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

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ABSTRACT

We examine the distribution of household consumption, income and savings from 2019 through the end of 2020 using the Consumer Expenditure Survey (CE) and other data. This is the first work to study the impact of the COVID-19 pandemic on economic well-being using nationally representative consumption data. We find that low percentiles of the consumption distribution see pre-pandemic growth and little change with the onset of the pandemic. On the other hand, higher percentiles of the consumption distribution do not increase before the pandemic and fall in 2020. Leveraging the rich demographics of our microdata, 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. These patterns for consumption are different than those for income, particularly in the upper part of the distribution. Liquid assets increase in the upper half of the distribution, consistent with the divergence between the upper half of the income and consumption distributions. Our results suggest that the policy response to the pandemic averted a decrease in consumption for the most materially disadvantaged families, while changes in aggregate consumption accord with the observed patterns in the top of the consumption distribution. The changes for various types of consumption, and the distribution of those changes across the material resource distribution, are consistent with reductions in travel to work—which were large for those with greater material advantage—and restrictions on outlets for consumption.

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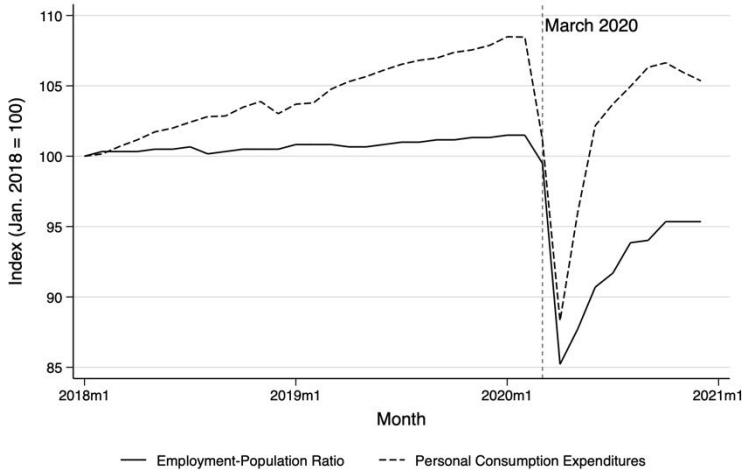
I. Introduction

On March 11, 2020, the World Health Organization (WHO) officially declared the emerging global COVID-19 outbreak a pandemic (WHO 2020). In the months that followed, 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 both 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 and sustained response. The CARES Act, which was passed in March 2020, carried a $1.7 trillion price tag. The bill's provisions 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

[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.

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 households, and 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. 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. 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 households, 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). 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 households 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 estimating average changes in types of consumption for various parts of the consumption distribution.

Our results indicate that in the year preceding the pandemic, the consumption of households near the bottom of the distribution increased more than that of households 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. 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.

We also find that the patterns for consumption are different than the patterns for income. Looking by education group, we find that the decline in consumption after the start of the pandemic is more pronounced for households headed by those with at least some college education. In addition, 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.

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. Their approach has the advantage of providing near-real-time information on how income changed during the pandemic; data on household income are available with less than a one-month lag, while nationally representative consumption data for the latter part of 2020 were not available until September 2021. However, as Han, Meyer, and Sullivan acknowledge, this income measure has important limitations as it is based on a global income question that is asked of a subset of the monthly CPS respondents and is designed to capture money income, which does not include in-kind transfers such as SNAP benefits or housing subsidies.

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 household spending behavior during the pandemic using transaction data and other customer records. Using account-level data from JP Morgan Chase, Cox et al. (2020a,b) identify, in the months following 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 socio-economic status, as measured by ZIP code level income. They find that households in the top quartile of ZIP code level income reduce spending by 13% from January to July 2020, compared to just 4% for households in bottom-quartile ZIP codes. These studies provide important, timely evidence on how economic well-being was impacted during the pandemic. Our study contributes to this evidence by providing information on consumption for a nationally representative sample and by analyzing the patterns at different points in the distribution of consumption and for specific demographic groups.

Other researchers have investigated specific aspects of the pandemic policy response. Parker et al. (2022) use a nationally representative sample from the CE to study the impact of

EIPs on household spending behavior, finding that people increased their spending by 5-10 percent of their EIP amount during the quarter in which they received the payment. Those with low liquid wealth or who received their EIPs on debit cards spent a greater share of their EIPs. Karger and Rajan (2020) and Baker et al. (2020) use records from financial institutions to estimate marginal propensities to consume of 0.46 and 0.25-0.40, respectively, in the first weeks following EIP receipt. Again, these studies find an increased propensity to spend among those with lower levels of material advantage. These studies suggest that households (at least temporarily) allocated some of their EIPs to savings, consistent with the evidence from savings in customer records in Bachas et al. (2020).

The evidence on material hardship throughout the unfolding of 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. The U.S. Department of Agriculture, using data from the CPS Food Security Supplement from before and after the start of the pandemic, show that food insecurity did not change between December 2019 and December 2020 overall, although the prevalence of food insecurity rose for households with children during this period from 6.5 percent to 7.6 percent (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 in order to ensure a consistently defined measure of total expenditures throughout our sample period. From this measure of total expenditures, we make a few adjustments to construct a measure of consumption (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.[2] To adjust for differences in family 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 on our equivalence scale and inflation adjustments. 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). We examine finer components because not all subcategories would be expected to respond to the pandemic in the same way. 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).

Pandemic-Era Nonresponse Bias and Reweighting

The onset of the pandemic forced the Census Bureau to switch CE and CPS interviews that would typically be conducted in-person to telephone interviews. These changes coincided with a decline in response rates: from February to June 2020, response rates fell by 21.4% and 14.3% for the CPS and CE, respectively.[3] Furthermore, changes in response rates differed considerably across groups (see Appendix Tables AD1 and AD2) in ways for which the survey weights do not account, introducing nonresponse bias. Bee and Rothbaum (2021) find evidence of upward nonresponse bias in estimates of income from the CPS during the pandemic. The CE relies on the CPS for population control totals in its reweighting procedure, suggesting that there are similar issues with nonresponse bias in the CE.

To address concerns about possible changes in sample representativeness, we re-weight the samples during pandemic so that observable characteristics—family type, age of head, education of head, and race/ethnicity of head—match those from the period immediately preceding the pandemic. For the CE, we re-weight observations from the second through fourth interview quarters of 2020 so that observables from these quarters match those in interview quarter 1. For the CPS, we re-weight observations from March through December of 2020 so that observables from these months match those from January and February. See Appendix D for more details.

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[2] In prior work, we have focused on a measure of consumption that relies on only the well-measured categories of consumption to address concerns about underreporting of consumption and changes in underreporting over time. These well-measured components compare well to national accounts both in levels and in changes over time (Bee, Meyer, and Sullivan 2015). For the short run changes we examine here, concerns about changes in underreporting are less of a concern. In addition, for well-measured consumption to be an adequate proxy for total consumption its share of total reported consumption must be roughly constant (Meyer and Sullivan 2022). Unfortunately, given the changes in demand and supply during the pandemic, departures from this assumed pattern are substantial. We report trends for well-measured consumption in Appendix Tables 2 and 10 and Appendix Figures 1 and 7.

[3] See https://www.bls.gov/osmr/response-rates/home.htm.

Empirical Approach

To examine changes in consumption we estimate the following model:

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

where C^*_{iyq} is consumption for household 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 household 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, 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.[5]

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 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).

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[4] We censor total expenditure (0.02% of [weighted] observations), total consumption (0.01%), well-measured consumption (0.04%), 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%.

[5] Our quarter 1 2020 data consist of interviews from March, April, and May, so two thirds of reference months are completely pre-pandemic, but all interviews occur during pandemic-exposed months. Further, the first quarter of 2020 could reflect greater pandemic exposure if respondents overweight recent expenditures when responding to the survey. This bias could be intensified due to the extreme salience of the pandemic. Beginning a reference period with a salient event can reduce telescoping (Loftus and Marburger 1983). In our analysis, however, a salient event occurs in the middle of a reference period (and the salient event continues for an indeterminate time period). Additionally, the CE survey questions might enable bias towards recent expenditures. For example, respondents are asked for their usual weekly spending on groceries, and the BLS converts this weekly amount into a quarterly value. Gibson (2005) reviews evidence on recall bias; generally, more spending is recalled when reference periods are shortened. These results suggest expenditures further in the past would be more likely to be forgotten.

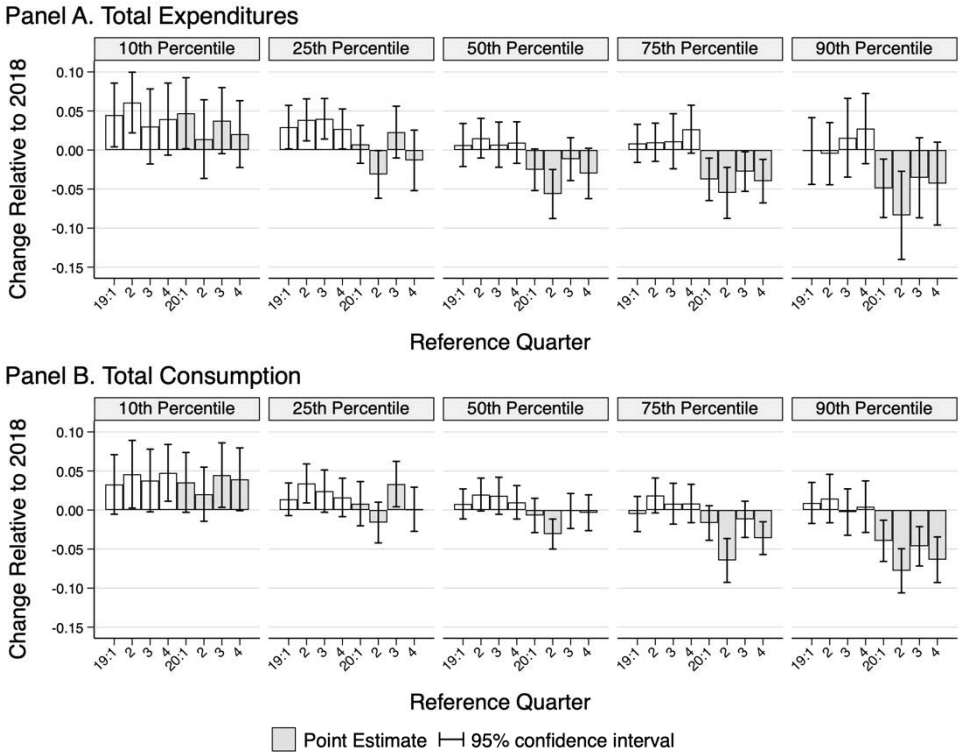
The first bar ($\hat{\beta}_1$) indicates that the tenth percentile of total expenditures increased by 4.5% between 2018 and 2019 in quarter one, and this change is statistically significant at the 5% level.[6] The fifth bar ($\hat{\beta}_5$), the first shaded in light gray, corresponds to 2020 Q1. It 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 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.

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

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 family 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. The 75th and 90th percentiles also increased in 2019 Q2. All but two of these estimates are significant at the 1% level; the increase in the 10th percentile at the end of 2019 and the Q2 increase for the 75th percentile are 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.[7]

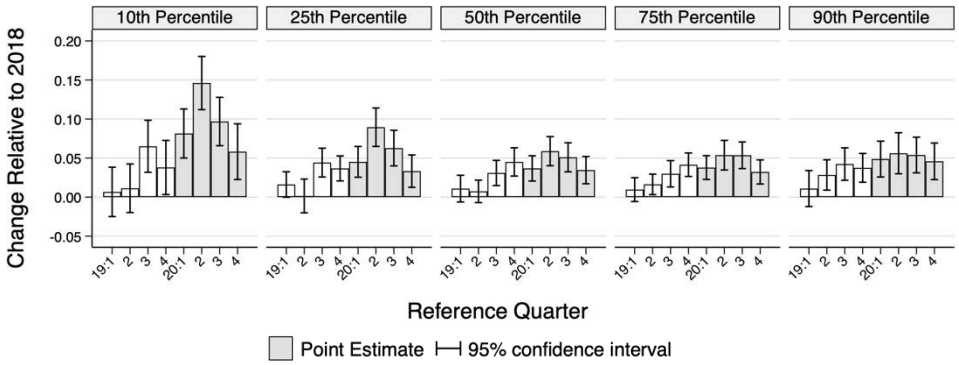
Relative to 2018, all percentiles of income increase in all quarters of 2020, and these estimates are significant at the 1% level. Unlike the results for expenditures and consumption, however, our results indicate that family income increased for all percentiles in the first half of 2020 and either increased 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

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

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. To consider the role that saving played in these different patterns, we also examined changes in liquid assets (Appendix Tables 4 and 11 and Appendix Figures 2 and 8).[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). It is worth noting that pandemic-related changes in the timing of tax refunds could partly explain some of our results. In 2020, the IRS postponed the due date for 2019 taxes which led to returns being processed and refunds being issued slightly later in 2020 than other years.[10] We would expect the delay in refunds to push some consumption encouraged by EITC and ACTC receipt from the second to third quarter of 2020.

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, gender and race. Our results indicate that the decline in consumption after the start of the pandemic was more pronounced for those in more educated households (Figure 4 and Appendix Table 5). The 75th and 90th percentiles of total consumption for those in households 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

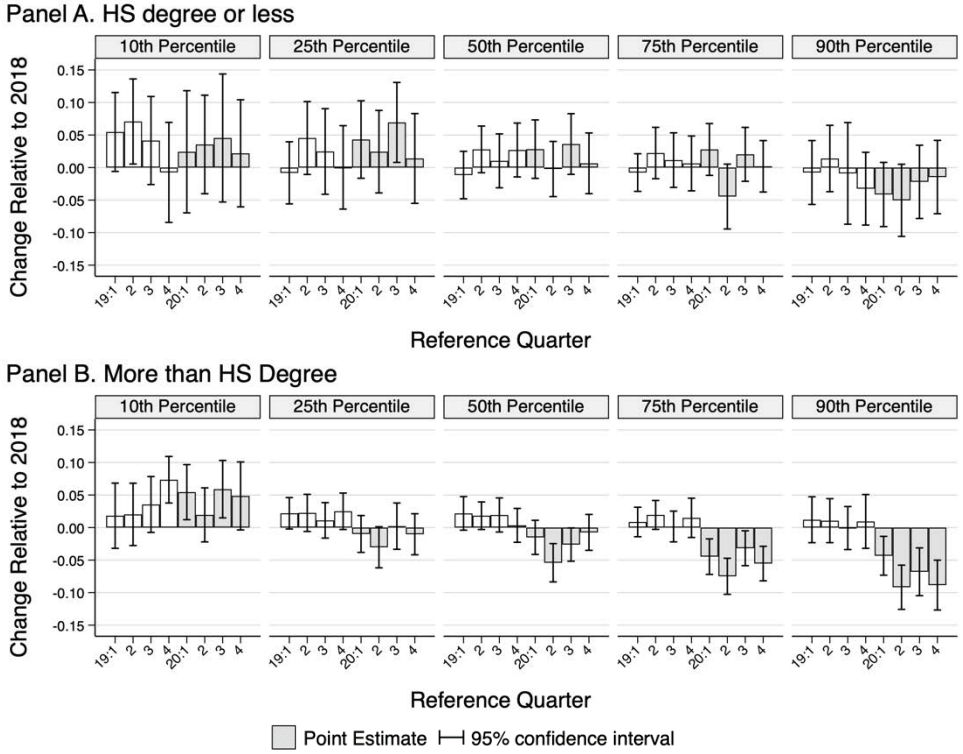
[8] Liquid assets includes checking, savings, money market accounts, and certificated of deposit or CDs,

[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.

