Changes in the Distribution of Economic Well-Being during the COVID-19 Pandemic: Evidence from Nationally Representative Consumption Data*

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Abstract

This study is the first to examine the impact of the pandemic on economic well-being using nationally representative consumption data and units sharing resources. We find that low percentiles of consumption see pre-pandemic growth and little change with the pandemic, while higher percentiles do not increase before the pandemic and fall in 2020. High-educated families and seniors near the top of the distribution see the most noticeable declines. Our results suggest that the pandemic policy response averted a decrease in consumption for the most disadvantaged families. Changes for categories of consumption indicate robustness of the aggregate changes to underreporting.

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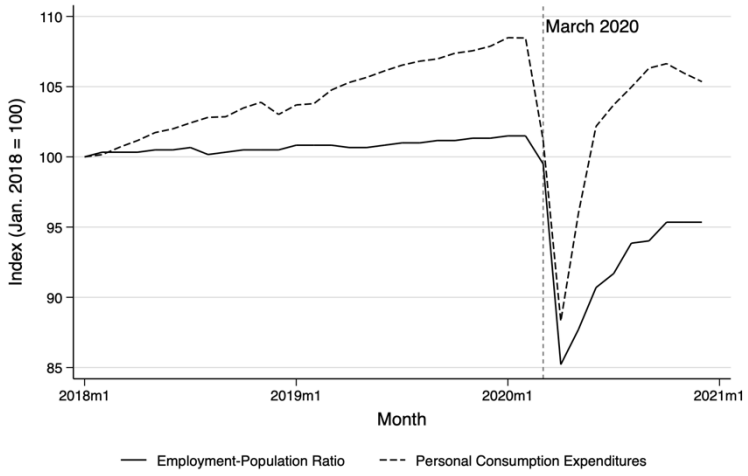
I. Introduction

On March 11, 2020, the World Health Organization (WHO) officially declared the emerging global COVID-19 outbreak a pandemic (WHO 2020). In the following months, the virus spread rapidly throughout the United States—cases rose from just over 1,000 in early March to more than 1 million by the end of April. The consequent economic fallout was swift and severe. Employment and personal spending fell sharply (Figure 1), while voluntary distancing and/or policies that restricted public interaction and travel greatly reduced mobility and economic activity (Wellenius et al. 2021; Goolsbee and Syverson 2020).

Figure 1. Employment-Population Ratio and Personal Consumption Expenditures, 2018-2020



Source: FRED
Notes: Figure reports seasonally adjusted values, indexed to January 2018 value.

The federal government quickly mounted a large, sustained response. The CARES Act, which was passed in March 2020, carried a $1.7 trillion price tag. The bill included direct stimulus payments, or Economic Impact Payments (EIPs), of up to $1,200 per adult and $500 for each qualifying child. In addition, the CARES Act expanded Unemployment Insurance (UI) benefits by $600 per week and relaxed eligibility criteria for UI benefits (Stone 2020). These UI and stimulus benefits were partially extended through the Consolidated Appropriations Act (passed in December 2020) and the American Rescue Plan Act (passed in March 2021). Together these laws contained $2.7 trillion of spending, with households receiving just over $800 billion in EIPs across the three bills. Spending on UI jumped from $28 billion in 2019 to $581 and $323 billion in 2020 and 2021, respectively.[1] These direct payments to households were a part of the broader local, state, and federal pandemic-related policy response.

Understanding how the countervailing forces of pandemic-related economic disruption and the associated policy response affected the economic circumstances of households is critically important for assessing the impact of relief efforts and shaping future policy during economic and epidemiological crises. Recent studies have examined the impact of the pandemic on indicators of economic well-being such as income, bank account balances, credit and debit card transactions, and material hardship. In general, this literature has found that early in the pandemic income increased, particularly for low-income individuals, and

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[1] For the CARES Act, see https://www.cbo.gov/publication/56334. For the Consolidated Appropriations and American Rescue Plan Acts, see https://www.cbo.gov/publication/57343. For spending on EIPs, see https://www.irs.gov/statistics/soi-tax-stats-coronavirus-aid-relief-and-economic-security-act-cares-act-statistics. For UI spending, see https://fiscaldata.treasury.gov/datasets/daily-treasury-statement/deposits-and-withdrawals-of-operating-cash.

that spending fell, particularly for non-essential items and for those living in high-income ZIP codes. The evidence on material hardship is mixed.

In this paper we examine changes in consumption and expenditures before and after the start of the pandemic using data from the Consumer Expenditure Interview Survey (CE) through the end of 2020. We focus consumption, as it better captures the economic well-being of resource sharing units. Our analyses contribute to the existing literature on the impact of the pandemic on economic well-being in several important ways. First, we provide the first evidence of how overall consumption and spending changed during the pandemic using nationally representative microdata and for a well-defined resource sharing unit, the consumer unit (CU).[2] Previous work that has examined spending behavior has relied on administrative data such as credit and debit card transactions, which misses a nontrivial fraction of individuals, particularly the most disadvantaged ones; the FDIC estimates that 5.4 percent of U.S. households are unbanked; for households with annual income under $15,000, the rate rises to 23 percent (Kutzbach et al. 2020). This work also relies on an economic unit of uncertain size and composition that is not defined by resource sharing. Second, we look at heterogeneity in the impact of the pandemic and associated policy responses on consumption and expenditures, examining how the impact differed between high- and low-consumption CUs and by education, age and race.

