as employer contributions to defined-contribution retirement plans) to income. We deal with inflation in section 5. We ignore here the decision to claim that households are better off because they have (possibly due to aging, and possibly due to stress from lower incomes and greater income variability) more health problems and need to use more government-provided and employer-provided health insurance. We also argue below (section 3) that the shift form defined-benefit retirement plans to defined-contribution plans *reduce* household living standards because household have to make contributions to these plans out of their wages and salaries in order to be able to retire and have the same benefits as they had with defined-benefit plans.

payments, various government benefits (such AFDC/TANF, and Supplemental Security Income for those 65 and older), regular financial assistance from outside the household (payments from a parent or close relative), rents, royalties, regular income from estates, Veterans benefits, and educational assistance (including Pell Grants and scholarships from colleges and universities).

Many things are not included in these survey questions. All capital gains are ignored. It does not matter whether I sell an asset or not; the gains on my home or on my stocks are *not* considered part of my income. A lump sum inheritance also does not count as income for the year; it is considered a one-time payment and gets. Also, the Census Bureau does not ask about non-cash forms of income, such as food assistance (Food Stamps or, now, SNAP) or housing assistance from the government, health benefits received from the government (Medicaid or Medicare) or from one's employer (contributions to health insurance). Likewise, when business firms make payments to employee retirement plans, or to cover employment-related expenses, these benefits are not included in the US measure of income.

Once data is obtained from a sample of households, the rest is easy. Median household income is the income of the household exactly in the middle after all incomes are rank ordered. To compare the median income from previous years with the median income derived from the most recent data, previous figures are inflated by the increase in prices from that year, using the Consumer Price Index (CPI).

Before getting to the big problems, we note one factor that has pushed up reported median household income. This involves changes in who gets counted and who gets left out.

Over the past several decades, multi-generational living or adults living with their parents or other relatives of another generation, has increased. In 1940 almost one-quarter of US households were multi-generational. By 1980 this was cut by more than half—to 12.1%. Then things began to change in the opposite direction. Since the 1980s there has been a continual rise in multi-generational households, so that by 2012 18.1% of US households were multi-generational (Fry & Passel 2014, p. 4). This decade (2010-2019) is the first in 160 years to see household size increase in the United States (Fry, 2019).

Some of this change is likely due to the need for care—child care by young parents and the need to care for elderly parents and other relatives. The latest Survey of Income and Program Participation (released in May 2019) showed that working families with children under five years old who were paying for childcare paid 10 percent of average household income, which is "40 percent higher than the US Department of Health and Human Services' definition of affordability" (Malik, 2019). This affects 5.1 million US families. Another likely reason for the growth of multi-generational households is the dire economic situation facing many people, in particular stagnating incomes and rising job insecurity. To live on one's own requires the ability to afford a place to live while also paying for other living expenses, including paying off debt, such as college loans. When it is not feasible to live alone for financial reasons, one shares expenses with others. Eliminating rent by living with one's parents is one simple and easy solution to this problem. And it is an effective solution since housing is the largest expense for almost all households.

This demographic change has undoubtedly propped up median incomes. It does this by reducing the number of households with income below the median. If grown children live with their parents for economic reasons, their income is more likely below the median than above it. Because they live with their parents instead of on their own, the nation has fewer low-income households; so, the income of the household in the middle rises. There is another way multi-generational households increase median household income. When more grown children live with their parents**,** their income gets counted as part of their parents' household income. In some cases, adding the income of a grown child living at home to the income of the parents will push that household from below the median to above the median. This too raises the income of the household in the middle. We have not seen and have yet to make a good estimate of the extent of this change on median household income; but there is little doubt that median household income reported by the government is higher due to this demographic change.

The following sections look at five other problems with the estimate of median household income – methodological changes in making the estimate, excluding employee benefits, excluding taxes,

underestimating inflation, and ignoring rising household needs.