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

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 through 8 and Appendix Figures 3 through 5 show results by sex, 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. 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 family 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 Table 1 (also see

Appendix Figures 6 and 7 and Appendix Tables 9 and 10) we present 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. These estimates can be interpreted as the percent change relative to 2018 in the mean of the consumption measure within a given tercile of total consumption. For example, the first cell in Table 1 ($\hat{\beta}_1$) indicates that housing and utility consumption of CUs in the first tercile of total consumption increased by 2.5% in the first quarter of 2019 relative to 2018, and this increase is not statistically different from zero. We also report the differences between the quarterly estimates for 2019 and 2020, yielding estimates of year-over-year changes by quarter in 2020. For example, the 2020 Q1 estimate for tercile 1 in the "Relative to 2019" section of Panel A is 15.2% and significant at the 1% level. This estimate corresponds to the difference between the 2020 Q1 and 2019 Q1 estimates in the "Relative to 2018" section of Panel A ($\hat{\beta}_5 - \hat{\beta}_1$).

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.[11] Relative to 2019, food at home consumption increases for the third tercile in all quarters of 2020, for the second tercile in the last three quarters of the year, and just in Q4 for the first tercile. Housing and utility consumption increases for the first tercile after the onset of the pandemic, and the last quarter of 2019 also sees a significant increase. The second and third terciles see an increase in two quarters of 2020. The decline in food away from home is significant at the 1% level for nearly all terciles and all of 2020; the decline each quarter is largest for the third tercile and smallest for the first tercile. The second and third terciles see a significant decrease in all quarters of 2020 for gasoline and motor oil consumption, while the fall for the first tercile is only significant in Q2 and Q3. Other consumption, which includes components such as phones and appliances, entertainment, and clothing, declined more modestly than food away from home and gasoline and motor oil in 2020, and most noticeably for the third tercile. We find no strong evidence that consumption of these other goods and services declined in 2020 for the first tercile, though the point estimates are all negative and range from -4% to -9%. Other researchers have found a decline in services and an increase in goods consumption using 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.

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

[11] Previous work has shown that some components of consumption in the CE, including food away from home, are significantly underreported and that this underreporting has increased over time (Bee, Meyer, and Sullivan 2015). This underreporting, however, is less likely to be a concern for the very short run changes that we examine here unless the pandemic significantly affected reporting.

[12] The first tercile point estimates for the 2020 year-over-year changes (the difference 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

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.

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		
Relative to 2018									
2019 Q1	0.025	0.005	0.013	0.138*	0.043	-0.008	0.167**	-0.040	-0.032
	(0.030)	(0.012)	(0.013)	(0.076)	(0.055)	(0.055)	(0.078)	(0.047)	(0.044)
2019 Q2	0.056*	0.009	-0.001	0.160**	0.109*	0.023	0.157*	0.075*	-0.063*
	(0.029)	(0.016)	(0.014)	(0.080)	(0.056)	(0.058)	(0.083)	(0.044)	(0.035)
2019 Q3	0.069**	0.027	-0.009	0.216**	0.009	0.019	0.217**	-0.065	-0.009
	(0.033)	(0.017)	(0.016)	(0.090)	(0.066)	(0.064)	(0.088)	(0.051)	(0.037)
2019 Q4	0.076**	0.018	0.011	0.159*	0.099	-0.021	0.162*	-0.005	0.043
	(0.032)	(0.016)	(0.016)	(0.092)	(0.066)	(0.070)	(0.091)	(0.054)	(0.037)
2020 Q1	0.176***	0.015	0.001	0.265***	0.001	-0.061	-0.040	-0.266***	-0.321***
	(0.030)	(0.018)	(0.018)	(0.086)	(0.058)	(0.075)	(0.090)	(0.052)	(0.037)
2020 Q2	0.134***	0.058***	0.035**	0.131	0.035	-0.031	-0.150	-0.467***	-0.657***
	(0.030)	(0.017)	(0.014)	(0.087)	(0.058)	(0.073)	(0.095)	(0.056)	(0.039)
2020 Q3	0.178***	0.054***	0.031**	0.247***	0.050	0.019	-0.029	-0.416***	-0.488***
	(0.038)	(0.018)	(0.015)	(0.084)	(0.057)	(0.067)	(0.091)	(0.059)	(0.041)
2020 Q4	0.163***	0.062***	0.018	0.223***	0.084	0.100	0.088	-0.407***	-0.394***
	(0.034)	(0.017)	(0.016)	(0.084)	(0.065)	(0.064)	(0.094)	(0.050)	(0.035)
Relative to 2019									
2020 Q1	0.152***	0.011	-0.011	0.127	-0.042	-0.053	-0.207*	-0.226***	-0.289***
2020 Q2	0.078**	0.049**	0.036**	-0.030	-0.074	-0.054	-0.307***	-0.542***	-0.593***
2020 Q3	0.109***	0.028	0.040**	0.030	0.041	-0.000	-0.246**	-0.351***	-0.480***
2020 Q4	0.088**	0.044**	0.007	0.064	-0.015	0.121	-0.075	-0.402***	-0.437***
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		
Relative to 2018									
2019 Q1	0.007	0.035*	0.018	0.073	0.027	-0.028	0.078**	0.023	-0.003
	(0.029)	(0.018)	(0.017)	(0.098)	(0.062)	(0.042)	(0.037)	(0.023)	(0.023)
2019 Q2	0.025	0.001	-0.006	0.176*	-0.032	-0.002	0.144***	0.065**	0.004
	(0.030)	(0.019)	(0.023)	(0.099)	(0.078)	(0.046)	(0.036)	(0.026)	(0.024)
2019 Q3	0.053*	-0.002	0.012	0.085	0.091	-0.038	0.142***	0.052**	0.001
	(0.028)	(0.021)	(0.022)	(0.110)	(0.068)	(0.051)	(0.040)	(0.025)	(0.026)
2019 Q4	0.021	0.016	0.006	0.029	0.117*	0.017	0.103**	0.016	-0.045*
	(0.030)	(0.021)	(0.023)	(0.121)	(0.065)	(0.049)	(0.042)	(0.026)	(0.025)
2020 Q1	0.078**	0.065***	0.081***	-0.333**	-0.427***	-0.654***	-0.010	-0.045	-0.119***
	(0.033)	(0.022)	(0.020)	(0.140)	(0.073)	(0.067)	(0.063)	(0.029)	(0.026)
2020 Q2	0.057	0.085***	0.117***	-0.604***	-0.937***	-1.270***	0.060	-0.083***	-0.271***
	(0.056)	(0.020)	(0.019)	(0.142)	(0.093)	(0.067)	(0.056)	(0.031)	(0.031)
2020 Q3	0.079**	0.102***	0.065***	-0.267**	-0.714***	-0.913***	0.100**	-0.034	-0.169***
	(0.039)	(0.018)	(0.020)	(0.121)	(0.087)	(0.063)	(0.050)	(0.026)	(0.025)
2020 Q4	0.160***	0.107***	0.103***	-0.532***	-0.545***	-0.893***	0.026	-0.064**	-0.198***
	(0.027)	(0.018)	(0.019)	(0.114)	(0.089)	(0.066)	(0.047)	(0.028)	(0.023)
Relative to 2019									
2020 Q1	0.071	0.030	0.063***	-0.406***	-0.455***	-0.626***	-0.088	-0.068**	-0.116***
2020 Q2	0.032	0.084***	0.123***	-0.780***	-0.906***	-1.269***	-0.084	-0.148***	-0.276***
2020 Q3	0.026	0.104***	0.053**	-0.352**	-0.805***	-0.876***	-0.042	-0.086***	-0.170***
2020 Q4	0.139***	0.091***	0.096***	-0.561***	-0.662***	-0.910***	-0.077	-0.080**	-0.153***
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 estimates of β_s from equation 1 with OLS, and year-over-year differences in the estimates of β_s, 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 family 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 households 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 households 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 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 (along both the intensive and extensive margins) UI benefits, multiple direct stimulus payments, and other forms of 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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APPENDICES:

I. Appendix Figures and Tables

Table A1a. Summary Statistics, CE

Variable	1984-2017	2018	2019	2020
Total expenditure	16,236	18,754	18,937	18,103
	(13,335)	(15,412)	(14,791)	(14,102)
	[1.00]	[1.00]	[1.00]	[1.00]
Total consumption	13,852	15,946	16,006	15,395
	(9,390)	(10,989)	(10,127)	(8,988)
	[1.00]	[1.00]	[1.00]	[1.00]
Well-measured consumption	8,867	10,502	10,573	10,735
	(4,798)	(5,703)	(5,595)	(5,562)
	[1.00]	[1.00]	[1.00]	[1.00]
Housing and utilities	5,615	7,034	7,093	7,270
	(3,848)	(4,685)	(4,651)	(4,648)
	[1.00]	[0.99]	[1.00]	[1.00]
Vehicle flows	729	816	830	845
	(845)	(937)	(915)	(952)
	[0.89]	[0.89]	[0.90]	[0.90]
Food at home	1,821	1,927	1,939	2,099
	(1,031)	(1,172)	(1,120)	(1,242)
	[0.99]	[0.99]	[0.99]	[0.99]
Gasoline and motor oil	702	725	711	522
	(637)	(638)	(582)	(459)
	[0.92]	[0.91]	[0.92]	[0.92]
Food away from home	895	977	984	719
	(1,429)	(1,260)	(1,317)	(944)
	[0.84]	[0.85]	[0.85]	[0.77]
Other consumption	4,090	4,468	4,449	3,940
	(5,416)	(6,402)	(5,273)	(4,570)
	[1.00]	[1.00]	[1.00]	[1.00]
Liquid assets	22,992	20,199	22,775	23,191
	(86,491)	(76,070)	(81,992)	(77,934)
	[0.77]	[0.67]	[0.69]	[0.70]
Reference person has HS degree or less	0.46	0.34	0.34	0.33
	(0.50)	(0.47)	(0.47)	(0.47)
CU members younger than 18	1.18	1.11	1.09	1.09
	(1.38)	(1.39)	(1.39)	(1.36)
CU members aged 18 to 64	1.95	1.92	1.93	1.93
	(1.11)	(1.13)	(1.16)	(1.20)
CU members older than 64	0.25	0.33	0.33	0.35
	(0.58)	(0.65)	(0.66)	(0.66)
CU members White, non-Hispanic	2.18	1.92	1.86	1.88
	(1.91)	(1.93)	(1.90)	(1.86)
CU members other race	1.20	1.43	1.49	1.49
	(2.08)	(2.10)	(2.19)	(2.13)
CU members female	1.73	1.71	1.69	1.72
	(1.13)	(1.13)	(1.12)	(1.12)
CU members male	1.66	1.64	1.67	1.65
	(1.15)	(1.15)	(1.18)	(1.16)

N	859,324	22,980	21,471	20,023
N (liquid assets)	147,533	4,990	4,691	4,694

See notes below table A1b.

Table A1b. Summary Statistics, CPS

Variable	2005-2017	2018	2019	2020
Family income	99,051	109,341	114,588	117,707
	(110,310)	(117,897)	(129,131)	(134,383)
	[0.99]	[0.99]	[0.99]	[0.99]
N	1,584,993	109,291	105,644	88,621

Source: CE Interview Survey, Monlthly CPS

Notes: This table reports summary stats for our samples from the CE (A1a) and the CPS (A1b). Standard deviations are in parentheses, and the proportion of values that exceed zero are in brackets. The CE sample includes data from 1984 through 2020. CE consumption and expenditure variables have a 3-month reference period. The CPS sample includes data from 2005 through 2020. The CPS family income variable has a 12-month reference period. Estimates are weighted at the individual level with fixed demographic weights for 2020. Resource measures are adjusted for inflation using the PCE (and expressed in April 2020 $) and for differences in family size using the NAS equivalence scale.