Understanding how changes in well-being differ across groups is particularly important given the disparate impact that the pandemic has had on the labor market, with low-wage jobs being hit the hardest (Cortes and Forsythe 2020), and given that much of the policy response was targeted to unemployed individuals. Lastly, we examine the nature of the change in consumption by

[2] In the CE, consumer units are those who share in the purchase or consumption of resources.

estimating average changes in types of consumption for various parts of the consumption distribution. This analysis also allows us to examine robustness to expenditure underreporting.

Our results indicate that in the year preceding the pandemic, the consumption of CUs near the bottom of the distribution increased more than that of consumer units higher in the distribution. Following the onset of the pandemic, those at the bottom of the consumption distribution experience modest or no reduction in consumption, while those higher up see progressively larger and significant falls, concentrated in the 2nd quarter of 2020. We see similar patterns for total expenditures. This decline at higher percentiles explains the sharp decline in aggregate consumption. An advantage of using nationally representative survey data is that we can leverage the rich demographic information to examine patterns for many subgroups. We find the most pronounced decline for high-educated families near the top of the consumption distribution and seniors in the top half of the distribution. The decrease in the top half is less evident for non-Whites than for White non-Hispanics, particularly for the 90th percentile during the latter half of 2020. Looking by education group, we find that the decline in consumption after the start of the pandemic is more pronounced for CUs headed by those with at least some college education.

We also find that the patterns for consumption are different than the patterns for income.[3] Income increases throughout the distribution in the first half of 2020, with greater proportional changes towards the bottom of the distribution. Focusing on annual data due to sample size, liquid assets also show an increase at all levels of the distribution in 2020.

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[3] For our income analyses, we use the Monthly CPS, where our unit of analysis is the family instead of CU.

Our estimated changes in the composition of consumption are consistent with families spending more time at home, especially families with greater levels of material advantage. We see a decrease in food away from home, gasoline and motor oil, and other consumption throughout the distribution, but especially at the top, and an increase in housing consumption, especially at the bottom. Across all categories, the increases in consumption are smaller or the declines larger at the top of the distribution than at the bottom in nearly all cases. Without any substantial deviations from this pattern, differential underreporting by category cannot explain the observed aggregate pattern. Most of the aggregate change by tercile of total consumption is due to changes within spending category rather than differences in initial shares.

II. Previous Work on the Impact of the Pandemic on Economic Well-Being

Some past research has found that the large federal policy response mitigated pandemic-related income shocks. Han, Meyer, and Sullivan (2020) find that the income poverty rate fell in the early months of the pandemic, a drop that can be entirely explained by stimulus and expanded unemployment insurance (UI) payments; Ganong et al. (2022), using account-level data from JP Morgan Chase, show that UI helped sustain consumer spending during the pandemic. However, as Han, Meyer, and Sullivan acknowledge, this income measure has important limitations as it is based on a global income question that is designed to capture only money income.

More generally, consumption may provide a better indicator of economic well-being than income for several reasons. Consumption better reflects long-run resources and is more likely to capture disparities that result from differences across families in the accumulation of assets or access to credit. Consumption will reflect the loss of housing services flows if homeownership falls, the loss in wealth if asset values fall, and the belt-tightening that a growing debt burden might require, all of which an income measure would miss. Furthermore,

consumption is more likely than income to be affected by access to public insurance programs. Consumption will also reflect changes in uncertainty about future income streams, which may be particularly important during periods of crisis. For example, a household might reduce spending due to concerns about future income loss, health shocks, or restricted access to goods and services. In addition to these conceptual advantages, consumption may better reflect economic well-being because of measurement issues—income has been shown to be substantially under-reported in surveys, especially for those with few resources, and the extent of under-reporting has increased over time (Meyer and Sullivan 2003, 2011; Meyer, Mok, and Sullivan 2015).

Recent studies have provided early evidence on spending behavior of individuals during the pandemic using transaction data and other customer records. Studies that have examined the spending out of EIPs (Parker et al. 2022; Karger and Rajan 2020; Baker et al. 2020) find marginal propensities to consume under 0.5, often considerably so, suggesting that individuals (at least temporarily) allocated some of their EIPs to savings, and an increased propensity among those with lower levels of material advantage. Cox et al. (2020a,b) employ the Chase data and identify, after the onset of the pandemic, a temporary increase in expenditures on essentials and a larger, sustained decrease in expenditures on non-essentials, with the decrease concentrated in healthcare and transportation spending. Using the same data, Bachas et al. (2020) find an increase in saving that outpaces income gains, yielding falling expenditure. Using data on credit and debit card transactions that they can access in near-real-time, as well as some information on cash transactions, Chetty et al. (2020) document changes in spending during the pandemic. Because their data include geographic information, they are also able to examine how the patterns differ by ZIP code level income. They find that individuals in the top quartile of ZIP code level income reduce spending by 13% from January to July 2020, compared to just 4%

for individuals in bottom-quartile ZIP codes. These studies provide important, timely evidence on how economic well-being was impacted during the pandemic. However, the economic units in these analyses are not defined by resource sharing and are of uncertain size and composition. Our study contributes to this recent literature by providing information on consumption for a nationally representative sample of well-defined resource sharing units and by analyzing the patterns at different points in the distribution of consumption and for specific demographic groups.