2. Methodology Changes

A first problem with median household income estimates is that the survey methodology has changed over time. Concerns in the 1990s and 2000s about income not being reported led to new group of questions being asked in an attempt to elicit better information. Problems were thought to be particularly acute when it came to the receipt of income received via public assistance programs and from retirement income, such as pensions, annuities and withdrawals from retirement plans.

A revised methodology asks more questions, and more explicit questions, regarding these forms of income. Specific questions were added to the survey that asked about retirement account withdrawals. These are counted as household income by the government; however, they may not be regarded as income by the person surveyed because this is money that may have been moved from a retirement account to a non-retirement account. The additional questions were designed to try to make sure that net payouts from retirement accounts got counted as part of household income. This new methodology was introduced in 2014 for estimating 2013 incomes. It has been used every year since.

The Census Bureau estimates that the new methodology resulted in a 230% increase in income reported from retirement accounts (Semega & Welniak 2015, p.11). This change, and the overall change in reported median household income due to the change in methodology, was estimated in a straightforward manner. When households were surveyed about their income, estimates were made using both the old questions and the new questions. Based on the old questions, median household income in 2013 was $51,939. With the new questions median household income was $53,514. The new method thus led to a 3% increase in median household income (Semega & Welniak 2015). Had the methodology for measuring income and calculating median income not changed, had the 3% methodological income bump *not* taken place in 2018, reported median income in 2018 would have been *below* the median income in reported in 1999, once adjusted for inflation.

3. **Employee Benefits**

Benefits received from employers certainly make people better off. As noted above, all non-monetary forms of compensation, including government non-cash benefits to low-income households and benefits to firm employees, do not get counted. We ignore the former here since few middle-income households, or households near median income, are eligible to receive them. However, middle-income households receive many job-related benefits, including dental insurance, vision insurance, life insurance, disability insurance, long-term care insurance, gym memberships, financial coaching and even pet insurance. The two most important benefits, retirement contributions and health insurance, will be the focus of this section.

If benefits from employment grew at the same rate that wages grew, there would be no problem with median income figures, ceteris paribus. In this case, wages would be a good proxy for benefits as well as benefits plus wages. But while real wages have flat-lined for workers, retirement and health benefits have actually declined, forcing workers to pick up the slack. Not including essential employee benefits in median household income figures means that the change in real household income has been overestimated because, as employers cut benefits for the typical household, additional household spending is needed to prevent a decline in household living standards.

To understand the impact of this, consider two households with the same money income, the $62,000 median reported by the US government in 2017. One household has health insurance, the other does not. While these families have the same income, they don't have the same standard of living. The household with health insurance has a higher standard of living. This likewise holds for one household over time. If family income stays the same, but the family loses its health insurance or loses it retirement benefits, or if these are reduced by the firm, the family is in worse economic shape. It will have to pay more for insurance premiums; and it will have to save more of its current income in order to have the standard of living in retirement, or spend more to maintain its current standard of living and worry about the future when the future comes.

Either way it is worse off.[2]

It is difficult to calculate the additional cost to households due to changes in health insurance because health insurance benefits are complex. There are copays, deductibles, changes in available doctors within a network, and changes in basic coverage. Moreover, health care costs have soared over the past several decades. Much of this increase gets picked up in estimates of inflation. Latter in this paper we will focus on health care inflation. For now we just focus on the problem of retirement benefits.

Employer contributions to retirement accounts are not reported to the IRS as taxable income and most people do not even think of this as part of their income for the year. They are not asked about this in government surveys and so these benefits are not counted as part of reported income figures. However, it does impact household living standards. When these benefits are cut, future retirement income falls.