Table A2a. Total Expenditures and Consumption, 2019–2020, Seasonally Adjusted Changes

	Quantile					
	10th	25th	50th	75th	90th	OLS
			Panel A. Total Expenditure			
Relative to 2018						
2019 Q1	0.045**	0.029**	0.006	0.008	-0.001	0.017*
	(0.021)	(0.014)	(0.014)	(0.012)	(0.022)	(0.010)
2019 Q2	0.061***	0.039***	0.015	0.010	-0.005	0.027**
	(0.020)	(0.014)	(0.013)	(0.012)	(0.020)	(0.011)
2019 Q3	0.030	0.040***	0.007	0.011	0.016	0.021*
	(0.025)	(0.013)	(0.015)	(0.018)	(0.026)	(0.012)
2019 Q4	0.040*	0.027**	0.010	0.027*	0.028	0.024*
	(0.024)	(0.013)	(0.014)	(0.016)	(0.023)	(0.012)
2020 Q1	0.047**	0.007	-0.025*	-0.038***	-0.049**	-0.006
	(0.023)	(0.012)	(0.014)	(0.014)	(0.019)	(0.012)
2020 Q2	0.014	-0.031**	-0.056***	-0.055***	-0.084***	-0.042***
	(0.026)	(0.016)	(0.016)	(0.017)	(0.029)	(0.014)
2020 Q3	0.038*	0.023	-0.012	-0.028**	-0.036	0.005
	(0.022)	(0.017)	(0.014)	(0.013)	(0.026)	(0.012)
2020 Q4	0.020	-0.013	-0.030*	-0.040***	-0.043	-0.017
	(0.022)	(0.020)	(0.016)	(0.014)	(0.027)	(0.013)
Relative to 2019						
2020 Q1	0.002	-0.022	-0.032*	-0.046***	-0.048**	-0.023*
2020 Q2	-0.047	-0.070***	-0.071***	-0.065***	-0.079**	-0.069***
2020 Q3	0.007	-0.017	-0.019	-0.039**	-0.051*	-0.016
2020 Q4	-0.019	-0.040*	-0.040**	-0.067***	-0.071**	-0.041***
			Panel B. Total Consumption			
Relative to 2018						
2019 Q1	0.033*	0.014	0.008	-0.005	0.009	0.008
	(0.019)	(0.011)	(0.010)	(0.011)	(0.013)	(0.009)
2019 Q2	0.046**	0.034***	0.020*	0.019	0.015	0.025***
	(0.022)	(0.013)	(0.011)	(0.011)	(0.016)	(0.009)
2019 Q3	0.038*	0.024*	0.018	0.008	-0.003	0.016
	(0.020)	(0.014)	(0.012)	(0.013)	(0.015)	(0.010)
2019 Q4	0.048**	0.016	0.010	0.008	0.004	0.015
	(0.019)	(0.013)	(0.011)	(0.013)	(0.017)	(0.010)
2020 Q1	0.035*	0.008	-0.007	-0.017	-0.039***	-0.002
	(0.020)	(0.014)	(0.011)	(0.011)	(0.013)	(0.010)
2020 Q2	0.020	-0.016	-0.031***	-0.065***	-0.078***	-0.034***
	(0.018)	(0.013)	(0.010)	(0.014)	(0.014)	(0.011)
2020 Q3	0.045**	0.033**	-0.001	-0.012	-0.046***	0.004
	(0.021)	(0.015)	(0.011)	(0.012)	(0.013)	(0.010)
2020 Q4	0.039*	0.001	-0.004	-0.036***	-0.064***	-0.005
	(0.021)	(0.014)	(0.012)	(0.011)	(0.015)	(0.011)
Relative to 2019						
2020 Q1	0.003	-0.006	-0.015	-0.012	-0.049***	-0.009
2020 Q2	-0.026	-0.050***	-0.051***	-0.083***	-0.093***	-0.059***
2020 Q3	0.007	0.009	-0.019	-0.020	-0.044**	-0.012
2020 Q4	-0.008	-0.015	-0.013	-0.044***	-0.068***	-0.020
N	923,798	923,798	923,798	923,798	923,798	923,798

Source: CE Interview Survey

Notes: * p<0.10, ** p<0.05, *** p<0.01. This table reports estimates of β_s from equation 1 from 5 quantile regressions and OLS with log expenditures and consumption as the dependent variables, as well as year-over-year differences in the estimates of β_s. 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 family size using the NAS equivalence scale. Bootstrapped standard errors are clustered at the CU level.

Table A2b. Well-Measured Consumption, 2019–2020, Seasonally Adjusted Changes

	Quantile					
	10th	25th	50th	75th	90th	OLS
Relative to 2018						
2019 Q1	0.010	0.009	0.006	0.004	0.016	0.008
	(0.017)	(0.011)	(0.010)	(0.010)	(0.013)	(0.009)
2019 Q2	0.032*	0.026**	0.012	0.009	0.003	0.018**
	(0.020)	(0.010)	(0.009)	(0.009)	(0.012)	(0.009)
2019 Q3	0.034**	0.016	0.005	0.007	-0.011	0.009
	(0.017)	(0.013)	(0.010)	(0.010)	(0.015)	(0.011)
2019 Q4	0.033*	0.025	0.024**	0.013	-0.002	0.022**
	(0.017)	(0.016)	(0.011)	(0.012)	(0.016)	(0.010)
2020 Q1	0.050***	0.032***	0.015	-0.002	0.003	0.032***
	(0.015)	(0.012)	(0.011)	(0.011)	(0.014)	(0.009)
2020 Q2	0.036*	0.035**	0.011	0.009	-0.004	0.021**
	(0.021)	(0.015)	(0.013)	(0.009)	(0.013)	(0.010)
2020 Q3	0.059***	0.047***	0.027**	0.015	0.021	0.042***
	(0.017)	(0.014)	(0.013)	(0.011)	(0.014)	(0.010)
2020 Q4	0.044**	0.043**	0.031**	0.029***	0.011	0.048***
	(0.018)	(0.018)	(0.012)	(0.011)	(0.016)	(0.010)
Relative to 2019						
2020 Q1	0.040*	0.023	0.010	-0.006	-0.014	0.024**
2020 Q2	0.003	0.009	-0.002	-0.001	-0.007	0.003
2020 Q3	0.026	0.032**	0.022	0.008	0.031*	0.033***
2020 Q4	0.011	0.018	0.007	0.016	0.013	0.026**
N	923,798	923,798	923,798	923,798	923,798	923,798

Source: CE Interview Survey

Notes: This table reports estimates of β_s from equation 1 from 5 quantile regressions and OLS with the log of well-measured consumption as the dependent variable. See notes to Table A2a for additional details.

Table A3. Annual Family Income, 2019–2020, Seasonally Adjusted Changes

	Quantile					
	10th	25th	50th	75th	90th	OLS
Relative to 2018						
2019 Q1	0.007	0.016*	0.011	0.010	0.011	0.015
	(0.016)	(0.008)	(0.009)	(0.008)	(0.012)	(0.012)
2019 Q2	0.011	0.002	0.007	0.016**	0.028***	0.011
	(0.016)	(0.011)	(0.007)	(0.007)	(0.010)	(0.013)
2019 Q3	0.065***	0.044***	0.031***	0.030***	0.042***	0.059***
	(0.017)	(0.009)	(0.008)	(0.009)	(0.011)	(0.011)
2019 Q4	0.038**	0.037***	0.045***	0.041***	0.037***	0.047***
	(0.018)	(0.008)	(0.009)	(0.008)	(0.009)	(0.012)
2020 Q1	0.081***	0.045***	0.037***	0.038***	0.049***	0.065***
	(0.016)	(0.010)	(0.008)	(0.008)	(0.012)	(0.012)
2020 Q2	0.146***	0.090***	0.059***	0.054***	0.056***	0.145***
	(0.017)	(0.013)	(0.010)	(0.010)	(0.013)	(0.011)
2020 Q3	0.097***	0.063***	0.051***	0.054***	0.054***	0.101***
	(0.016)	(0.012)	(0.009)	(0.009)	(0.012)	(0.013)
2020 Q4	0.058***	0.033***	0.035***	0.032***	0.046***	0.065***
	(0.018)	(0.011)	(0.009)	(0.008)	(0.012)	(0.012)
Relative to 2019						
2020 Q1	0.075***	0.029***	0.026**	0.028***	0.038***	0.050***
2020 Q2	0.135***	0.088***	0.051***	0.037***	0.028**	0.134***
2020 Q3	0.032*	0.019*	0.020*	0.024***	0.012	0.042***
2020 Q4	0.020	-0.003	-0.011	-0.009	0.008	0.018
N	1,897,871	1,897,871	1,897,871	1,897,871	1,897,871	1,897,871

Source: Monlthly CPS

Notes: * p<0.10, ** p<0.05, *** p<0.01. This table reports estimates of β_s from equation 1 from 5 quantile regressions and OLS with log family income as the dependent variable, as well as year-over-year differences in the estimates of β_s. The estimation sample includes data from 2005 through 2020. Years prior to 2018 are included to account for seasonal variation. The 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 CU level.

Table A4. Liquid Assets, 2019–2020, Seasonally Adjusted Changes

	Quantile					
	10th	25th	50th	75th	90th	OLS
			Panel A. Quarterly			
Relative to 2018						
2019 Q1		22.30	366.41**	807.43*	1,077.91	3,967.96*
		(27.55)	(155.96)	(471.18)	(1,270.53)	(2,363.99)
2019 Q2		-3.13	122.37	415.72	860.82	2,037.32
		(15.84)	(218.91)	(562.00)	(744.98)	(2,327.78)
2019 Q3		-5.99	320.14	799.25	313.30	-2,721.89
		(21.26)	(226.17)	(577.79)	(1,139.75)	(2,063.09)
2019 Q4		-17.00	162.71	571.94	1,098.13	3,018.54
		(22.12)	(211.68)	(529.24)	(1,190.95)	(2,604.52)
2020 Q1		39.80*	596.71***	1,016.83**	1,632.33	6,010.82**
		(24.10)	(154.61)	(455.59)	(1,285.44)	(2,658.19)
2020 Q2		70.41*	527.59**	1,273.69***	1,042.97	-75.13
		(41.12)	(225.40)	(445.37)	(1,206.11)	(2,119.77)
2020 Q3		63.48**	410.43**	980.73	405.27	-614.02
		(28.22)	(180.42)	(739.00)	(1,055.25)	(2,038.95)
2020 Q4		14.56	363.72	1,434.70***	1,446.97	3,208.38
		(18.71)	(237.83)	(553.12)	(1,214.13)	(2,376.01)
Relative to 2019						
2020 Q1		17.50	230.31	209.40	554.42	2,042.86
2020 Q2		73.54*	405.22	857.96	182.15	-2,112.45
2020 Q3		69.46**	90.29	181.49	91.97	2,107.87
2020 Q4		31.56	201.01	862.76	348.84	189.84
			Panel B. Yearly			
Relative to 2018						
2019		1.42	224.94*	683.55**	907.31*	1,644.47
		(13.50)	(116.54)	(344.30)	(550.22)	(1,463.11)
2020		34.88**	506.48***	1,235.42***	1,364.19**	2,116.23
		(16.05)	(130.85)	(298.60)	(614.50)	(1,444.72)
Relative to 2019						
2020		33.47*	281.54**	551.87**	456.88	471.76
N	232,727	232,727	232,727	232,727	232,727	232,727

Source: CE Interview Survey

Notes: * p<0.10, ** p<0.05, *** p<0.01. This table reports estimates of β_s from equation 1 from 5 quantile regressions and OLS with the level of liquid assets as the dependent variable, as well as year-over-year differences in the estimates of β_s. Panel B replaces the 2019 and 2020 quarterly dummies with indicators for years 2019 and 2020. 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 variable is adjusted for inflation using the PCE (and expressed in April 2020 $) and for differences in family size using the NAS equivalence scale. Bootstrapped standard errors are clustered at the CU level.

Table A5. Total Consumption by Educational Attainment of Reference Person, 2019–2020, Seasonally Adjusted Changes

	Quantile					
	10th	25th	50th	75th	90th	OLS
	Panel A. HS degree or less					
Relative to 2018						
2019 Q1	0.055*	-0.008	-0.012	-0.008	-0.008	0.001
	(0.031)	(0.024)	(0.019)	(0.015)	(0.025)	(0.016)
2019 Q2	0.071**	0.045	0.028	0.022	0.014	0.046***
	(0.033)	(0.029)	(0.018)	(0.020)	(0.026)	(0.017)
2019 Q3	0.041	0.025	0.010	0.011	-0.009	0.029
	(0.035)	(0.034)	(0.021)	(0.021)	(0.040)	(0.019)
2019 Q4	-0.007	0.000	0.027	0.006	-0.033	0.012
	(0.039)	(0.033)	(0.021)	(0.022)	(0.029)	(0.020)
2020 Q1	0.024	0.043	0.028	0.028	-0.041	0.027
	(0.048)	(0.030)	(0.023)	(0.020)	(0.025)	(0.019)
2020 Q2	0.035	0.024	-0.002	-0.045*	-0.050*	-0.012
	(0.039)	(0.032)	(0.022)	(0.025)	(0.028)	(0.024)
2020 Q3	0.045	0.069**	0.036	0.020	-0.022	0.041**
	(0.050)	(0.031)	(0.024)	(0.021)	(0.029)	(0.020)
2020 Q4	0.022	0.014	0.006	0.002	-0.015	0.022
	(0.042)	(0.035)	(0.024)	(0.020)	(0.029)	(0.020)
Relative to 2019						
2020 Q1	-0.030	0.051	0.040	0.036*	-0.034	0.026
2020 Q2	-0.035	-0.021	-0.030	-0.067**	-0.064**	-0.059**
2020 Q3	0.004	0.045	0.026	0.009	-0.013	0.012
2020 Q4	0.029	0.014	-0.020	-0.004	0.018	0.010
N	403,052	403,052	403,052	403,052	403,052	403,052
	Panel B. More than HS Degree					
Relative to 2018						
2019 Q1	0.018	0.022*	0.022*	0.009	0.012	0.013
	(0.026)	(0.012)	(0.013)	(0.012)	(0.018)	(0.010)
2019 Q2	0.020	0.023	0.018*	0.019*	0.011	0.014
	(0.024)	(0.015)	(0.011)	(0.011)	(0.017)	(0.011)
2019 Q3	0.035	0.011	0.019	0.002	-0.001	0.009
	(0.022)	(0.014)	(0.013)	(0.012)	(0.017)	(0.012)
2019 Q4	0.073***	0.025*	0.003	0.015	0.009	0.019
	(0.018)	(0.014)	(0.013)	(0.015)	(0.021)	(0.012)
2020 Q1	0.054**	-0.010	-0.015	-0.045***	-0.043***	-0.013
	(0.022)	(0.014)	(0.013)	(0.014)	(0.015)	(0.012)
2020 Q2	0.019	-0.030*	-0.054***	-0.075***	-0.092***	-0.045***
	(0.021)	(0.016)	(0.015)	(0.014)	(0.017)	(0.012)
2020 Q3	0.059***	0.002	-0.026**	-0.032**	-0.068***	-0.016
	(0.022)	(0.018)	(0.013)	(0.014)	(0.019)	(0.012)
2020 Q4	0.049*	-0.010	-0.007	-0.055***	-0.088***	-0.016
	(0.027)	(0.016)	(0.014)	(0.014)	(0.020)	(0.013)
Relative to 2019						
2020 Q1	0.036	-0.032**	-0.037**	-0.053***	-0.055**	-0.026*
2020 Q2	-0.001	-0.053***	-0.072***	-0.094***	-0.102***	-0.059***
2020 Q3	0.024	-0.009	-0.046***	-0.033**	-0.067***	-0.025*
2020 Q4	-0.025	-0.035**	-0.011	-0.070***	-0.098***	-0.035**
N	520,746	520,746	520,746	520,746	520,746	520,746

Source: CE Interview Survey

Notes: This table reports estimates of β_s from equation 1 from 5 quantile regressions and OLS with the log of consumption as the dependent variable. See notes to Table A2a for additional details.