The evidence on material hardship throughout the pandemic and the associated policy response has proved mixed. Using data from the National Health Interview Survey (pre-pandemic) and the COVID Impact Survey (after the start of the pandemic) Bitler, Hoynes, and Schanzenbach (2020) report a threefold increase in food insecurity. Winship and Rachidi (2020), however, argue that much of this measured change is due to differences in the data sources used before and after the start of the pandemic. Using data from the CPS Food Security Supplement (pre-pandemic) and the Census Pulse Survey (after the start of the pandemic) Bitler et al. find a sharp difference in food pantry usage during the pandemic. In contrast, Waxman, Gupta, and Gonzalez (2020), using data from the Urban Institute's Coronavirus Tracking Survey, report a decrease in food insecurity between March and May and a subsequent increase measured in September, coinciding with a short-term retreat in government support. Data from the CPS Food Security Supplement from before and after the start of the pandemic, suggest that food insecurity did not change between December 2019 and December 2020 overall, although it rose for households with children (Coleman-Jensen et al. 2021). Using data from the Well-Being and Basic Needs Survey, the Urban Institute finds a decline in material hardship across all six measures of material hardship that they report, including food insecurity, between

December 2019 and December 2020, and this decline was statistically significant for five of the six measures (Karpman and Zuckerman 2021).

III. Data and Methods

Data

Our main analyses use consumption data from the CE, a nationally representative survey that provides comprehensive information on spending for about 6,000 to 7,000 families each quarter (or about 5,000 prior to 1999). Surveys are administered continuously throughout the year, and families are asked about expenditures over the three months preceding the interview month. We use interviews with reference periods from 1984 through 2020. Our results will focus on 2019 and 2020—the period just prior to and after the start of the pandemic, but we will include data from earlier years to capture seasonal patterns.

Our measure of total expenditures includes all spending reported in the CE except cash contributions to parties outside of the consumer unit (CU) and other miscellaneous spending categories that are very small relative to total consumption (see Appendix A). These small categories are excluded to ensure a consistently defined measure throughout our sample period. We make a few adjustments to construct a measure of consumption from expenditures (see Appendix A). First, we convert vehicle spending to a service flow equivalent, which we calculate using information on the market value of the car and a fixed depreciation rate. Second, to convert housing expenditures to housing consumption for homeowners, we substitute the reported rental equivalent of the home for the sum of mortgage interest payments, property tax payments, spending on insurance, and maintenance and repairs. Finally, we exclude spending that is better interpreted as an investment such as spending on education and health care, and outlays for retirement including pensions and social security.

In prior work, we have focused on well-measured categories of consumption to address concerns about underreporting of consumption. For the

short run changes we examine here, concerns about changes in underreporting are less of a concern. Furthermore, for well-measured consumption to be an adequate proxy for total consumption its share of total consumption must be roughly constant (Meyer and Sullivan 2022), a condition that did not hold during the pandemic.

To adjust for differences in unit size and composition we scale our measures using an NAS recommended equivalence scale (Citro and Michael 1995). We adjust for price changes using the Personal Consumption Expenditures Chain-Type (PCE) price index. See Appendix C for more details. Because the pandemic affected access to and demand for certain types of goods and services, we also examine trends for major components of consumption, dividing them more finely than just the broad categories of goods and services, as others have done using PCE data (Tauber and Van Zandweghe 2021; Edgerton 2021; Remes et al. 2021). To complement our analyses of changes in consumption, we examine the patterns for family income during the pandemic using data from the Monthly CPS (see Appendix B). To address concerns about possible changes in sample representativeness, we re-weight the samples during the pandemic so that observable characteristics match those from the period immediately preceding the pandemic as explained in Appendix D.

Empirical Approach

To examine changes in consumption we estimate the following model:

$$\log\left(C_{iyq}^{*}\right) = \kappa_q + \tau_y + \beta_1 * (y = 2019 \,\&\, q = 1) + \cdots + \beta_8 * (y = 2020 \,\&\, q = 4) + X_{iyq}\delta + \varepsilon_{iyq}, \quad (1)$$

where C^*_{iyq} is consumption for CU i in interview year y and quarter q censored from below at 1[4] ($C^*_{iyq} \coloneqq \max(1, C_{iyq})$), κ_q and τ_y are quarter and year fixed effects, respectively, and X_{iyq} is a vector of observable CU characteristics. We include quarter fixed effects to account for seasonal patterns and year fixed effects to account nonparametrically for growth in our resource measures. Instead of including year fixed effects for 2018, 2019, and 2020, we include the 2019 and 2020 indicators interacted with the quarter indicators, leaving 2018 as our comparison year for the 2019 and 2020 quarterly terms. Accordingly, β_s where $s \in \{1,2,3,4\}$ can be interpreted as the percent change in (a percentile or moment of) C^* from 2018 to 2019 quarter s, accounting for seasonality. Similarly, β_s where $s \in \{5,6,7,8\}$ can be interpreted as the percent change in (a percentile or moment of) C^* from 2018 to 2020 quarter $s-4$, accounting for seasonality. The vector X_{iyq} contains indicators for the race and educational attainment of the reference person and a quadratic in age of the reference person. We group interviews by reference quarter to increase power, assigning a given interview to the calendar quarter containing the majority of the interview's reference months. The pandemic partially impacts the first quarter of 2020 and fully impacts all remaining quarters of 2020.

For our primary resource measures, we report results from five quantile regressions (10th, 25th, 50th, 75th, and 90th percentiles), and we report OLS results in appendix tables. For our analyses of trends in components of consumption, we divide our sample by terciles of total consumption—to have sufficient precision to

[4] We censor total expenditure (0.02% of [weighted] observations), total consumption (0.01%), housing and utility consumption (0.35%), vehicle flows (10.62%), food at home (0.56%), gasoline and motor oil (8.09%), food away from home (16.18%), other consumption (0.61%) and family income 1.05%.

draw conclusions—and report OLS estimates of changes in these components. All standard errors are clustered at the CU (CE) or family (CPS) level, accounting for correlation between observations introduced by the panel nature of the surveys. We report summary statistics for key variables in our CE and CPS samples in Appendix Table 1.