Over the past several decades pension plans have changed from defined-benefit to defined-contribution plans. In a defined-benefit plan, employers contribute to a retirement fund, manage that fund, and then pay benefits out of the fund to former employees who retire. Benefits are based on years in service and salary, and are guaranteed for life. Employees typically pay nothing. In a defined-contribution plan, both employers and employees contribute some money to a retirement plan for each employee. Contributions are not mandatory; people can elect to contribute little or nothing. Everyone is responsible for investing the money in their own account, and for ensuring that there will be enough money available for retirement. “In 1975, participants in employer-sponsored defined benefit pension plans outnumbered participants in defined contribution plans by 2.4 to 1” (Campbell et al. 2011, p. 104); or, 71% of plans were defined-benefit plans. Then things began to change. More and more firms dropped their defined-benefit retirement programs in favor of defined-contribution plans. This reduced the risks to the firm, which no longer had to worry about making sure that there was enough money to pay promised benefits; this risk was now shifted to the

[2] If health care costs soar, and this leads to both cuts in the quality of insurance (e.g., greater deductibles) and the firm also pays more for employee insurance, each employee is worse off. Failing to see this, a number of authors have argued that greater health insurance expenditures by firms should be regarded as anincrease household income (see footnote 1).

employee. As a result, by 2007 defined-contribution plans exceeded defined benefit plans by a ratio of 3.4-to-1, making 77% of retirement plans defined-contribution plans.

How this happened is interesting. The Employee Retirement Income and Security Act of 1974 (ERISA) was passed to protect employees from employer abuses in defined-benefit system. Firms were underfunding the system by making unreasonable assumptions about how much the money they put into these plans would grow. Assuming large returns meant that they had to contribute less each year, which increased firm profits and share prices. The IRS code was then amended in 1978 by adding section 401(k). In 1981 the IRS declared that contributions to these accounts by both employers and employees would not be subject to taxation. The 401(k) was originally intended as a way to *supplement* Social Security and defined-benefit plans. Instead, it became the alternative to defined benefit plans. One problem with these plans is that people are not saving enough in these plans to retire with a standard of living similar to their working years. Stagnant and declining household incomes is one reason for this; another reason is the greater income volatility that has led people to raid their retirement plans when money is tight (DePillis 2019)—despite the 10% tax penalty you pay for doing so before age 59.5 (in addition to taxes on the money you withdraw).

Defined contribution plans work as follows. Typically, employers will match employee contributions of between 2% and 6% to their retirement plan. If they contribute nothing, or less than 2%, they get no match from their firm. If they contribute more than 6%, the firm will only match 6% of their contribution. The important point here is that when employers shift from defined-benefit to defined-contribution plans, employees must make a contribution equal to a few percentage points of their income. Even if they contribute just the minimum to get employer matching funds (an immediate 100% return on their contribution), their take-home pay and standard of living fall by 2%. Furthermore, this small monetary contribution does not make up for the fact that defined contribution plans provide less money in retirement than the old defined-benefit plan yielded. To get the same net benefits as before would require much larger contributions than the minimum 2%. In fact, it would require close to the maximum 6% contribution. The main reason for this is that

most people lack financial knowledge to invest their retirement money effectively. A report from the Center for Retirement Research at Boston College compared 401(k) plans and defined benefits plans from 1988 to 2006. They found that 401(k) plans underperformed pension plans. The reasons for these differences are fees, investor mistakes and poor asset allocation choices (Munnell et al., 2006). Ghilarducci (2008, p. 127) reports that the loss in going from defined benefit to defined contribution plans arises mainly from the higher fees charged on 401(k) plans. This reduces the returns on a typical account by 20 to 30 percent over 30 years.

4. Taxes

Sales and excise taxes are considered when measuring real median household income. They are counted as part of the cost to consumers when people purchase goods. If gas prices rise by 10 cents a gallon, and nothing else changes, real household income will fall by a little bit. Property taxes are counted indirectly, because they are part of the cost of owning a home. Even though the Bureau of Labor Statistics (BLS) uses rents to estimate the cost of housing, if property taxes rise, landlords will pass along the tax to their tenets by raising their rent. This then gets captured in the BLS inflation measure.