Table A6. Total Consumption by Individual Age, 2019–2020, Seasonally Adjusted Changes

	Quantile					
	10th	25th	50th	75th	90th	OLS
	Panel A. Children (0-17)					
Relative to 2018						
2019 Q1	0.046*	0.033	0.018	-0.000	-0.013	0.014
	(0.028)	(0.021)	(0.020)	(0.018)	(0.022)	(0.015)
2019 Q2	0.061*	0.054***	0.051***	0.009	-0.011	0.027*
	(0.036)	(0.020)	(0.019)	(0.021)	(0.033)	(0.016)
2019 Q3	0.058*	0.020	0.019	-0.017	-0.016	0.007
	(0.031)	(0.025)	(0.022)	(0.021)	(0.026)	(0.018)
2019 Q4	0.072**	0.036**	0.011	-0.010	-0.001	0.016
	(0.029)	(0.016)	(0.023)	(0.025)	(0.025)	(0.017)
2020 Q1	0.051*	0.003	0.012	-0.035	-0.040	-0.000
	(0.027)	(0.022)	(0.021)	(0.022)	(0.024)	(0.017)
2020 Q2	0.042	0.003	0.008	-0.047**	-0.085***	-0.022
	(0.042)	(0.023)	(0.024)	(0.019)	(0.031)	(0.022)
2020 Q3	0.074***	0.044*	0.037	-0.008	-0.017	0.028
	(0.027)	(0.024)	(0.024)	(0.026)	(0.028)	(0.018)
2020 Q4	0.074**	0.004	-0.001	-0.030	-0.050*	0.002
	(0.034)	(0.025)	(0.022)	(0.021)	(0.028)	(0.019)
Relative to 2019						
2020 Q1	0.005	-0.030	-0.006	-0.034	-0.027	-0.014
2020 Q2	-0.019	-0.051*	-0.043	-0.056**	-0.074*	-0.049**
2020 Q3	0.016	0.024	0.018	0.009	-0.001	0.021
2020 Q4	0.002	-0.032	-0.013	-0.020	-0.049*	-0.014
N	320,975	320,975	320,975	320,975	320,975	320,975
	Panel B. Adults (18-64)					
Relative to 2018						
2019 Q1	0.025	0.009	0.001	-0.006	-0.004	0.005
	(0.024)	(0.012)	(0.011)	(0.012)	(0.017)	(0.010)
2019 Q2	0.041*	0.038***	0.008	0.013	0.017	0.021**
	(0.024)	(0.012)	(0.012)	(0.012)	(0.013)	(0.010)
2019 Q3	0.038*	0.036**	0.013	0.011	0.011	0.017
	(0.021)	(0.015)	(0.012)	(0.014)	(0.019)	(0.011)
2019 Q4	0.042**	0.011	0.002	0.015	0.002	0.014
	(0.021)	(0.014)	(0.012)	(0.018)	(0.015)	(0.012)
2020 Q1	0.042**	0.006	-0.010	-0.014	-0.038**	0.003
	(0.020)	(0.015)	(0.013)	(0.015)	(0.016)	(0.011)
2020 Q2	0.006	-0.007	-0.040***	-0.057***	-0.077***	-0.031***
	(0.020)	(0.015)	(0.014)	(0.014)	(0.017)	(0.011)
2020 Q3	0.060***	0.026*	-0.012	-0.023**	-0.052***	-0.000
	(0.021)	(0.014)	(0.013)	(0.010)	(0.019)	(0.011)
2020 Q4	0.028	0.001	-0.010	-0.049***	-0.064***	-0.007
	(0.020)	(0.016)	(0.012)	(0.012)	(0.018)	(0.012)
Relative to 2019						
2020 Q1	0.017	-0.003	-0.011	-0.008	-0.034	-0.002
2020 Q2	-0.036	-0.044**	-0.047***	-0.070***	-0.094***	-0.052***
2020 Q3	0.022	-0.010	-0.025*	-0.034**	-0.063***	-0.018
2020 Q4	-0.014	-0.010	-0.013	-0.064***	-0.066***	-0.021
N	768,595	768,595	768,595	768,595	768,595	768,595

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	Quantile					
	10th	25th	50th	75th	90th	OLS
	Panel C. Seniors (65+)					
Relative to 2018						
2019 Q1	0.007	0.002	0.021	0.018	0.005	0.008
	(0.019)	(0.015)	(0.013)	(0.017)	(0.027)	(0.013)
2019 Q2	0.002	0.011	0.041**	0.042**	0.025	0.032**
	(0.026)	(0.022)	(0.016)	(0.018)	(0.026)	(0.015)
2019 Q3	0.019	0.018	0.017	0.011	0.022	0.022
	(0.027)	(0.021)	(0.016)	(0.019)	(0.026)	(0.015)
2019 Q4	0.005	0.021	0.019	0.010	0.029	0.017
	(0.027)	(0.018)	(0.017)	(0.020)	(0.027)	(0.016)
2020 Q1	-0.007	-0.018	-0.017	-0.018	-0.030	-0.020
	(0.021)	(0.013)	(0.018)	(0.018)	(0.038)	(0.015)
2020 Q2	0.006	-0.045***	-0.061***	-0.063***	-0.108***	-0.059***
	(0.022)	(0.016)	(0.017)	(0.015)	(0.020)	(0.016)
2020 Q3	0.008	0.003	-0.025	-0.024	-0.049**	-0.021
	(0.032)	(0.016)	(0.018)	(0.016)	(0.025)	(0.016)
2020 Q4	0.029	-0.011	0.007	-0.021	-0.040	-0.009
	(0.022)	(0.019)	(0.015)	(0.019)	(0.026)	(0.016)
Relative to 2019						
2020 Q1	-0.014	-0.020	-0.038*	-0.036*	-0.035	-0.028
2020 Q2	0.004	-0.055**	-0.102***	-0.105***	-0.133***	-0.090***
2020 Q3	-0.011	-0.015	-0.042**	-0.035	-0.071***	-0.043**
2020 Q4	0.024	-0.033	-0.012	-0.031	-0.069**	-0.026
N	229,039	229,039	229,039	229,039	229,039	229,039

Source: CE Interview Survey

Notes: This table reports estimates of β_s from equation 1 from 5 quantile regressions and OLS with the log of consumption as the dependent variable. See notes to Table A2a for additional details.

Table A7. Total Consumption by Individual Race/Ethnicity, 2019–2020, Seasonally Adjusted Changes

	Quantile					
	10th	25th	50th	75th	90th	OLS
	Panel A. White, non-Hispanic					
Relative to 2018						
2019 Q1	0.050**	0.028*	0.035***	-0.000	0.003	0.017
	(0.023)	(0.016)	(0.012)	(0.010)	(0.020)	(0.010)
2019 Q2	0.031	0.018	0.023*	0.010	0.014	0.017
	(0.020)	(0.016)	(0.012)	(0.011)	(0.018)	(0.011)
2019 Q3	0.034	0.014	0.016	-0.002	0.010	0.011
	(0.025)	(0.017)	(0.014)	(0.013)	(0.017)	(0.013)
2019 Q4	0.023	0.015	-0.001	0.000	0.021	0.008
	(0.029)	(0.016)	(0.012)	(0.014)	(0.018)	(0.012)
2020 Q1	0.015	-0.019	-0.024*	-0.019	-0.048***	-0.016
	(0.023)	(0.016)	(0.012)	(0.015)	(0.016)	(0.012)
2020 Q2	0.004	-0.023	-0.043***	-0.069***	-0.084***	-0.046***
	(0.025)	(0.016)	(0.015)	(0.016)	(0.016)	(0.013)
2020 Q3	0.042	0.021	-0.014	-0.018	-0.055***	-0.004
	(0.026)	(0.016)	(0.012)	(0.013)	(0.020)	(0.012)
2020 Q4	0.043**	-0.012	-0.014	-0.039***	-0.068***	-0.013
	(0.021)	(0.016)	(0.014)	(0.012)	(0.016)	(0.012)
Relative to 2019						
2020 Q1	-0.035	-0.047**	-0.059***	-0.018	-0.051**	-0.033**
2020 Q2	-0.027	-0.041*	-0.066***	-0.079***	-0.098***	-0.062***
2020 Q3	0.008	0.007	-0.030*	-0.016	-0.065***	-0.015
2020 Q4	0.020	-0.027	-0.013	-0.040**	-0.089***	-0.021
N	694,731	694,731	694,731	694,731	694,731	694,731
	Panel B. Other					
Relative to 2018						
2019 Q1	-0.002	-0.021	-0.033**	-0.011	-0.017	-0.009
	(0.025)	(0.023)	(0.016)	(0.018)	(0.023)	(0.015)
2019 Q2	0.097***	0.060***	0.016	0.029	0.009	0.039**
	(0.027)	(0.020)	(0.018)	(0.019)	(0.025)	(0.015)
2019 Q3	0.055	0.027	0.012	0.012	-0.032	0.023
	(0.034)	(0.024)	(0.022)	(0.018)	(0.025)	(0.017)
2019 Q4	0.075**	0.028	0.025	0.025	-0.031	0.025
	(0.033)	(0.030)	(0.019)	(0.022)	(0.021)	(0.017)
2020 Q1	0.078**	0.056**	0.002	-0.012	-0.039	0.020
	(0.035)	(0.027)	(0.019)	(0.025)	(0.026)	(0.017)
2020 Q2	0.037	0.032	-0.010	-0.052**	-0.069**	-0.010
	(0.033)	(0.026)	(0.017)	(0.022)	(0.028)	(0.019)
2020 Q3	0.067	0.029	0.015	-0.005	-0.048	0.016
	(0.043)	(0.030)	(0.018)	(0.022)	(0.030)	(0.018)
2020 Q4	0.053	0.025	0.023	-0.026	-0.056**	0.007
	(0.043)	(0.032)	(0.022)	(0.020)	(0.023)	(0.019)
Relative to 2019						
2020 Q1	0.080**	0.077**	0.034*	-0.001	-0.023	0.029
2020 Q2	-0.060*	-0.028	-0.026	-0.081***	-0.078**	-0.049**
2020 Q3	0.012	0.002	0.003	-0.017	-0.016	-0.007
2020 Q4	-0.021	-0.003	-0.002	-0.050**	-0.025	-0.018
N	272,341	272,341	272,341	272,341	272,341	272,341

Source: CE Interview Survey

Notes: This table reports estimates of β_s from equation 1 from 5 quantile regressions and OLS with the log of consumption as the dependent variable. See notes to Table A2a for additional details.

Table A8. Total Consumption by Individual Sex, 2019–2020, Seasonally Adjusted Changes

	Quantile					
	10th	25th	50th	75th	90th	OLS
			Panel A. Female			
Relative to 2018						
2019 Q1	0.036	0.015	0.006	0.002	-0.001	0.008
	(0.023)	(0.012)	(0.011)	(0.011)	(0.016)	(0.010)
2019 Q2	0.053***	0.039***	0.025**	0.021*	0.006	0.026**
	(0.020)	(0.014)	(0.012)	(0.012)	(0.014)	(0.010)
2019 Q3	0.036*	0.024	0.013	0.008	0.000	0.014
	(0.022)	(0.016)	(0.013)	(0.016)	(0.017)	(0.012)
2019 Q4	0.038	0.020	0.004	0.006	0.014	0.012
	(0.023)	(0.014)	(0.013)	(0.015)	(0.017)	(0.012)
2020 Q1	0.032	0.000	-0.009	-0.023	-0.055***	-0.011
	(0.021)	(0.015)	(0.012)	(0.015)	(0.015)	(0.011)
2020 Q2	0.021	-0.016	-0.026**	-0.061***	-0.090***	-0.034***
	(0.022)	(0.017)	(0.011)	(0.015)	(0.016)	(0.012)
2020 Q3	0.043*	0.039***	0.001	-0.016	-0.051***	0.004
	(0.024)	(0.015)	(0.012)	(0.012)	(0.017)	(0.011)
2020 Q4	0.045**	0.005	0.001	-0.034***	-0.070***	-0.005
	(0.022)	(0.012)	(0.011)	(0.010)	(0.016)	(0.011)
Relative to 2019						
2020 Q1	-0.004	-0.015	-0.015	-0.025	-0.054**	-0.019
2020 Q2	-0.032	-0.055***	-0.051***	-0.082***	-0.096***	-0.060***
2020 Q3	0.007	0.015	-0.012	-0.024	-0.051***	-0.010
2020 Q4	0.007	-0.015	-0.002	-0.040**	-0.084***	-0.017
N	788,092	788,092	788,092	788,092	788,092	788,092
			Panel B. Male			
Relative to 2018						
2019 Q1	0.029	0.009	0.006	-0.009	0.012	0.007
	(0.020)	(0.012)	(0.012)	(0.012)	(0.015)	(0.009)
2019 Q2	0.036*	0.029**	0.016	0.016	0.022	0.024**
	(0.021)	(0.014)	(0.012)	(0.012)	(0.016)	(0.011)
2019 Q3	0.043**	0.018	0.019	0.009	-0.004	0.018
	(0.021)	(0.014)	(0.012)	(0.013)	(0.018)	(0.011)
2019 Q4	0.055**	0.013	0.009	0.007	-0.006	0.018
	(0.022)	(0.013)	(0.013)	(0.014)	(0.017)	(0.011)
2020 Q1	0.052**	0.020	-0.001	-0.016	-0.020	0.008
	(0.023)	(0.014)	(0.013)	(0.013)	(0.014)	(0.011)
2020 Q2	0.017	-0.014	-0.037***	-0.064***	-0.063***	-0.033***
	(0.020)	(0.015)	(0.012)	(0.016)	(0.015)	(0.013)
2020 Q3	0.046*	0.026*	-0.006	-0.007	-0.040**	0.003
	(0.024)	(0.014)	(0.014)	(0.012)	(0.017)	(0.011)
2020 Q4	0.029	-0.006	-0.008	-0.034***	-0.049***	-0.005
	(0.027)	(0.016)	(0.013)	(0.012)	(0.017)	(0.012)
Relative to 2019						
2020 Q1	0.023	0.011	-0.007	-0.007	-0.032	0.001
2020 Q2	-0.019	-0.044**	-0.054***	-0.080***	-0.085***	-0.057***
2020 Q3	0.003	0.008	-0.026*	-0.016	-0.036*	-0.015
2020 Q4	-0.026	-0.019	-0.018	-0.042**	-0.043**	-0.023*
N	740,360	740,360	740,360	740,360	740,360	740,360

Source: CE Interview Survey

Notes: This table reports estimates of β_s from equation 1 from 5 quantile regressions and OLS with the log of consumption as the dependent variable. See notes to Table A2a for additional details.