IV. Results

We begin by examining changes in the distribution of overall expenditures and consumption. Figure 2, which reports estimates for various quantiles for β_1 through β_8 in equation 1, shows changes prior to and after the start of the pandemic relative to 2018 (also see Appendix Table 2). The first bar ($\hat{\beta}_1$) indicates that the tenth percentile of total expenditures increased by 4.5% between 2018 and 2019 in quarter one, and this change is statistically significant at the 5% level.[5] The fifth bar ($\hat{\beta}_5$), the first shaded in light gray, corresponds to 2020 Q1. It indicates that the tenth percentile of total expenditures increased by 4.7% from 2018 to the first quarter of 2020, and this increase is significant at the 5% level. We also report the differences between the quarterly estimates for 2019 and 2020 in appendix tables, yielding estimates of year-over-year changes by quarter in 2020. For example, $\hat{\beta}_5 - \hat{\beta}_1$, the estimated change in total expenditures from 2019 Q1 to 2020 Q1, is 0.2% and statistically insignificant.

In 2019, the 10th percentiles of total expenditures and total consumption and the 25th percentile of total expenditures increased in multiple quarters of the year, and these increases were statistically significant. In 2020, the 10th percentiles of total expenditures and total consumption remained flat, relative to 2019, in all quarters. We estimate a 2.6% decrease in total consumption in the

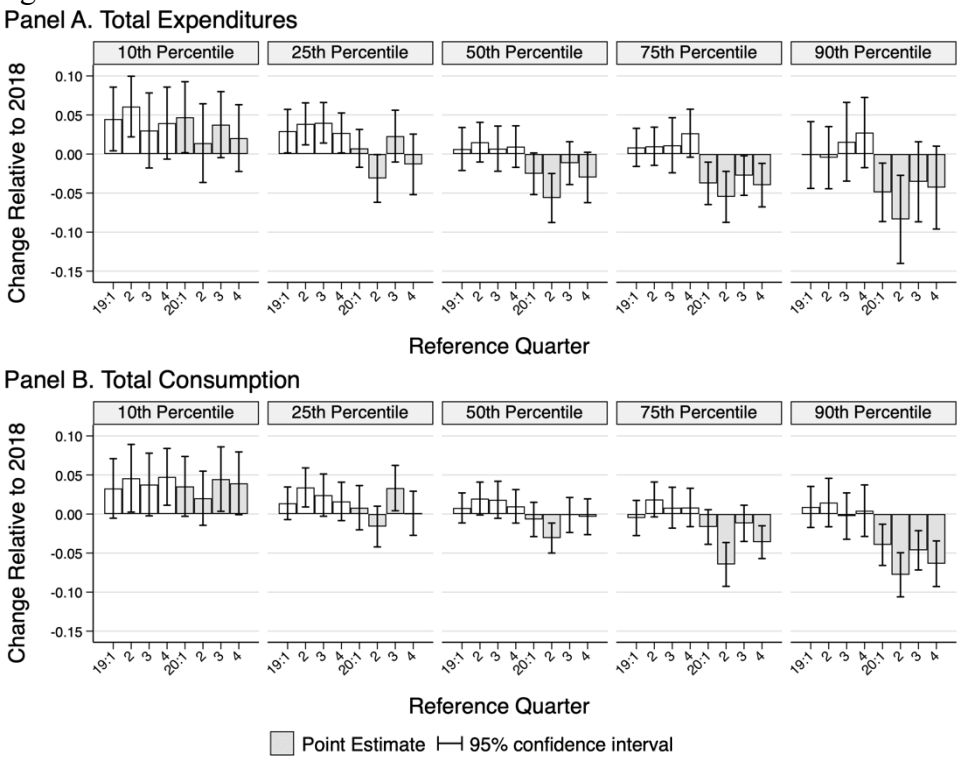
[5] More specifically, our reported estimates capture the percent change for a given quarter of 2019 or 2020 relative to 2018, controlling for seasonal variation.

second quarter, but this estimate is statistically insignificant. Across the other quarters, we can reject decreases in total consumption greater than 5.3%. For both total consumption and expenditures, we see a statistically significant decline for the 25th percentile only in quarter two.

As we move up the distributions of consumption and expenditure, a different pattern emerges. The 75th and 90th percentiles of total expenditures and consumption do not increase in 2019. In 2020, we begin to see decreases, especially in the second quarter of 2020. The 75th and 90th percentiles of total expenditures decline in Q2 2020 relative to Q2 2019 by 6.5% and 7.9%, respectively. For total consumption, we estimate decreases of 8.3% and 9.3%, respectively. The 90th percentile of total consumption falls in all quarters of 2020, and the 75th percentile in quarters two and four. These 2020 changes in the 75th and 90th percentiles of total consumption are all significant at the 1% level, outside of Q3 2020 for the 90th percentile, where the decrease of 4.4% is significant at the 5% level.

We might be worried that any change to total consumption and expenditures simply reflects a reallocation of spending among different categories of consumption with different levels of reporting. However, as we show below when we disaggregate consumption into six categories, the differences between changes for the bottom and top of the distribution are nearly all in the same direction (smaller increases and larger decreases for the top), implying that this worry is unfounded.

Figure 2. Total Expenditures and Consumption, 2019–2020, Seasonally Adjusted Changes Relative to 2018



Source: CE Interview Survey

Notes: This figure reports estimates of β_s from equation 1 from 5 quantile regressions with log expenditures and consumption as the dependent variables. The estimation sample includes data from 1984 through 2020. Years prior to 2018 are included to account for seasonal variation. Estimates are weighted at the individual level with fixed demographic weights for 2020. Dependent variables are adjusted for inflation using the PCE and for differences in unit size using the NAS equivalence scale. Bootstrapped standard errors are clustered at the CU level.