The logic of including sales taxes and property taxes (even indirectly) when measuring household living standards holds for income and payroll taxes (Social Security, unemployment insurance, Medicare) that come directly out of people's paychecks. With less money in my paycheck, my standard of living falls. However, this is not done when the government reports median household income. Hikes in these taxes don't get counted as reducing household living standards; only pre-tax income gets measured.

The good news is that it is fairly easy to measure the loss in purchasing power due to these taxes since there is good data stretching back in time. We ignore unemployment insurance since this tax is very small, has not changed much over time, and in most states it is entirely paid by employers. .

Income tax payments for a median-income household can be estimated using IRS data on individual income taxes. The bad news is that this data gets reported in terms of adjusted gross income (AGI), which is not the same thing as income (as noted above). Deductions are subtracted from income to arrive AGI. The

good news is that the IRS provides information on the value of adjustments for income ranges and how many taxpayers there were in that range. From this we find the gross income associated with the AGI as reported by the IRS. Then we estimate how much a household with median gross income paid in taxes each year. Between 1999 and 2017 (the last available data), there was a very tiny decline in the percentage of household income paid in Federal income taxes by the median household. At .2% it is not much more than a rounding error.

States also tax income, and state income taxes are a bit harder to calculate since the data is not as good, and requires aggregating over all 50 US states. Some states don't even tax income. However, we can make some reasonably good estimates for state income taxes paid by the median household nationally in each state and then derive a weighted average for the nation as a whole. In real terms, between 1999 and 2018, average state income taxes increased $438 (in 2018 dollars), or .3%. Some of this was likely due to improved or greater government services that require less spending by households for similar private services—for example, more after-school child care and greater police protection to prevent thefts and other crimes. And taxes that go to road repairs and increase gasoline mileage or reduce needed car repairs also improve household living standards. If we assume that half the increase went to improved services to households, the loss is reduced to .15 percentage points. Either way, changes in income taxes at the state and Federal level, taken together, have had no appreciable effect on household disposable income over the past two decades.

Perhaps the most important tax when it comes to measuring median household living standards is the payroll tax for Social Security and Medicare. Most middle-income households pay more in Social Security taxes than they pay in income taxes. Social Security taxes increased from 6.13% in 1979-80 to 7.65% at the end of the 20th century and until today. This reduced median *disposable* household incomes by 1.52 percentage points. However, since 1999 Social Security taxes have not increased. Nonetheless, some other changes have led to effective changes in Social Security tax paid.

First, most households with incomes around the median are likely have some income (interest, dividends, capital gains, state tax refunds, etc.) not subject to the Social Security payroll tax. *Statistics of*

Income: Individual Income Tax Returns indicates that for a median household in 1999, around 81.3% of income was in the form of wages or salaries income. The rest (18.7%) was received in forms *not* subject to Social Security taxes. For 2017 only 77.7% of AGI was wages and salaries; 22.5% was not. This means that 3.8% of income escaped Social Security taxation, resulting in a small .03% increase in disposable household income.

In addition, more workers are engaged in freelancing—many holding down a second job in the gig economy to supplement their regular income from employment. Rothwell (2019) reports that between 1981 and 2017, the percentage of taxpayers reporting self-employed income to the IRS grew from 10% to 17%. Of these, 55% also get a W2 form from an employer. This additional fraction of income that is self-employment income will be subject to double Social Security taxes—as both an employee and an employer. Thus, even if household income remains the same, if more of it comes from self-employment, the household pays more in Social Security taxes. While we have made no estimates of this change, we don't expect it will be large; and it is not likely to be much different than the .03% change noted in the previous paragraph, but working in the opposite direction.

In total, it seems there was no change in the taxes paid by median households between 1999 and 2017. However, we do note again that between 1989 and 1999, there was a significant increase in payroll taxes.