Table A9. Components of Consumption, All Observations, 2019-2020, Seasonally Adjusted Changes

	Panel A. Housing and Utilities	Panel B. Vehicle Flows	Panel C. Gasoline and Motor Oil
Relative to 2018			
2019 Q1	0.013	0.046	0.020
	(0.012)	(0.037)	(0.032)
2019 Q2	0.029**	0.101**	0.059*
	(0.013)	(0.045)	(0.034)
2019 Q3	0.027*	0.072	0.039
	(0.015)	(0.049)	(0.042)
2019 Q4	0.035***	0.072	0.060
	(0.013)	(0.046)	(0.042)
2020 Q1	0.062***	0.064	-0.212***
	(0.012)	(0.049)	(0.041)
2020 Q2	0.062***	0.025	-0.439***
	(0.013)	(0.051)	(0.042)
2020 Q3	0.090***	0.106**	-0.311***
	(0.016)	(0.042)	(0.042)
2020 Q4	0.073***	0.126***	-0.245***
	(0.015)	(0.044)	(0.036)
Relative to 2019			
2020 Q1	0.049***	0.018	-0.232***
2020 Q2	0.033**	-0.077	-0.498***
2020 Q3	0.063***	0.034	-0.350***
2020 Q4	0.038**	0.054	-0.305***
	Panel D. Food at Home	Panel E. Food away from Home	Panel F. Other Consumption
Relative to 2018			
2019 Q1	0.019	0.015	0.029*
	(0.013)	(0.045)	(0.017)
2019 Q2	0.009	0.055	0.080***
	(0.015)	(0.047)	(0.019)
2019 Q3	0.019	0.031	0.058**
	(0.015)	(0.059)	(0.023)
2019 Q4	0.013	0.047	0.023
	(0.014)	(0.059)	(0.022)
2020 Q1	0.073***	-0.478***	-0.063***
	(0.016)	(0.058)	(0.024)
2020 Q2	0.078***	-0.968***	-0.119***
	(0.021)	(0.073)	(0.027)
2020 Q3	0.083***	-0.637***	-0.035
	(0.015)	(0.054)	(0.023)
2020 Q4	0.118***	-0.676***	-0.093***
	(0.012)	(0.056)	(0.028)
Relative to 2019			
2020 Q1	0.054***	-0.493***	-0.092***
2020 Q2	0.069***	-1.023***	-0.199***
2020 Q3	0.064***	-0.669***	-0.093***
2020 Q4	0.105***	-0.723***	-0.116***
N	923,798	923,798	923,798

Source: CE Interview Survey

Notes: * p<0.10, ** p<0.05, *** p<0.01. This table reports estimates of β_s from equation 1 with OLS, as well as year-over-year differences in the estimates of β_s. Various measures of log consumption are used 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 family size using the NAS equivalence scale. Standard errors are clustered at the CU level.

Table A10. Total and Well-Measured Consumption by Total Consumption Tercile, 2019–2020, Seasonally Adjusted Changes

	1st Tercile	2nd	3rd	All	1st Tercile	2nd	3rd	All
	Panel A. Total Consumption				Panel B. Well-Measured Consumption			
Relative to 2018								
2019 Q1	0.020	0.009	-0.001	0.008	0.014	0.008	0.008	0.008
	(0.014)	(0.009)	(0.011)	(0.009)	(0.019)	(0.010)	(0.009)	(0.009)
2019 Q2	0.050***	0.011	-0.005	0.025**	0.036**	0.005	-0.003	0.018**
	(0.015)	(0.010)	(0.010)	(0.010)	(0.018)	(0.010)	(0.010)	(0.009)
2019 Q3	0.048***	0.014	-0.002	0.016	0.033	0.007	-0.005	0.009
	(0.016)	(0.011)	(0.011)	(0.012)	(0.024)	(0.012)	(0.011)	(0.011)
2019 Q4	0.044***	0.012	-0.009	0.015	0.048***	0.017	0.004	0.022**
	(0.016)	(0.012)	(0.011)	(0.009)	(0.018)	(0.011)	(0.010)	(0.009)
2020 Q1	0.059***	-0.011	-0.043***	-0.002	0.094***	0.011	-0.002	0.032***
	(0.015)	(0.012)	(0.012)	(0.010)	(0.017)	(0.011)	(0.012)	(0.009)
2020 Q2	0.049***	-0.024*	-0.085***	-0.034***	0.064***	0.019	0.014	0.021**
	(0.015)	(0.013)	(0.013)	(0.011)	(0.021)	(0.012)	(0.011)	(0.009)
2020 Q3	0.078***	-0.008	-0.061***	0.004	0.087***	0.026*	0.008	0.042***
	(0.017)	(0.012)	(0.011)	(0.010)	(0.021)	(0.014)	(0.010)	(0.010)
2020 Q4	0.066***	-0.001	-0.051***	-0.005	0.103***	0.039***	0.023*	0.048***
	(0.019)	(0.012)	(0.011)	(0.012)	(0.022)	(0.012)	(0.012)	(0.010)
Relative to 2019								
2020 Q1	0.039**	-0.020*	-0.043***	-0.009	0.080***	0.003	-0.010	0.024**
2020 Q2	-0.001	-0.036**	-0.080***	-0.059***	0.029	0.014	0.017	0.003
2020 Q3	0.030	-0.022	-0.059***	-0.012	0.054**	0.019	0.013	0.033**
2020 Q4	0.021	-0.013	-0.043***	-0.020	0.056**	0.022*	0.018	0.026**
N	923,798				923,798			

Source: CE Interview Survey

Notes: * p<0.10, ** p<0.05, *** p<0.01. This table reports estimates of β_s from equation 1 with OLS, as well as year-over-year differences in the estimates of β_s, dividing the sample by tercile of total consumption. The dependent variables are log consumption and log well-measured consumption. 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 family size using the NAS equivalence scale. Bootstrapped standard errors are clustered at the CU level.

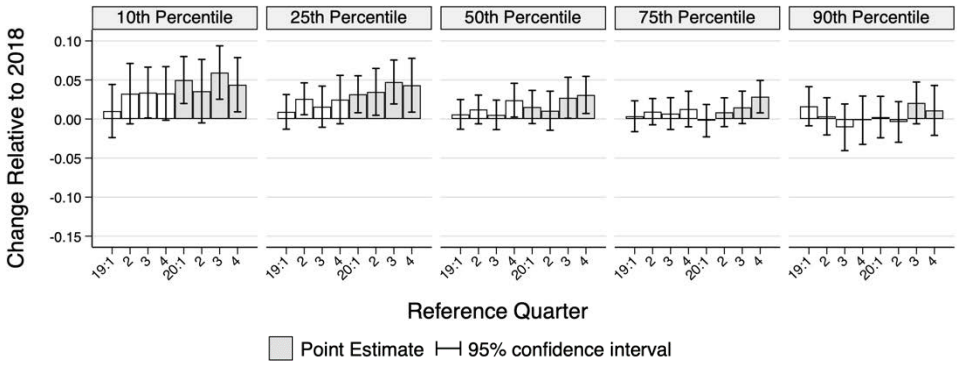
Table A11. Liquid Assets by Total Consumption Tercile, 2019–2020, Seasonally Adjusted Changes

	1st Tercile	2nd	3rd	All
		Panel A. Quarterly		
Relative to 2018				
2019 Q1	656.15	2,223.93	7,492.41	3,967.96*
	(1,744.13)	(3,891.66)	(6,102.81)	(2,340.52)
2019 Q2	656.07	63.57	6,300.03	2,037.32
	(2,008.83)	(2,990.42)	(5,563.68)	(2,459.12)
2019 Q3	-1,815.77*	1,970.29	-6,365.26	-2,721.89
	(998.31)	(3,445.73)	(5,180.41)	(2,309.07)
2019 Q4	-2,204.52*	4,191.57	9,482.35	3,018.54
	(1,148.86)	(4,096.82)	(6,958.74)	(2,801.17)
2020 Q1	676.30	5.87	19,355.26**	6,010.82**
	(1,711.81)	(2,190.81)	(7,882.99)	(3,010.05)
2020 Q2	-926.14	3,663.75	-778.02	-75.13
	(1,124.46)	(3,293.74)	(5,957.19)	(2,018.54)
2020 Q3	-1,225.00	-3,431.09	2,805.91	-614.02
	(1,210.52)	(2,313.01)	(5,341.49)	(2,105.34)
2020 Q4	-532.01	7,106.47*	4,908.47	3,208.38
	(1,499.45)	(3,852.63)	(6,146.43)	(2,392.57)
Relative to 2019				
2020 Q1	20.14	-2,218.06	11,862.84	2,042.86
2020 Q2	-1,582.21	3,600.18	-7,078.05	-2,112.45
2020 Q3	590.78	-5,401.38	9,171.17	2,107.87
2020 Q4	1,672.51	2,914.90	-4,573.88	189.84
		Panel B. Yearly		
Relative to 2018				
2019	-686.63	2,117.45	4,338.95	1,644.47
	(966.76)	(1,923.86)	(3,660.35)	(1,611.46)
2020	-494.26	1,776.01	6,253.02*	2,116.23
	(950.64)	(1,867.94)	(3,396.09)	(1,623.24)
Relative to 2019				
2020	192.37	-341.44	1,914.07	471.76
N		232,727		

Source: CE Interview Survey

Notes: * p<0.10, ** p<0.05, *** p<0.01. This table reports estimates of β_s from equation 1 with OLS, as well as year-over-year differences in the estimates of β_s, dividing the sample by tercile of total consumption. The dependent variable is the level of liquid assets. Panel B replaces the 2019 and 2020 quarterly dummies with indicators for years 2019 and 2020. 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 expressed in April 2020 $) and for differences in family size using the NAS equivalence scale. Bootstrapped standard errors are clustered at the CU level.

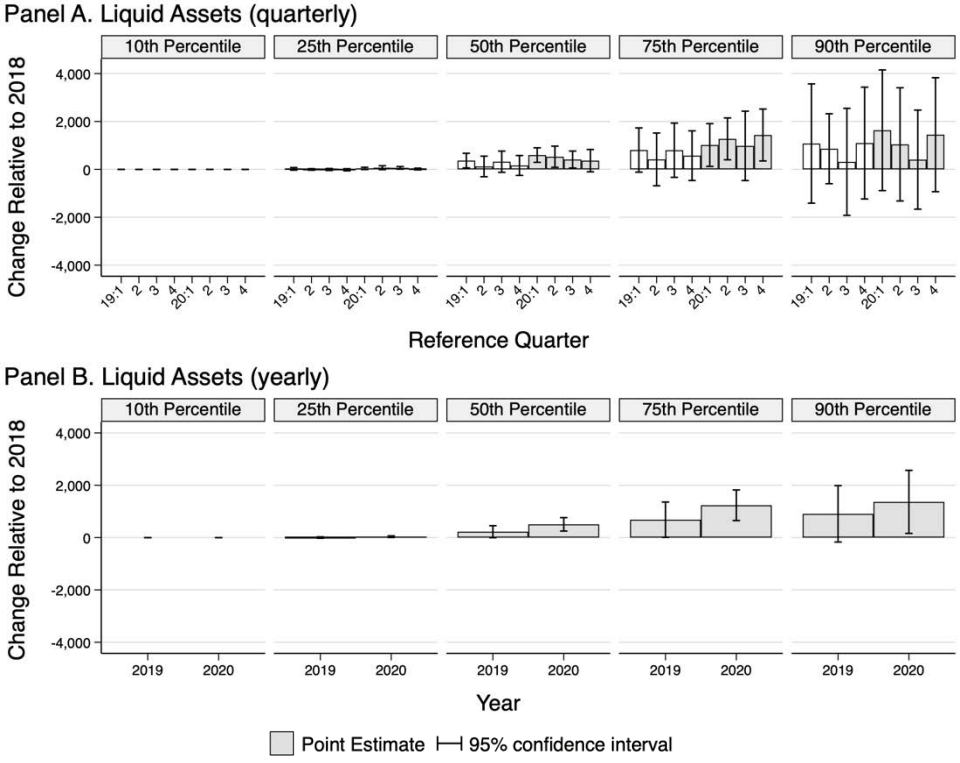
Figure A1. Well-Measured Consumption, 2019–2020, Seasonally Adjusted Changes Relative to 2018



Source: CE Interview Survey

Notes: This figure reports estimates of β_s from equation 1 from 5 quantile regressions with the log of well-measured consumption as the dependent variable. 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 family size using the NAS equivalence scale. Bootstrapped standard errors are clustered at the CU level.

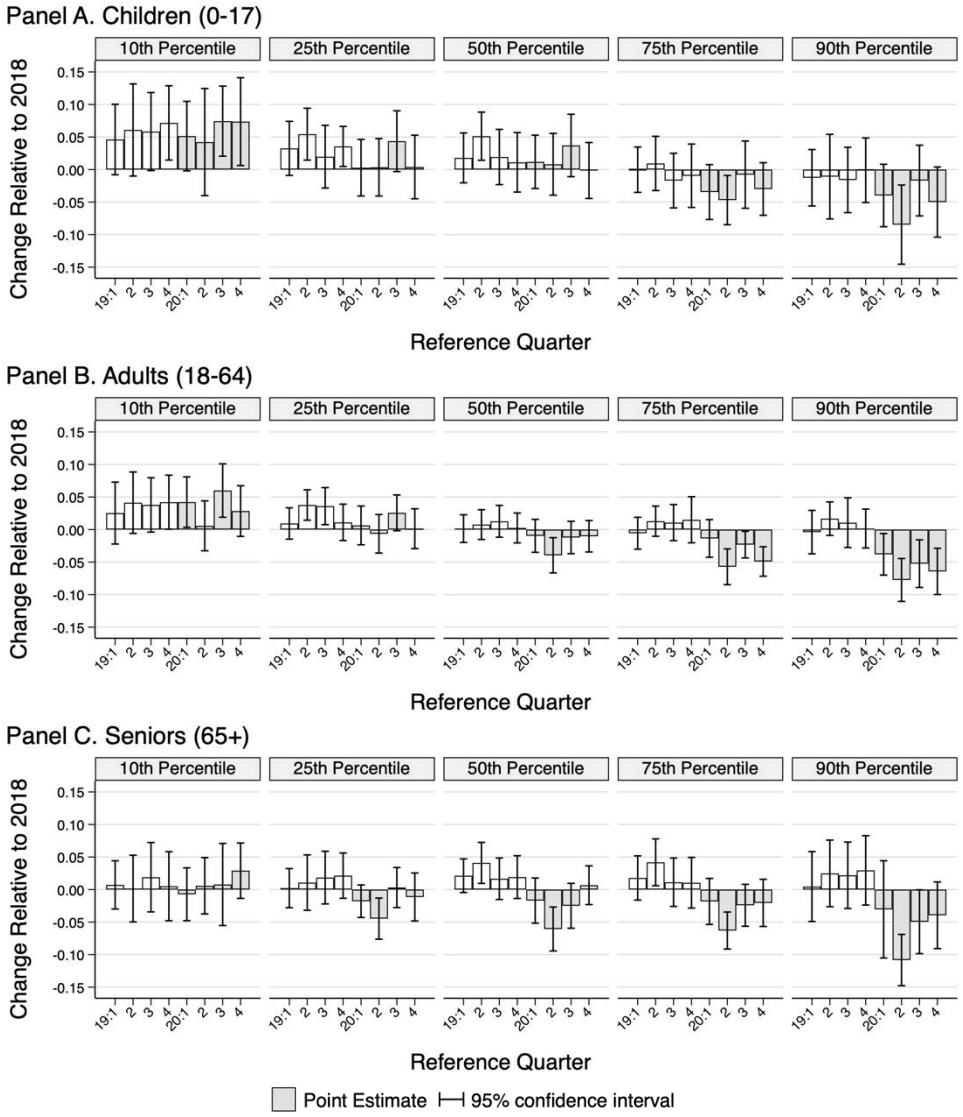
Figure A2. Liquid Assets, 2019–2020, Seasonally Adjusted Changes Relative to 2018



Source: CE Interview Survey

Notes: This figure reports estimates of β_s from equation 1 from 5 quantile regressions with the level of liquid assets as the dependent variable. Panel B replaces the 2019 and 2020 quarterly dummies with indicators for years 2019 and 2020. 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 variable is adjusted for inflation using the PCE (and expressed in April 2020 $) and for differences in family size using the NAS equivalence scale. Bootstrapped standard errors are clustered at the CU level.