We also consider how income changed during the period before and after the start of the pandemic (Figure 3 and Appendix Table 3). The month of interview now corresponds to the end of the (one year) reference period. Across all percentiles, family income increased in the second half of 2019, and all of these estimates are significant at the 1% level except the increase in the 10th percentile at the end of 2019, which is significant at the 5% level. The pre-pandemic increase in income is consistent with the decline in poverty immediately before the pandemic found by Han, Meyer, and Sullivan (2020) and the nearly 50-year record low unemployment rate achieved in February 2020.[6]

Relative to 2018, all percentiles of income increased in all quarters of 2020, and these estimates are significant at the 1% level. Unlike the results for expenditures and consumption, however, our results indicate that family income increased for all percentiles in the first half of 2020 and either increased slightly or remained flat in the second half of the year. These changes tend to be largest in the second quarter of 2020, which coincides with the period when the initial EIPs and expanded UI payments were distributed. Additionally, the growth in income is most pronounced for the 10th percentile and tapers off as we move up the distribution. The 10th and 25th percentiles increased by 13.5% and 8.8%, respectively, in 2020 Q2 relative to 2019 Q2. The 50th, 75th, and 90th percentiles see changes ranging from 3% to 5% for the same period.

The upper portions of the income and consumption distributions move in opposite directions in 2020, with income rising but consumption falling. In the bottom parts of the distributions, income grew while consumption remained flat. Pandemic-related delays in tax refunds could partly explain our results, pushing

[6] From BLS via FRED: https://fred.stlouisfed.org/series/UNRATE

some consumption encouraged by EITC and ACTC receipt from the second to third quarter of 2020.[7]

To consider the role that saving played in these different patterns, we also examined changes in liquid assets (Appendix Tables 4 and 11).[8] Due to a limited sample size, we replace the 2019 and 2020 quarterly terms in equation 1 with indicators for 2019 and 2020.[9] Given these constraints on power, our results are imprecise, but they suggest that liquid wealth increases in 2020, and these increases grow (in dollar amounts) as we move up the distribution, consistent with the findings of Bachas et al. (2020). The consistency between the changes for total consumption and expenditures, income, and assets lends credence to our results for total consumption and expenditures.

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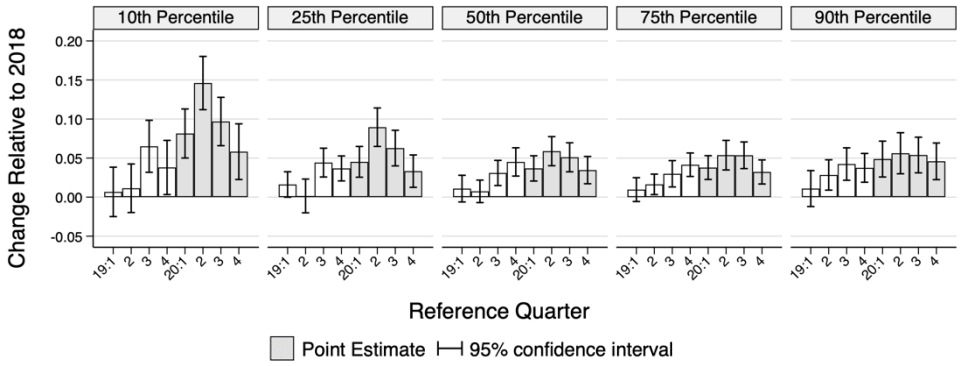
[7] See https://www.irs.gov/newsroom/filing-season-statistics-by-year.

[8] Liquid assets include checking, savings, money market accounts, and certificated of deposit or CDs,

[9] CUs are only asked about their assets in their final interviews, and, in recent years, approximately 15% of CUs in their final interview do not respond to the asset questions.

Figure 3. Annual Family Income, 2019–2020, Seasonally Adjusted Changes Relative to 2018