5. Are We Measuring Inflation Correctly?

Responses to surveys are always in current dollars; data must then be converted to real dollars. Making this adjustment requires a good inflation measure. Accurate inflation measures are difficult to create for a few reasons. First, the cost of living and inflation varies based on geography. Second, the basket of goods and services is not homogenous across time and space. Technological innovation and labor market transformations change the market basket of goods that households need to purchase. Third, like all statistics, inflation is susceptible to changes in methodology. Starting in 1983 the BLS replaced the cost of owning a home with

owners' rent equivalent, or what it would a homeowner to rent their house. By doing this the BLS missed much of the rise in home prices in the early 2000s and the impact of this on household living standards.

This last change was not made to be deceptive; rather, it was designed to obtain better data. Nonetheless, it masked the "real" inflation facing most Americans. If actual inflation is 2% and the government says it is 3%, my 3% income gain gets me 1% more in goods and services rather than keeping my standard of living constant. For a median income household, making $60,000 a year, this is like getting another $600 that the government does not record when measuring my income from year to year. On the other hand, if actual inflation is greater than what inflation has been estimated to be, then we are not reducing this year's income enough when comparing it to last year's income. When my income goes up 3%, and inflation is actually 4% (rather than the 3% estimated by the government), my standard of living has fallen by 1% ($600 again) even though the government says I am just as well off as in the previous year.

Even small errors add up and compound over time. If inflation is overestimated by a mere 0.2 of a percentage point error each year, after 20 years real median household income would be more than 4% higher than reported by the government. On the other hand, if inflation is underestimated by 0.2 of a percent each year, households are more than 4% worse off than reported in government figures.

A debate over how the US measures inflation arose in the US during the 1970s as inflation soared to double digit levels. Many economists argued that actual inflation was not as bad as government data reported. A Commission headed by economist Michael Boskin was formed to analyze the problem and make some recommendations for improving the government measure of inflation.

The main takeaway from the Boskin Commission (Boskin et al. 1996) was that the CPI overstates annual US inflation rate by around 1.1 percentage points because of three biases. First, when prices rise, people tend to buy less of that good and will purchase cheaper substitutes. The problem here is that the market basket of goods used to compute the CPI and inflation does not get adjusted regularly, which understates inflation facing middle-income households (National Research Council 2002, p. 32). The Boskin

Commission estimates that this accounts for nearly a 0.5 percentage point upward bias in the CPI. Second, there is an outlet bias, which concerns how people change their buying habits in response to changing prices and technology. If books are cheaper on Amazon, people will purchase books there rather than at the local book shop. This bias does not seem to be substantive; Lebow et al. (1994) estimated that the upward bias here at 0.1 percentage point per year. Finally, if not properly accounted for, improvements in the quality of goods will be counted as higher inflation, since higher quality goods cost more to make and this cost will be passed on to consumers. The Boskin Commission held that this biased the CPI by around 0.6 percentage points per year.[3]

BLS officials have countered that the quality bias is much smaller than what the Boskin Commission estimated (Abraham 1997). We wish to go even further—BLS quality adjustments lead to a large *underestimation* of inflation. There are many examples of lower quality goods and services—longer lines at checkout counters in stores, more waiting time trying to reach a person by phone to deal with a problem, pesticides in foods (forcing people to buy higher priced organic foods), less legroom on airplanes, cheaper materials use to build homes (increasing heating and cooling costs), and planned obsolescence so consumers must replace things sooner.

Further, many quality adjustments leave households *worse off*, even if they benefit from a higher quality good. Consider internet service, something most middle-income households regard as a necessity. If I am charged for faster internet speed, I do get a higher quality good. But I likely cannot choose whether I want the slightly faster speed; my provider may offer this or nothing. Lacking the choice, I have to pay the higher price even though I don't want to. I see this as my cost of living increasing. According to the government, I don't face higher costs because I am buying a higher quality good.