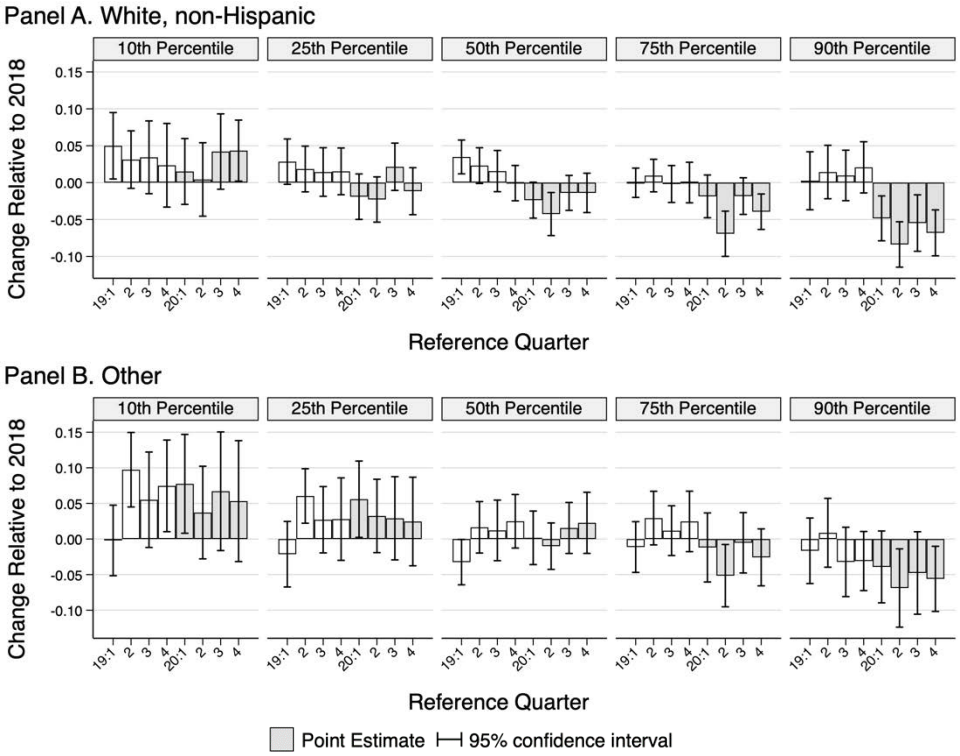
Figure A3. Total Consumption by Individual Age, 2019–2020, Seasonally Adjusted Changes Relative to 2018



Source: CE Interview Survey

Notes: This figure reports estimates of β_s from equation 1 from 5 quantile regressions with the log of consumption as the dependent variable. See notes to Figure A1 for additional details.

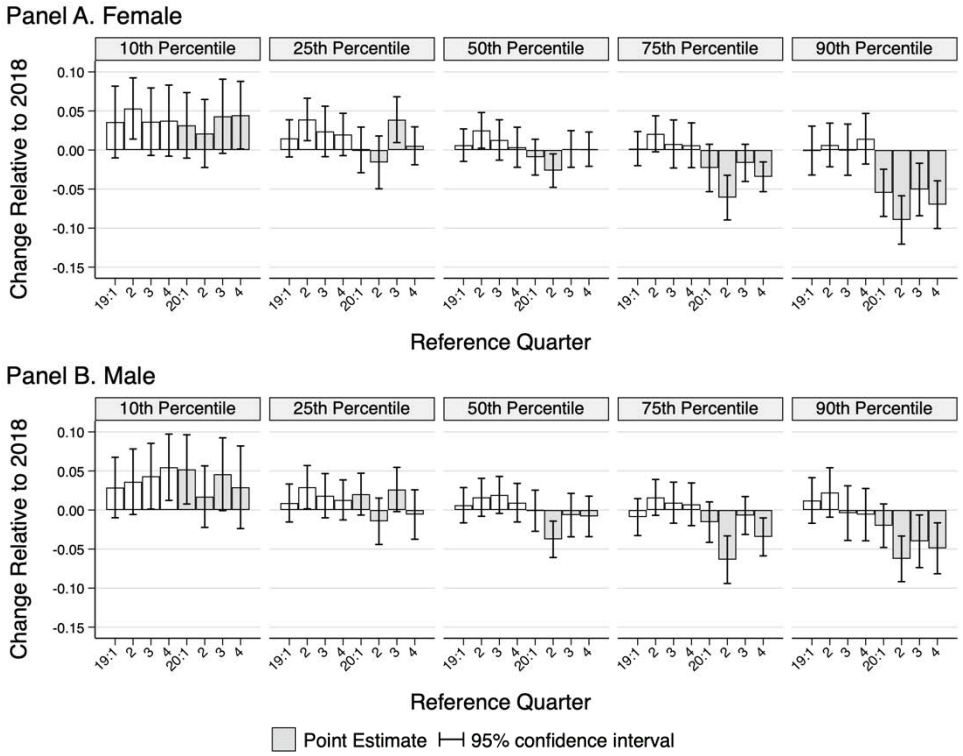
Figure A4. Total Consumption by Individual Race/Ethnicity, 2019–2020, Seasonally Adjusted Changes Relative to 2018



Source: CE Interview Survey

Notes: This figure reports estimates of β_s from equation 1 from 5 quantile regressions with the log of consumption as the dependent variable. See notes to Figure A1 for additional details.

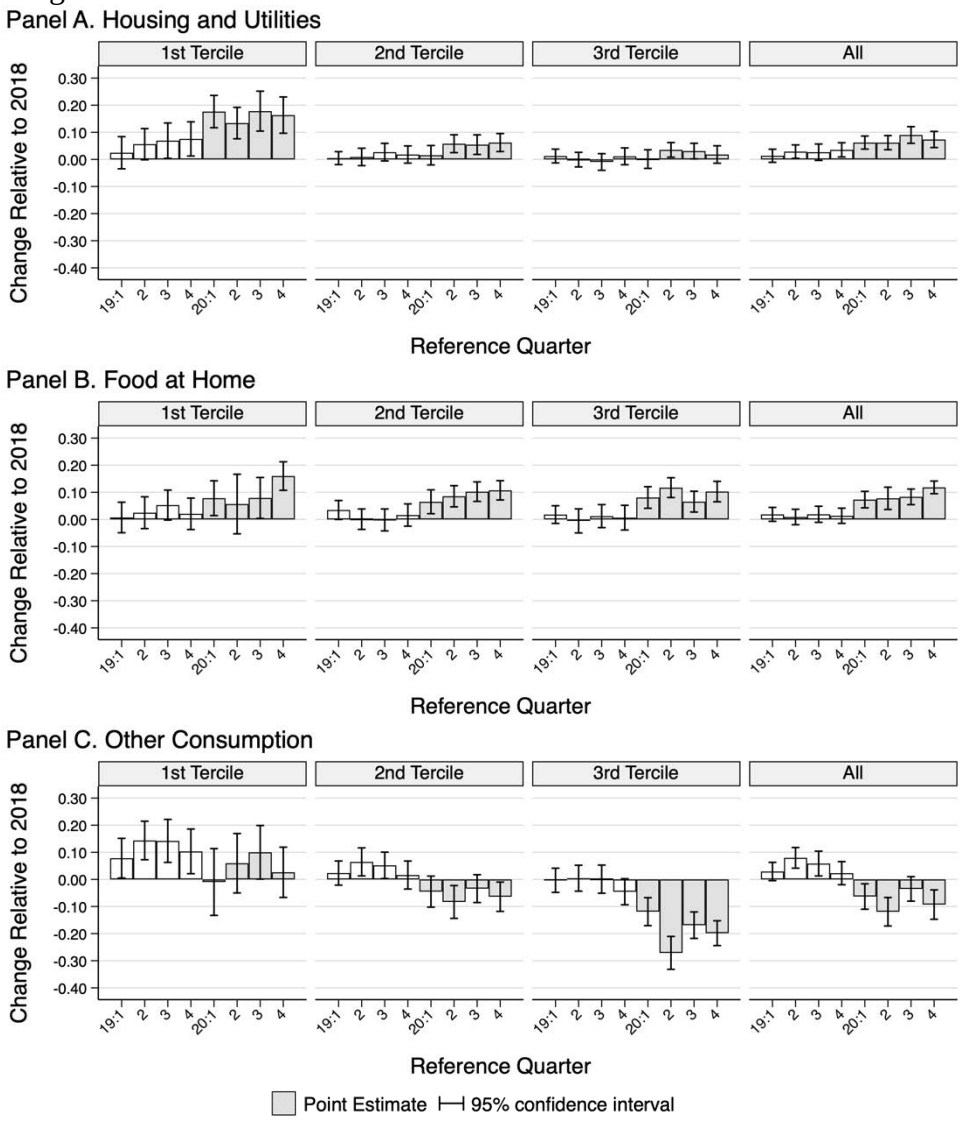
Figure A5. Total Consumption by Individual Sex, 2019–2020, Seasonally Adjusted Changes Relative to 2018



Source: CE Interview Survey

Notes: This figure reports estimates of β_s from equation 1 from 5 quantile regressions with the log of consumption as the dependent variable. See notes to Figure A1 for additional details.

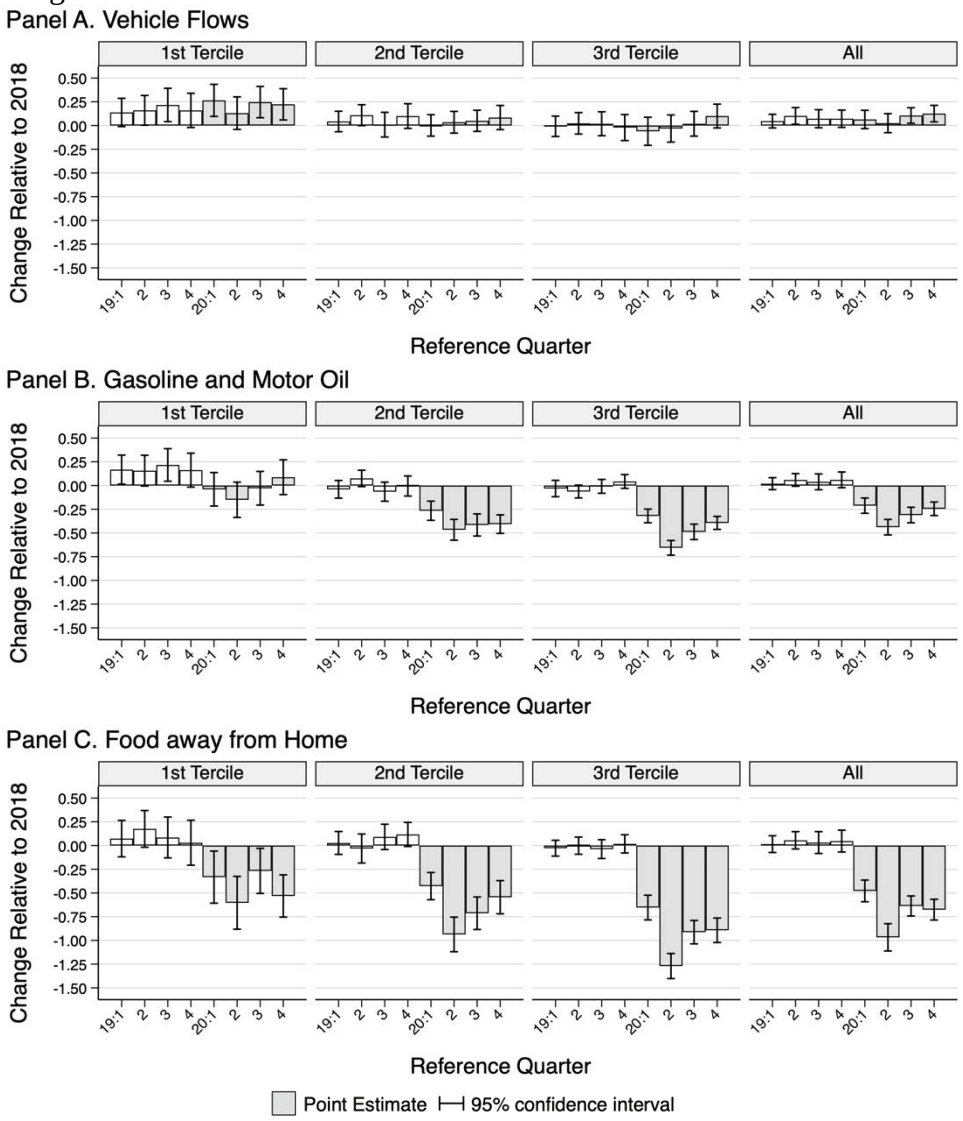
Figure A6a. Components of Consumption by Total Consumption Tercile, 2019–2020, Seasonally Adjusted Changes Relative to 2018



Source: CE Interview Survey

Notes: This figure reports estimates of β_s from equation 1 with OLS, dividing the sample by tercile of total consumption. The dependent variables are housing and utilities, food at home, and other consumption. 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 family size using the NAS equivalence scale. Bootstrapped standard errors are clustered at the CU level.