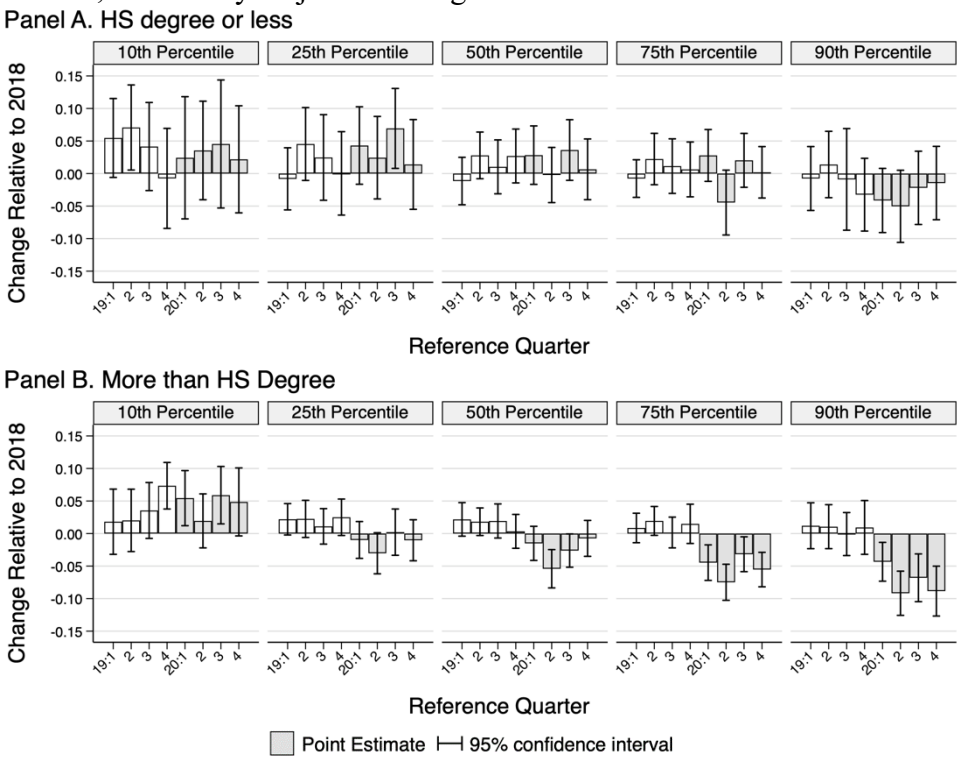


Source: Monlthly CPS

Notes: This figure reports estimates of β_s from equation 1 from 5 quantile regressions with log family income as the dependent variable. The estimation sample includes data from 2005 through 2020. Years prior to 2018 are included to account for seasonal variation. Estimates are weighted at the individual level with fixed demographic weights for 2020. Family income is adjusted for inflation using the PCE and for differences in family size using the NAS equivalence scale. Bootstrapped standard errors are clustered at the family level.

We also examine how changes in consumption during the pandemic differed across demographic groups defined by education, age and race. Our results indicate that the decline in consumption after the start of the pandemic was more pronounced for those in more educated CUs (Figure 4 and Appendix Table 5). The 75th and 90th percentiles of total consumption for those in CUs with a head with at least some college see a decrease relative to 2019 in every quarter of 2020, with declines ranging from 3.3% to 10.2%. These decreases are all significant at the 1% level, outside of 2020 Q3 for the 75th percentile and 2020 Q1 for the 90th percentile, which are both significant at the 5% level. Both the 25th and 50th percentiles for this higher educated group saw a significant decline in three quarters of 2020. For those in low-educated families, we find little evidence of a decline in consumption, although many of the point estimates are imprecise. The only declines that are statistically significant (at the 5% level) for these individuals are for the 75th and 90th percentiles in 2020 Q2. Appendix Tables 6 and 7 show results by age and race. Notably, the decline in consumption tends to be largest for the elderly and smallest for children. Since the elderly face greater risk of mortality or severe illness from COVID-19 than other age cohorts, their larger reductions in consumption could owe to a greater propensity to avoid in-person retail and services that also carry risk of transmission. The decline in consumption higher up in the consumption distribution is less evident for non-Whites than for White non-Hispanics, particularly for the 90th percentile during the latter half of 2020.

Figure 4. Total Consumption by Educational Attainment of Reference Person, 2019–2020, Seasonally Adjusted Changes Relative to 2018



Source: CE Interview Survey

Notes: This figure reports estimates of β_s from equation 1 from 5 quantile regressions with total consumption as the dependent variable. The estimation sample includes data from 1984 through 2020. We first partition our sample and then estimate quantile regressions. Thus, (changes in) percentiles are calculated with respect to the given group's distribution. Years prior to 2018 are included to account for seasonal variation. Estimates are weighted at the individual level with fixed demographic weights for 2020. Total consumption is adjusted for inflation using the PCE and for differences in unit size using the NAS equivalence scale. Bootstrapped standard errors are clustered at the CU level.

Recent changes in overall consumption may mask heterogeneity in changes in various types of consumption. This pattern may be particularly true given the significant disruptions to daily life that resulted from the pandemic, with many individuals traveling less and going to public places like restaurants and retail stores less frequently, for example. In addition, it is possible that reallocation of spending across category, combined with differential underreporting by category, could make comparisons across parts of the distribution misleading. We now disaggregate total consumption into six collectively exhaustive categories.

In Table 1 (also see Appendix Tables 8 and 9) we present year-over-year changes in estimates of β_s from equation 1 estimated with OLS for six different categories of consumption that sum to total consumption, with the sample divided into terciles of total consumption. Appendix Table 8 reports the underlying β_s estimates. The estimates of β_s can be interpreted as the percent change relative to 2018 in the mean of the consumption measure within a given tercile of total consumption, so the reported differences are estimates of year-over-year changes by quarter in 2020. For example, the first cell in Table 1 indicates that housing and utilities consumption for the first tercile rose by 15.2% in the first quarter of 2020 relative to the first quarter of 2019, and this change is significant at the 1% level. This estimate corresponds to the difference between the 2020 Q1 and 2019 Q1 estimates in appendix table 8 ($\hat{\beta}_5 - \hat{\beta}_1$).

The patterns that we find for components of consumption are quite consistent with the well-documented impact that the pandemic had on daily life—we see a dramatic increase in spending on goods consumed at home, such as food at home and housing and utilities, and a noticeable decrease in consumption of goods outside the home such as gasoline and motor oil and especially food away from home. Other researchers have found a decline in services and an increase in goods consumption using the Bureau of Economic Analysis (BEA) PCE data

(Tauber and Van Zandweghe 2021; Edgerton 2021; Remes et al. 2021). However, our results suggest that a simple split between goods and services does not fully capture the impact of the pandemic; for example, spending on gasoline and motor oil (classified as a good by BEA) falls during the pandemic, while housing (a service) increases. Looking across categories of consumption, the increases in consumption are smaller or the declines larger at the top of the distribution than at the bottom in nearly all cases. This pattern holds for each of the four quarters when comparing consumption in 2020 to either 2019 or 2018 and holds for all categories except food at home, where the pattern is mixed. This category (comprising 19 percent of the total for the bottom tercile and 10 percent of the total for the top tercile) and the differences across tercile of the category are sufficiently small that differential underreporting by category does not explain the change in total consumption.