Quality presents problems because, unlike prices, we cannot measure quality precisely. We need to improvise, particularly when new or improved goods are introduced. Typically, the BLS looks at the new goods

[3] Percentages for each case don't add up to 1.1 due to rounding.

and old good simultaneously, and assumes the increased price of the new good is due to quality improvements. Returning to our Wi-Fi example, if the new service costs $10 more per month, it is assumed that the consumer gets $10 more in value. It is entirely a quality improvement. I am better off because I can download things more quickly. Yet, I am also out $120 a year. If I am a median income household, my expenses have gone up 0.2 of a percentage point for the year and my standard of living has fallen by this amount. I need this $120 to buy the same things this year that I bought last year (everything I bought last year plus slightly better internet service). The extra money may initially come from savings. If and when I have no savings, I must cut back somewhere else or going into debt. As such, it is not really clear that I am as well of this year with faster internet service compared to last year, when I had slower service but another $120 to spend.

While I am paying more, the Bureau of Labor Statistics says that because of the quality improvement, my cost change is zero. If my income stayed the same from one year to the next, they make no adjustment to my nominal income in the second year because the extra cost of internet service is counted as a quality improvement and not inflation. Household income figures say that my real income or my standard of living is the same in both years. Out an additional $120, I am likely to feel that my standard of living has fallen by 0.2%.

There are many real world examples like this. When the government mandated a new gasoline formulation to reduce auto emissions, this added 10 cents to the price of a gallon of gasoline. The CPI took this to be a quality improvement for the consumer and so the price of gasoline did not rise in the CPI (Wilds 2017). If the typical household buys 100 gallons per month, which is close to the actual figure,[4] this comes out to $10 extra spent each month. Over an entire year, the household pays another $120 (or 0.2% of their income) for gasoline.

In many cases, the BLS actually asks producers about the costs and quality of goods when new models get introduced for things like cars and smart phones. Data on quality improvements in cars comes from manufactures, who have incentives to blame any price increase on government mandated changes to

[4] https://www.eia.gov/todayinenergy/detail.php?id=33232.

automobiles. If producers exaggerate quality improvements, relying on producers to estimate the inflation rate exerts a downward bias on the CPI and the rate of inflation (Kokoski 1993, p. 35; Griliches 1971, p. 11; Moulton & Moses 1997.

Motor vehicles provide a good example because we have good data on this and it is easy to understand the quality improvement problem. Let's start with a simple example where quality is easy to measure and doesn't create a problem. If my car costs 10 percent more, but is built better and so lasts 10 percent longer or breaks down less (saving me money on repairs), that is a legitimate quality improvement. Likewise, if my car gets better gas mileage, this is an improvement in the quality of my vehicle. I pay more when buying a car, but make up for this in the long haul through reduced expenses to own and operate it.

Other improvements in the quality of motor vehicles are more difficult to deal with, and actual adjustments made by the BLS are hard to justify. Consider a government-mandated requirement that all cars have airbags or catalytic converters (to reduce air pollution). These are all clear quality improvements. But the question is whether my gain is enough to compensate me for the cost of these features. Even if the benefit to me of the airbag in case of accident is equal to the cost of the airbag, it doesn't mean that the requirement is worth it for me. I could have done many other things with my money besides buy airbags that would have given me greater utility. And airbags have costs as well as benefits—they can get stolen and have to be replaced or repaired, they can have defects that the manufacturer did not want to correct and so cause accidents when they inadvertently inflate or do not inflate when needed (far more common than most people realize).

Going further, some people even claim that when producers come up with new products that are similar to old products, the consumer has more choice, which should count as a quality improvement. The quality adjustment here results in lower the estimate of inflation because I have, for example, another flavor of jelly that I can buy when I go to the grocery store. The price I pay to buy jelly is thus assumed to fall by, say, 0.1 percent (even though the actual price has not changed) because I can now purchase a new good--

cranberry guava jelly. Clearly, this doesn't help my income go any further. It is even questionable if this increases my "utility" since, as (Schwarz 2004) has demonstrated, when faced with additional choices consumers sometimes get overwhelmed and do not buy anything at all.