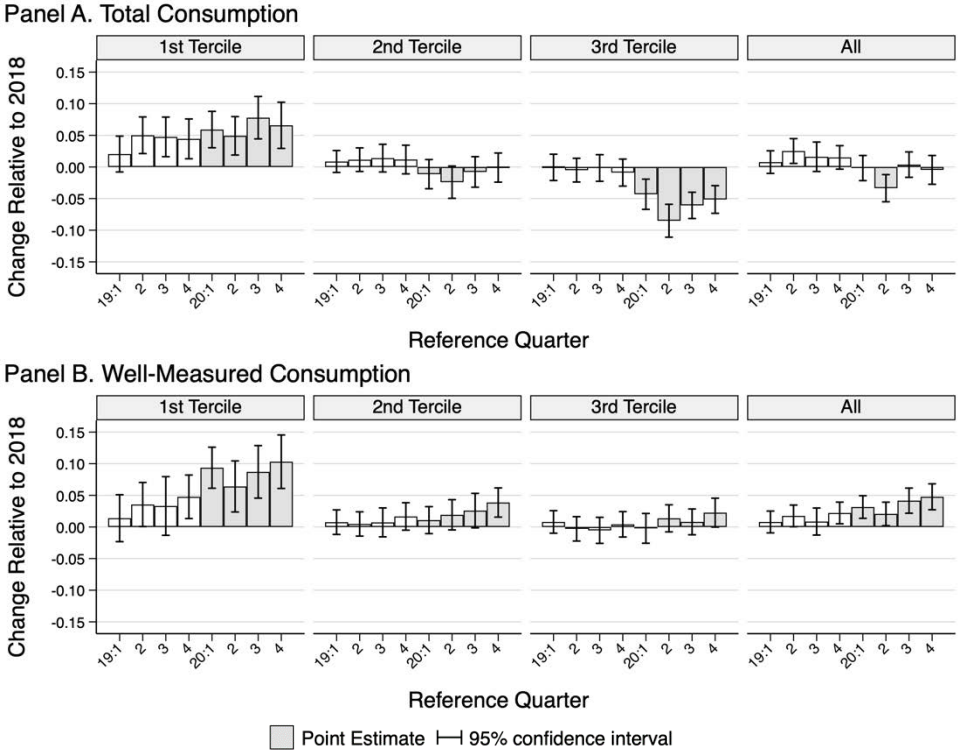
Figure A6b. Components of Consumption by Total Consumption Tercile, 2019–2020, Seasonally Adjusted Changes Relative to 2018



Source: CE Interview Survey

Notes: This figure reports estimates of β_s from equation 1 with OLS, dividing the sample by tercile of total consumption. The dependent variables are vehicle flows, gasoline and motor oil, and food away from home. See notes to Figure A6a for more details.

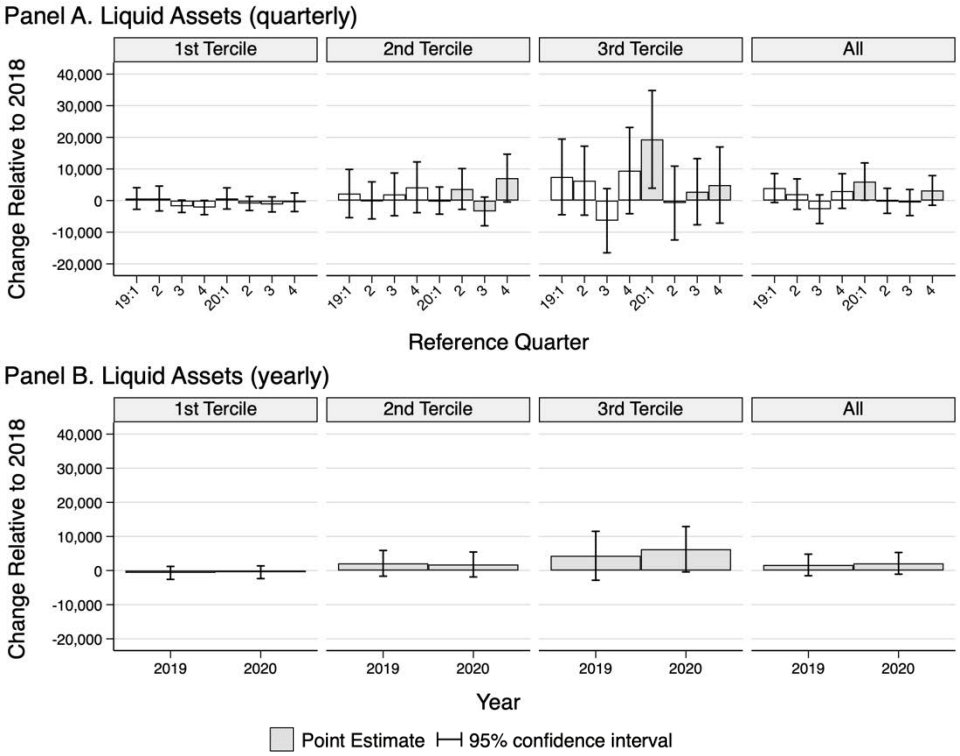
Figure A7. Total and Well-Measured Consumption by Total Consumption Tercile, 2019–2020, Seasonally Adjusted Changes Relative to 2018



Source: CE Interview Survey

Notes: This figure reports estimates of β_s from equation 1 with OLS, dividing the sample by tercile of total consumption. The dependent variables are total and well-measured consumption. See notes to Figure A6a for more details.

Figure A8. Liquid Assets by Total Consumption Tercile, 2019–2020, Seasonally Adjusted Changes Relative to 2018



Source: CE Interview Survey

Notes: This table reports estimates of β_s from equation 1 with OLS, dividing the sample by tercile of total consumption. The dependent variable is liquid assets. These estimates do not apply the log transformation to the dependent variable. Panel B replaces the 2019 and 2020 quarterly dummies with indicators for years 2019 and 2020. 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 variable is adjusted for inflation using the PCE (and expressed in April 2020 $) and for differences in family size using the NAS equivalence scale. Bootstrapped standard errors are clustered at the CU level.

II. Data Appendices

A. Appendix A – Measuring Consumption and Expenditures in the CE

The CE tracks the income and consumption of a rotating quarterly panel of consumer units (CUs) in the United States. The CU is defined as either a group of individuals who are related by blood or marriage, a single or financially independent individual, or two or more persons who share resources.[13]

The main measures of consumption presented in this paper are total consumption and well-measured consumption, but we also present results for subcomponents of total consumption and for total expenditure. We provide more details on these measures here and highlight how some components of these measures have changed over time.

Total Expenditure: This summary measure includes all expenditures reported in the CE Interview Survey except miscellaneous expenditures[14] and cash contributions[15] because some of these expenditures are not collected in all interviews. Since 1980, a subset of miscellaneous expenditures has been collected only in the last interview, and cash contributions are only collected in the last interview for surveys conducted from the first quarter of 1980 through the first quarter of 2001. We remove these components from our measure of total expenditure.

Total Consumption: Consumption includes all spending in our measure of total expenditures less spending on out-of-pocket health care expenses, education, and payments to retirement accounts, pension plans, and social security. In addition, housing and vehicle expenditures are converted to service flows. For homeowners we subtract spending on mortgage interest, property taxes, maintenance, repairs, insurance, and other expenses, and we add the reported rental equivalent of the home. For those in public or subsidized housing, we impute a rental value using the procedure outlined below. For vehicle owners we subtract spending on recent purchases of new and used vehicles as well vehicle finance charges. We then add the service flow value of all vehicles owned by the family, as described below.

i. Estimating Vehicle Service Flows

Our measure of consumption replaces the purchase price of vehicles and vehicle maintenance costs with the service flow value from owned vehicles. Our improved measure of vehicle service flows follows the approach used in Meyer and Sullivan (2012). Previous studies have imputed flows based only on recent spending on vehicles and descriptive characteristics of the family (Cutler et al. 1991), recent spending on vehicles, vehicle age, and descriptive characteristics of the family (Meyer and Sullivan 2003; 2004), or reported purchase prices and vehicle age (Slesnick 1993). Our approach provides two important improvements upon previous work. First, in addition to vehicle age, our approach uses detailed information for each vehicle (such as make, model, year, automatic transmission, and other characteristics) to determine the market price. Second, we

[13] Individuals are considered to be sharing resources if expenses are not independent for at least two of the three major expense categories: housing, food, and other living expenses.

[14] This category includes categories such as membership fees for credit cards or shopping clubs; non-real estate legal fees, burial fees, banking service fees, etc.

[15] This category includes alimony, child support, cash support for college students, gifts of stocks, bonds, and mutual funds to non-CU members, and cash contributions to charities and religious, educational, political, or other organizations.

estimate depreciation rates by comparing the reported purchase prices for similar vehicles of different ages. We use the detailed expenditure data for owned vehicles from the 1980-2020 CE.

We determine a current market price for each of the 1.85 million vehicles in the data from 1980-2020 in one of three ways. First, for vehicles that were purchased within twelve months of the interview and that have a reported purchase price (the estimation sample), we take the current market price to be the reported purchase price. This estimation sample accounts for about 13 percent of all vehicles in the 1980-2017 surveys. Second, for vehicles that were purchased more than twelve months prior to the interview and that have a reported purchase price (about 15 percent of all vehicles), we specify the current market price as a function of the reported purchase price and an estimated depreciation rate, as explained below.

For the remaining 72 percent of vehicles, we impute a current market price because the purchase price is not reported. Using the estimation sample, we regress the log real purchase price, $\log(y_i)$, on a cubic in vehicle age, vehicle characteristics, family characteristics, and make-model-year fixed effects.[16] The vehicle characteristics include indicators for whether the vehicle has automatic transmission, power brakes, power steering, air conditioning, a diesel engine, a sunroof, four-wheel drive, or is turbo charged. Family characteristics include log real expenditures (excluding vehicles and health), family size, region, and the age and education of the family head. Coefficient estimates from this regression are then used to calculate a predicted log real purchase price for the vehicle i, $x_i\hat{\beta}$. The predicted current market value for each vehicle without a reported purchase price is then equal to $\hat{\alpha} * \exp(x_i\hat{\beta})$, where $\hat{\alpha}$ is the coefficient on $\exp(x_i\hat{\beta})$ in a regression of y_i on $\exp(x_i\hat{\beta})$ without a constant term.[17]

To estimate a depreciation rate for vehicles, we compare prices across vehicles of different age, but with the same make, model, and year. In particular, from the estimation sample we construct a subsample of vehicles that are in a make-model-year cell with at least two vehicles that are not the same age. Using this sample, we regress the log real purchase price of the vehicle on vehicle age and make-model-year fixed effects.[18] From the coefficient on vehicle age, β, we calculate the depreciation rate δ, where $\delta = 1 - \exp(\beta)$. The service flow is then the product of this depreciation rate and the current market price. If the vehicle has a reported purchase price but was not purchased within 12 months of the interview we calculate the service flow as: $(real\ reported\ purchase\ price) * \delta * (1-\delta)^t$, where t is the number of years since the car was purchased.

We validate our procedure for predicting the current market value of vehicles for those observations where we do not have a purchase price by comparing the predicted values to published values in National Automobile Dealers Association (NADA) guides. For a given year of the CE we take a random sample of 100 vehicles for which a purchase price was not observed. We then find the average retail price of the vehicle reported in the NADA Official Used Car Guide,

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[16] 60 percent of the vehicles without a reported purchase price can be matched to at least one vehicle in the estimation sample with the same make, model, and year, all of which are before 2006. Starting in 2006, vehicles can be matched on make, but not model, because the CE stopped providing information on vehicle model after 2005. For those vehicles without a reported purchase price that do not have the same make, model, and year as at least one vehicle in the estimation sample but do have the same make and year as a vehicle in the estimation sample, a separate regression is estimated that includes make-year fixed effects instead of make-model-year fixed effects.

[17] This adjustment is made because $\exp(x_i\hat{\beta})$ will tend to underestimate y_i.

[18] The distribution of service flows does not differ noticeably when alternative specifications for depreciation are estimated. For example, specifications that allow the depreciation rate to vary by age of the vehicle (by including a cubic in vehicle age in the regression) yield similar results.

using observable vehicle characteristics including make, model, year, number of cylinders, and number of doors. In cases where a unique match is not found in the NADA guide (for example, there might be multiple sub-models listed in the NADA guide), we use the midpoint of the range of prices for the vehicles that match the description of the vehicle from the CE. For the sample of vehicles randomly drawn from the 2000 CE, the correlation between our imputed price and the 2000 NADA price was 0.88. Similarly, for a sample of 100 cars with a reported purchase price, the correlation between the reported price and the NADA price was 0.91.

ii. Estimating a Rental Equivalent for Families Living in Government or Subsidized Housing

We impute a rental equivalent for families in the CE living in government or subsidized housing using reported information on their living unit including the number of rooms, bedrooms, and bathrooms and the presence of appliances such as a microwave, disposal, refrigerator, washer, and dryer. Specifically, for renters who are not in public or subsidized housing we regress log rent on the CE housing characteristics mentioned above as well as a number of geographic identifiers including state, region, urbanicity, and SMSA status, as well as interactions of a nonlinear time trend with appliances (to account for changes over time in their price and quality). We then use the estimated coefficients to predict rent for the sample of families that do not report full rent because they reside in public or subsidized housing. We do not adjust for the lower quality of public housing in dimensions we do not directly observe. Evidence from the PSID indicates that the average reported rental equivalent of public or subsidized housing is just under the predicted 40^{th} percentile for these units using parameters estimated from those outside public or subsidized housing.

iii. Comparability over Time

We make two minor adjustments to the measure of total expenditures provided in the CE to maintain a comparable definition of expenditures across our sample period. First, the wording for the question regarding spending on food at home in surveys conducted between 1982 and 1987 differed from other years. Several studies have noted that this wording change resulted in a decrease in reported spending on food at home (Battistin 2003; Browning, Crossley, and Weber 2003). To correct for the effect of this change in the questionnaire, for the years 1984-1987 we multiply spending on food at home by an adjustment factor of 1.2213.

To calculate this factor, we regress monthly food at home spending on a new question indicator and fixed effects for year and reference months pairs (adjusting for time trends) and interview and reference month pairs (adjusting for seasonality in spending and reporting). We include in our sample October and November reference months and reference years 1985 through 1988. The 1987 reference months are comprised of interviews from both 1987 and 1988, allowing us to compare values for the same reference months under both question formulations. We divide the coefficient on the new question indicator by the mean of food at home spending immediately preceding the question change, yielding a value of 0.2213. We add one to this value to get our adjustment factor.

Second, starting with interviews in the second quarter of 2007, the question on food away from home changed from a query about usual monthly spending to usual weekly spending. This change resulted in a noticeable increase in reported food away spending. BLS analysis suggests that, in the quarter of the question rollout, some interviewers were still requesting monthly amounts from respondents. Since all values are scaled in postprocessing to represent monthly amounts as if they were reported as weekly amounts, the second interview quarter of 2007 sees uniquely high

average food away from home spending, before settling to a lower, but still elevated from before the question change, level.[19] We multiply spending on food at home by 1.4329 for interviews preceding the question change and (1 – 0.3867) for value in the second interview quarter of 2007.