Further, accounting for different reporting rates by category would only strengthen our findings. Bee, Meyer, and Sullivan (2015) find substantial differences in reporting across categories of consumption, with high reporting rates for housing and utilities (102%), new vehicle purchases (96%), gasoline and motor oil (78%), and food at home (86%) (panels A through D of Table 1), but low reporting rates for food away from home (53%; panel E). They also note that large conceptual differences between the PCE expenditures data and the CE Interview Survey make a comprehensive comparison challenging. Nevertheless, since panel F of Table 1 excludes almost all of the goods that contribute the most to PCE aggregate spending and have the highest reporting rates,[10] it is

[10] Of the 10 largest categories, the remaining (in descending order by size) are reported at rates of 32% (clothing), 80% (communication), 44% (furniture), and 22% (alcohol for off-premise consumption).

underreported relative to panels A through D. Since the two poorly reported categories see much larger percentage declines for the higher terciles (and also have larger consumption shares for these terciles), scaling up these changes for underreporting would only lead to larger differences in total consumption across tercile.

We can also decompose the change in aggregate consumption by tercile into the part due to differences in initial consumption shares between terciles and that due to changes in consumption by category within tercile. In the analysis that follows, we calculate the percent change in quarterly means (by tercile) from 2018 to the same quarter in 2019 or 2020 as an analogue to our regression specification.[11] We denote the percent change from 2018 to year-quarter t for tercile k and category of consumption j with $\Delta_t^{k,j}$ and the associated baseline consumption share with $\alpha_t^{k,j}$, where $j = tot$ refers to total consumption and $k = all$ refers to the change for the entire distribution. The change from 2018 in total consumption for tercile k in year-quarter t relative to the change for the entire sample is:

$$\Delta_t^{k,tot} - \Delta_t^{all,tot} \quad (2)$$

Both terms in equation 2 can be represented as a share-weighted average of the changes for each category j.

$$\Delta_t^{k,tot} - \Delta_t^{all,tot} = \sum_j \alpha_t^{k,j} \Delta_t^{k,j} - \sum_j \alpha_t^{all,j} \Delta_t^{all,j} \quad (3)$$

We combine these sums, adding and subtracting the expression $\alpha_t^{k,j}\Delta_t^{all,j}$, and rearrange to obtain:

[11] We obtain similar conclusions when we decompose regression adjusted changes instead of the means (of inflation-adjusted and equivalized consumption) described here that allow for an exact decomposition.

$$\Delta_t^{k,tot} - \Delta_t^{all,tot} = \sum_j (\alpha_t^{k,j} - \alpha_t^{all,j})\, \Delta_t^{all,j} - \sum_j \alpha_t^{k,j}\, (\Delta_t^{k,j} - \Delta_t^{all,j}) \quad (4)$$

The first sum in equation (4) reflects the portion of the relative change in total consumption for tercile k in year-quarter t driven by differences in initial consumption shares between terciles, while the second term reflects differences in within-category changes across tercile. We report the results of this decomposition in Appendix Table 10. The second component is almost always much larger than the first for all terciles and components, showing that differences in initial category shares between parts of the distribution play a much smaller role than changes in spending within category for a part of the distribution.

In additional analyses not reported, we find that the increase in housing and utility consumption in the first tercile is driven by CUs residing in unowned housing and thus likely not explained primarily by rising property values. Further, much of the increase dissipates if we exclude CUs residing in student housing.[12] In 2019, CUs residing in student housing account for 1.0% of individuals in the first tercile of total consumption, and this share falls below 0.3% in 2020. We thus suspect that the increase in housing and utility consumption is partly compositional, owing to the decreased share of CUs residing in student housing during the pandemic; CUs in student housing tend to have low housing and utility consumption. Further, over 80% of CUs residing in student housing fall in the first tercile of total consumption in 2019 and 2020, limiting the impact of these compositional changes on the other terciles.

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[12] The first tercile point estimates for the 2020 year-over-year changes (the differences between the 2020 and 2019 quarterly terms) fall by as little as 21% (quarter two) and as much as 66% (quarter four) if we exclude CUs residing in student housing, despite CUs in student housing accounting for a mere 1.0% of individuals in the first tercile of total consumption in 2019.

Table 1. Components of Consumption by Total Consumption Tercile, 2019-2020, Seasonally Adjusted Changes