Housing so important because it is the largest expenditure category for most households. Nearly one-quarter of monthly expenses are classified as "homeowner rental equivalent" or the amount homeowners would have to pay themselves in order rent their home. Starting in 1989, the BLS "improved" their housing cost estimate by adjusting the cost of renting one's home for how much they thought that homeowners enjoyed their home. The result is that larger homes, while more expensive, provide greater utility for consumers. Effectively buying a larger home does not cost households any more money because the household gets a higher quality good for their money (Wilds 2017). As with the Wi-Fi case, additional housing costs are inflationary, and they lower the standard of living of households, even if they are not counted as such. This is especially the case when builders are building larger homes to make more money.

The median square footage of a new single-family house increased from 2,260 in 1999 to 2,687 in 2015. The additional space per person has increased by more than 20%. At the same time, prices of new homes have increased from $164,800 in 1999 to $329,700 in 2018, nearly 100%. Around one-fifth of this increase gets counted as a "quality improvement" rather than inflation. Certainly, not all housing is new housing, but larger new house also lead existing homeowners to "add on" to their homes. And over time more and more households live in larger and more expensive homes. If housing comprises a quarter of total household expenditures, and prices nearly double, the cost of living should rise by nearly one-eighth, or 12.5%. But 20 percent this increase is netted out due to larger homes being counted as a quality improvement. Effectively, there has been a 2-3% increase in the cost of living for an average household that has not been counted by the BLS because homes have gotten bigger. This alone counters the median household income gain reported by the Census Bureau over the past 20 years.

Finally, we return to another large household expenditure—health care. Since the CPI only counts

out-of-pocket expenses, medical care comprises a smaller share of the CPI (5.6% in 1999 compared to 13% in GDP and 17.6% in PCE). Yet, this category of spending has seen very large price increases over the past few decades. Further, the CPI does not include insurance premiums paid for by employers (National Research 2002, p. 179; Berndt et al. 2000).[5] It also doesn't include increased payments for Medicare Part B (Baker 1996, p. 28). Costs for Part B increased from $45.50 per month in 1999 to $144.60 in 2020 (announced December 2019), or in real terms an increase from $71.23 to $144.60. The annual loss, around $880, is nearly 1.3% of median household income for 2019.

We are not the only one concerned with how the BLS deals with quality improvements when measuring inflation. Triplett (1997) disputes the Boskin Commission findings on quality improvements, and thinks that there may be downward bias in the estimates. Mouton & Moses (1997, p. 348f.) argue while in some cases the CPI overstates inflation, overall bias in the CPI due to quality changes may be negative. Wilds (2017) estimates that all the changes introduced by the BLS since 1980 have reduced annual CPI inflation by seven percentage points. Assuming this is spread out evenly over time, the underestimation since 1999 is 3.5 percentage points. This underestimation alone negates the reported income gains for median households.

6. Household Needs

Finally, there is the question of household needs. Childcare presents the most pressing example of this problem. As noted above, real wages flat-lined starting in around 1980, but there has still been a small increase in reported median household income. The main reason for this is that households are working more hours. Bivens et al. (2014) report that between 1979 and 2007 (right before the Great Recession) non-elderly households in the middle of the income distribution worked an extra 920 hours per year, a 9.2% increase in labor effort. This accounts for two-thirds of the increase in household income over this time period. But greater work effort comes with greater costs, mainly transportation and child care costs. We focus here only on the latter.

[5] And it also fails to account for lower quality health insurance, with higher copays and deductibles.