We utilize a similar specification as in the adjustment to food at home. We regress monthly food away from home spending on a new question indicator, a new question indicator interacted with an indicator for reference year 2007 (adjusting for the issues with question rollout), and fixed effects for year and reference months pairs (adjusting for time trends) and interview and reference month pairs (adjusting for seasonality in spending and reporting). We include in our sample January and February reference months and reference years 2005 through 2008. The 2007 reference months are comprised of interviews from both the first and second quarters of 2007, allowing us to compare values for the same reference months under both question formulations. We divide the coefficient on the new question indicator by the mean of food away from home spending immediately preceding the question change, yielding a value of 0.4329. We add one to this value to get our adjustment factor for interviews preceding the question change. Next, we divide the coefficient on the new question indicator interacted with the reference year 2007 indicator by the mean of food away from home spending in the second quarter of 2007, yielding a value of 0.3687. We subtract this value from 1 to get our adjustment factor for interviews in the quarter of the question change.

The values for certain spending components are top coded in the public use files, and the threshold values for the top code changes over time. For example, the top code threshold for the monthly rental equivalent value of an owned home increased from $1,000 in 1988 to $1,500 in 1989. Over longer periods the real values of the top code thresholds have typically risen. For example, the value of the rental equivalent threshold in 2014 ($3,900) is 37% greater in real terms than the value of this threshold in 1980 ($1,000).

B. Appendix B – Imputing a Continuous Measure of Income from Bracketed Income in the Monthly CPS

Our measure of family income relies on data from the Monthly CPS, which collects information on labor market outcomes and demographic characteristics from a representative sample of about 40,000 to 50,000 households. Interviews are conducted during the calendar week containing the nineteenth of the month. The survey provides the timeliest nationally representative data available for family income. We employ data from January 2005 through December 2020 in our analyses.

Because interviews take place in the third week of the month, we assume that the respondent includes income from the interview month in their response to the question. Making this distinction is important for determining when we should expect to see this measure of family income reflect the effects of the pandemic. For example, respondents to the April CPS arguably included negative income shocks that occurred or government payments that were received during the first few weeks of April. During these weeks, UI claims grew sharply, and the first wave of Economic Impact Payments (EIPs) was distributed.

Income questions in the Monthly CPS are typically only asked for households in their first or fifth interview months in the survey. Second, the total income question is asked only in reference to the family income of the householder's family, so we do not observe this income information for individuals in the household who are outside the householder's family (i.e. unrelated

[19] See https://www.bls.gov/cex/ce-dryinv-199817.htm

individuals and unrelated subfamilies). Lastly, rather than reporting a specific amount for total income, respondents in the Monthly CPS choose among sixteen categorical income ranges:

1) Less than $5,000
2) 5,000 to 7,499
3) 7,500 to 9,999
4) 10,000 to 12,499
5) 12,500 to 14,999
6) 15,000 to 19,999
7) 20,000 to 24,999
8) 25,000 to 29,999
9) 30,000 to 34,999
10) 35,000 to 39,999
11) 40,000 to 49,999
12) 50,000 to 59,999
13) 60,000 to 74,999
14) 75,000 to 99,999
15) 100,000 to 149,999
16) 150,000 or more

For the bottom part of the income distribution, the income ranges are fairly small. Below $15,000 there are five categories, and from $15,000 to $40,000 the intervals are $5,000 wide. We convert these categorical responses into a continuous measure by randomly selecting values of family income from families in the CPS Annual Social and Economic Supplement (ASEC) from the same survey year who have incomes that fall in that same income range and who have some similar demographic characteristics. Specifically, we define the cells from which we draw income values based on the 16 income categories and 15 demographic categories defined by family size, number of children, and whether the age of the household head is 65 or older. For example, we would assign an income value for a 65-year-old single individual in the Monthly CPS who reports having income between $20,000 and $24,999 by randomly selecting an income value from the CPS ASEC sample of single individuals aged 65 and over who report a total income value that is between $20,000 and $24,999. The key assumption for this imputation approach is that the distribution within a given category is the same in the Monthly CPS as in the CPS ASEC, which is reasonable given that both questions refer to a twelve-month period and rely on the same definition of income. Han, Meyer, and Sullivan (2020) introduce this income measure and validate it against the CPS ASEC income measure.

C. Appendix C – Equivalence Scale and Inflation Adjustments

To allow for economies of scale in consumption and account for differences in consumption between children and adults, we adjust measures of income, consumption, and expenditures using a scale following NAS recommendations (Citro and Michael 1995):[20]

$$(number\ of\ adults + 0.7 * number\ of\ children)^{0.7}$$

We adjust for price changes using the Personal Consumption Expenditures Chain-Type (PCE) price index. We take the average of monthly PCE index values for each measure's reference

[20] We standardize this scale to a family with two adults and two children by multiplying by 2.355.

period, standardizing to April 2020 dollars.[21] This approach yields a smoother time series of inflation adjustments than measuring price changes in yearly increments. This prevents any 2018 to 2019 or 2019 to 2020 step change in our price index from distorting our estimated changes in resource measures and allows us to better match the reference periods of our resource measures when adjusting for price changes.

D. Appendix D – Fixed Demographic Reweighting

The COVID-19 pandemic disrupted the collection of household survey data and featured heterogeneous impacts across the socioeconomic distribution. Bee and Rothbaum (2021) find evidence of nonresponse bias in estimates of income from the Current Population Survey (CPS) during COVID. The Consumer Expenditure Survey (CE) faced similar challenges in data collection. Further, the CE adjusts consumer unit (CU) weights to match population control totals (by age, race, household tenure [owned or rented housing], region, and urban/rural status) from the CPS. Thus, we expect that the CE weighting procedure might not entirely correct for COVID-related nonresponse bias.

In light of these concerns, Han, Meyer, and Sullivan (2020) create fixed demographic weights for the pandemic period in their study of income and poverty during the pandemic. They fix the population share of demographic cells at pre-pandemic levels (from the first two months of 2020) throughout the pandemic. We apply the same methodology to the CE and Monthly CPS. The Han, Meyer, and Sullivan (2020) adjustment creates 27 cells across head educational attainment (less than high school degree, high school degree or some college, or college degree), head age (16 to 39, 40 to 64, and 65 and older), and family type (single parent, married parent, single individuals, married without children, and 65 and older. We add two race and ethnicity categories to this classification (non-Hispanic white and other), yielding 54 cells.

In the CPS, we fix each cell's share of the population to the share from interviews in January and February 2020. In the CE, we use interviews from January, February, and March (interview quarter one) to calculate our baseline shares. CE interviews are typically initiated at the beginning of the month. In Tables AB1 and AB2, we check for balance in demographic characteristics throughout the 2020 interview year (and the first quarter of 2021 for the CE), for the CPS and CE, respectively. We group CPS data into two-month periods and CE data by interview quarter. For both the original and fixed demographic weights, we report the mean for the first period and the difference from this mean (and the associated significance level) for the subsequent periods.

[21] Take, for example, consumption data from a CE interview conducted in July 2020. The consumption reference period covers April through June 2020. We take the average of the April, May, and June PCE price index values and divide by the April 2020 PCE price index value to yield a coefficient we use to scale these consumption measures.

Table AD1. Demographic Balance in the CPS Before and After Fixed Demographic Weight Adjustment, by Interview Month

	Panel A. Original Weights						Panel B. Fixed Demographic Weights					
Variable	Jan-Feb	Mar-Apr	May-Jun	Jul-Aug	Sep-Oct	Nov-Dec	Jan-Feb	Mar-Apr	May-Jun	Jul-Aug	Sep-Oct	Nov-Dec
Number of White ind.	1.806	**0.051****	**0.036***	0.024	-0.016	0.019	1.806	0.016	0.025	0.012	0.005	0.021
Number of Black ind.	0.284	0.008	0.000	0.011	0.019	0.008	0.284	0.004	-0.005	0.006	0.011	-0.004
Number of Asian ind.	0.155	0.002	0.002	-0.001	-0.003	-0.003	0.155	-0.006	-0.014	-0.010	-0.003	-0.013
Number of other race ind.	0.091	0.006	-0.000	0.003	-0.008	0.000	0.091	0.005	-0.002	0.003	-0.008	-0.001
Number of Hispanic origin ind.	0.417	0.021	0.018	0.012	0.001	**0.030***	0.417	0.018	0.017	0.014	0.004	0.026
HH head of Hispanic origin	0.138	0.004	**0.009***	0.001	0.005	**0.009***	0.138	0.005	**0.010***	0.003	0.005	**0.009***
Age of head	50.781	0.367	0.197	0.195	-0.003	-0.036	50.781	-0.112	0.017	-0.097	0.076	-0.089
Age of head's spouse	51.214	-0.217	-0.228	0.198	0.073	-0.234	51.214	-0.028	0.264	0.400	0.134	-0.067
Number of ind. younger than 18	0.558	**0.032****	0.006	0.008	-0.010	0.014	0.558	0.011	-0.003	0.001	-0.002	0.004
Number of ind. 18-64 years old	1.397	**0.025***	**0.030****	**0.025***	0.003	0.015	1.397	-0.000	0.002	0.004	-0.001	-0.004
Number of ind. 65 or older	0.380	0.010	0.003	0.005	-0.000	-0.005	0.380	0.008	0.005	0.005	0.008	0.003
Family size	2.335	**0.067*****	**0.039***	**0.037***	-0.008	0.024	2.335	0.020	0.004	0.011	0.005	0.003
Head has less than high school deg.	0.083	-0.006	**-0.013*****	**-0.015*****	**-0.006***	**-0.006***	0.083	-0.003	-0.003	-0.002	-0.003	-0.001
Head has high school deg.	0.243	-0.008	**-0.019*****	-0.007	0.000	-0.002	0.243	-0.002	-0.007	0.002	0.005	0.007
Head has some college educ. or assoc. deg.	0.289	-0.003	-0.006	-0.009	-0.003	**-0.014****	0.289	0.008	**0.013****	0.003	0.003	-0.001
Head has college and/or grad. deg.	0.386	**0.017****	**0.039*****	**0.030*****	0.009	**0.021*****	0.386	-0.003	-0.003	-0.003	-0.005	-0.005
HH lives in metro area	0.861	0.001	0.002	-0.001	0.003	-0.003	0.861	-0.002	-0.003	-0.005	-0.000	-0.006
HH resides in Northeast	0.171	0.000	0.002	0.005	-0.002	-0.002	0.171	-0.002	0.000	0.004	-0.003	-0.004
HH resides in Midwest	0.217	0.005	0.002	0.002	0.002	0.003	0.217	0.006	0.004	0.004	0.003	0.004
HH resides in South	0.378	-0.006	-0.009	-0.009	-0.000	-0.005	0.378	-0.006	-0.008	-0.010	-0.000	-0.004
HH resides in West	0.234	0.001	0.006	0.003	0.000	0.003	0.234	0.002	0.004	0.002	-0.000	0.004

Source: Monthly CPS

Notes: * p<0.10, ** p<0.05, *** p<0.01; significant estimates are in bold. This table reports 2020 means, by 2-month periods, of demographic variables at the family level, and the difference from those means in subsequent periods, using both original and fixed demographic weights. We weight at the family level.

Table AD2. Demographic Balance in the CE Before and After Fixed Demographic Weight Adjustment, by Interview Quarter

	Panel A. Original Weights					Panel B. Fixed Demographic Weights				
Variable	Q1 2020	Q2 2020	Q3 2020	Q4 2020	Q1 2021	Q1 2020	Q2 2020	Q3 2020	Q4 2020	Q1 2021
Number of White ind.	1.933	0.018	0.005	-0.019	-0.010	1.933	0.015	0.033	0.024	0.028
Number of Black ind.	0.329	0.006	-0.003	-0.007	-0.007	0.329	-0.003	-0.004	-0.022	-0.018
Number of Asian ind.	0.129	0.004	0.006	0.007	0.013	0.129	-0.002	-0.000	-0.002	0.008
Number of other race ind.	0.067	0.010	0.011	**0.016***	-0.000	0.067	0.007	0.011	0.013	-0.001
Number of Hispanic origin ind.	0.459	0.006	0.006	0.004	0.003	0.459	0.008	0.014	0.009	0.002
Ref. person of Hispanic origin	0.135	0.005	0.007	0.007	0.011	0.135	0.006	0.006	0.005	0.006
Age of ref. person	51.831	**0.776****	0.568	-0.063	-0.070	51.831	0.210	0.182	-0.024	0.066
Age of ref. person's spouse	51.202	0.062	0.209	0.388	0.621	51.202	0.042	0.085	0.415	0.664
Number of ind. younger than 18	0.572	0.021	0.005	-0.006	-0.009	0.572	0.011	0.022	-0.001	0.007
Number of ind. 18-64 years old	1.477	0.008	0.006	-0.005	-0.005	1.477	0.005	0.015	0.003	-0.003
Number of ind. 65 or older	0.409	0.009	0.009	0.008	0.010	0.409	0.001	0.004	0.011	0.014
CU size	2.458	0.038	0.020	-0.002	-0.004	2.458	0.017	0.041	0.013	0.018
Ref. person has less than high school deg.	0.090	-0.004	-0.007	-0.003	0.003	0.090	-0.000	0.000	0.000	-0.000
Ref. person has high school deg.	0.233	-0.007	-0.005	**-0.016***	**-0.021****	0.233	0.004	0.003	-0.003	-0.004
Ref. person has some college educ. or assoc. deg.	0.310	-0.015	-0.012	-0.005	-0.015	0.310	-0.008	-0.007	-0.001	-0.006
Ref. person has college and/or grad. deg.	0.367	**0.025****	**0.025****	**0.024****	**0.033*****	0.367	0.004	0.005	0.004	0.011
CU resides in urban area	0.929	-0.001	0.004	0.006	0.008	0.929	-0.003	0.003	0.004	0.006
CU lives in owned housing	0.645	**0.025****	**0.021****	0.005	0.003	0.645	0.017	0.015	0.007	0.007
CU resides in Northeast	0.174	0.002	-0.001	-0.001	-0.002	0.174	0.001	-0.002	-0.002	-0.002
CU resides in Midwest	0.191	0.007	0.008	0.004	0.012	0.191	0.008	0.010	0.006	**0.015***
CU resides in South	0.388	-0.006	-0.002	0.003	0.003	0.388	-0.005	-0.006	0.001	0.000

Notes: Data are from the CE Interview Survey. * p<0.10, ** p<0.05, *** p<0.01; significant estimates are in bold. This table reports 2020 interview quarter one means of demographic variables at the CU level, and the difference from those means in subsequent interview quarters, using both original and fixed demographic weights. We use CU-level weights. Interviews in the CE are initiated at the beginning of the month. Interviews from January and February 2021 are included in 2020 reference quarter 4, so we include 2021 interview quarter one data in this Table.

E. References for Appendices

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