	1st Tercile	2nd	3rd	1st Tercile	2nd	3rd	1st Tercile	2nd	3rd
	Panel A. Housing and Utilities			Panel B. Vehicle Flows			Panel C. Gasoline and Motor Oil		
2020 Q1	0.152	0.011	-0.011	0.127	-0.042	-0.053	-0.207	-0.226	-0.289
	(0.034)	(0.018)	(0.018)	(0.098)	(0.069)	(0.092)	(0.110)	(0.063)	(0.053)
2020 Q2	0.078	0.049	0.036	-0.030	-0.074	-0.054	-0.307	-0.542	-0.593
	(0.033)	(0.020)	(0.015)	(0.100)	(0.071)	(0.064)	(0.106)	(0.066)	(0.044)
2020 Q3	0.109	0.028	0.040	0.030	0.041	-0.000	-0.246	-0.351	-0.480
	(0.041)	(0.020)	(0.017)	(0.102)	(0.076)	(0.075)	(0.098)	(0.073)	(0.048)
2020 Q4	0.088	0.044	0.007	0.064	-0.015	0.121	-0.075	-0.402	-0.437
	(0.036)	(0.017)	(0.017)	(0.111)	(0.074)	(0.078)	(0.105)	(0.064)	(0.041)
Share	0.472	0.459	0.434	0.042	0.055	0.053	0.056	0.055	0.041
	Panel D. Food at Home			Panel E. Food away from Home			Panel F. Other Consumption		
2020 Q1	0.071	0.030	0.063	-0.406	-0.455	-0.626	-0.088	-0.068	-0.116
	(0.044)	(0.028)	(0.020)	(0.156)	(0.085)	(0.077)	(0.073)	(0.031)	(0.028)
2020 Q2	0.032	0.084	0.123	-0.780	-0.906	-1.269	-0.084	-0.148	-0.276
	(0.062)	(0.025)	(0.023)	(0.146)	(0.118)	(0.082)	(0.061)	(0.032)	(0.030)
2020 Q3	0.026	0.104	0.053	-0.352	-0.805	-0.876	-0.042	-0.086	-0.170
	(0.042)	(0.025)	(0.024)	(0.146)	(0.094)	(0.065)	(0.056)	(0.033)	(0.029)
2020 Q4	0.139	0.091	0.096	-0.561	-0.662	-0.910	-0.077	-0.080	-0.153
	(0.033)	(0.025)	(0.022)	(0.156)	(0.096)	(0.072)	(0.056)	(0.034)	(0.026)
Share	0.189	0.138	0.102	0.050	0.058	0.065	0.192	0.235	0.306

Notes: Data are from the CE Interview Survey. * p<0.10, ** p<0.05, *** p<0.01. N = 923,798. This table reports year-over-year differences in estimates of β_s from equation 1 with OLS, dividing the sample by tercile of total consumption. The dependent variables are various log compoents of consumption. The estimation sample includes 1984 to 2020 data. Years prior to 2018 are included to account for seasonal variation. Estimates are weighted at the individual level with fixed demographic weights for 2020. Dependent variables are adjusted for inflation using the PCE and for differences in unit size using the NAS equivalence scale. Bootstrapped standard errors are clustered at the CU level. The bottom of each panel reports the ratio between the mean of the consumption type and the mean of total consumption in 2018. The mean of the individual-level ratios yields similar results.

V. Discussion

Our results indicate few significant declines in overall consumption in 2020 for CUs near the bottom of the consumption distribution or for those with low education. We find no statistically significant decrease in the 10th percentile of consumption during 2020. At the 25th percentile, we find evidence of a decline in consumption in the second quarter of 2020 as compared to a year earlier, but we can reject decreases exceeding 5.3% in the other quarters. For CUs with greater material advantage, however, we find progressively larger declines. The most pronounced declines are evident for high-educated families near the top of the consumption distribution—the 90th percentile for this group fell by nearly 10 percent in the second quarter of 2020—and the elderly in the top half of the distribution. The decrease in the top half is less evident for non-Whites. Family income shows a different pattern than that for consumption. Relative to 2019, incomes increase across the board in the first half of 2020 and flatten out in the second half of the year. We find some evidence of increased liquid assets for the upper half of the distribution, consistent with the divergence between the upper half of the income and consumption distributions.

The results are robust to differential underreporting of expenditures across consumption categories. Underreporting likely attenuates, rather than exacerbates, the differences we find between different points in the distribution. We also find that differences across the distribution in aggregate consumption are driven by within category changes in consumption rather than differences in consumption shares across the distribution.

The pandemic impacted consumption beyond the normal recessionary channel of income shocks and employment uncertainty. Outlets and opportunities for leisure travel, dining, and entertainment (e.g., movie theaters) were greatly restricted. Many individuals, especially those shifting to remote work, spent far less time outside of their residence. These changes are reflected in our results for

changes in the types of consumption. Food away from home, gasoline and motor oil, and other consumption led the decline in total consumption. These declines were mitigated by an increase in food at home consumption. The increasing magnitude of changes we observe as we move up the total consumption distribution is consistent with the greater reduction in travel to work by the materially advantaged (relative to the materially disadvantaged); higher income workers and workers with higher educational attainment were more likely to shift to remote work (Parker, Horowitz, and Minkin 2020; Marshall, Burd, and Burrows 2021).

The onset of the pandemic brought massive economic upheaval to the United States, with an unprecedented combination of speed and scale. However, the associated policy response was also unprecedented, including expanded UI eligibility and benefits, multiple direct stimulus payments, and other support. To some extent, these programs targeted more disadvantaged households; the fixed nature of the EIPs and UI supplements mechanically increased the relative magnitude of benefits to income as we move down the income distribution. Our results suggest that the substantial and partially targeted policy response helped prevent consumption from falling for the most disadvantaged families. At the opposite end of the spectrum, the patterns at the top of the consumption distribution closely track changes in aggregate consumption.

We should emphasize that our results do not imply that the pandemic did not have any negative impacts on economic well-being for disadvantaged families. Our finding that consumption did not fall at low percentiles might mask heterogeneity in the impact of the pandemic, where some families experience a sharp decline in economic well-being, while others experience gains. Moreover, while consumption is arguably a better measure of economic well-being than income, it misses important dimensions of overall well-being. The profound disruptions from the pandemic such as the closures of schools, stores, churches

and other facilities, the uncertainty about future income streams, concerns about the health of family and friends, and other disruptions likely had adverse effects on the well-being of many families, and these disruptions are not directly captured by our measures of consumption.

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