In the 1970s stay-at-home moms were the norm for families with young children. Today the norm is that all adults work and the family struggles with childcare for their young children. Miller (2019) reports that 93% of fathers and 72% of women with children are in the labor force. Some of this surely includes people who work from home virtually, and some parents have family members watch their children during the working day; but in most cases, families with young children struggle with child care, and struggle mightily if their work schedules are precarious and change frequently (possibly with little or no notice).

If there are many two-parent families and one parent stays at home to care for the kids, there is little need for childcare besides a babysitter occasionally, or some relatives taking care of the children while the adults take a long weekend vacation. As more households are headed by a single adult and most adults work in households with two adult heads, childcare becomes a large expense. It is necessary to maintain the same living standard since that requires greater work effort.

Over time the BLS deals with this by changing the market basket of goods and services bought by a typical household. More childcare is added to the list of things bought by a typical household. However, the basket itself isn't increased to reflect the fact that households need more goods just to maintain their previous standard of living. Rather, it pegs the cost of the new basket to the cost of the old one, thereby reducing the quantity of other goods bought by the household. Effectively, this assumes that the standard of living of the household falls because households spend less on rent, on food, on transportation, etc.

We can make a rough estimate of the cost to this for a middle-income household. For a family with one child under the age of five in day care, at the average rate of $250 per week, their median income with two adults and one kid is $74,200. Requiring 50 weeks of childcare comes to 16.8% of gross pay. This reduction in median household income is substantial. Even for households making significantly more than the median income, the financial burden will be overwhelming. The best case scenario would be if the household has access to a cafeteria plan at work; but the maximum they can take tax free is $5,000 for dependent care, which is only 40% of their total cost.

A final way that median household income fails to measure the standard of living of the median household concerns household debt and the interest that must be paid on past debt. This is the point we made at the beginning of this paper. The "really real" median income should account for consumer debt repayments. At a minimum, incomes should be adjusted for the amount of interest paid on non-housing debt that goes to maintain the debt and not pay off the principal (although total debt repayment would be a better adjustment). Some may think these costs are negligible, but our research suggests otherwise. We have found that reducing each household's income by the interest paid on past debts underestimates poverty by four million people (over 1% of the population) and understates income inequality over the past 25 years by at least 3.5% and at most 7%.

6. Summary

This paper identified a number of reasons government estimates of real median household income are not accurate as a measure of how well US households are doing. Where possible it estimates how much the government overestimates the change in real household median income. Several things are important. First, a recent methodological change resulted in a 3% income overstatement compared to the past. Second, the change from defined benefit to defined contribution plans represents a 2 to 6 percent loss for US households that is not captured in measures of median household income. Third, inflation is likely underestimated by around 3.5 percentage points. Fourth, the interest paid on past consumer debt is responsible for a loss of 3.5 to 7 percent of household income. Fifth, increased household needs, especially child care, reduce household living standards by 3 to 7 percent. These changes together reduce real median household income comes by between 15% and 23%. At the lower end of the range, median household living standards drop 15% over two decades. Even if we are wrong here by half, there is still a large measurement problem and a sharp drop in living standards relative to 1999. The estimates we are most confident of (changes in methodology, interest on consumer debt, and employee benefits) are *each sufficient* to wipe out the reported increase in median household income over the past 20 years. Taken together they indicate that for an average US household

median income and the household standard of living has fallen over the past 20 years—and it has fallen considerably.

Last but not least, one final bit of support for our case that the government does overestimate real household income changes over time. Nearly half of US households report that their monthly income can't meet monthly household expenses (Pew Charitable Trusts 2015, p. 1). Bruce Wilds (2017) has noted that: "In the last 30 years, a growing gap has become obvious between government reporting of inflation, as measured by the Consumer Price Index (CPI), and the perceptions of actual inflation held by the general public. Informal evidence and occasional surveys have indicated that the general public believes inflation is running well above official reporting." It does seem that households are struggling to make ends meet and know that things have gotten worse over time. The purpose of this paper is to explain why this is so and why households are resorting to debt.

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