Covid-19 and Real Time Consumer Spending *

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Abstract

This paper uses a new real-time data source to study the effect of Covid-19 on consumer spending. The data is representative of aggregate spending trends, closely matching retail and restaurant data from the Census Monthly Retail Trade Survey and Quarterly Service Survey. The onset of Covid-19 in March led to a 20% decline in retail good spending, 50% decline in restaurant spending, and 50% decline in other service spending. Retail spending rose from its lows in April, but restaurant and service spending remains depressed. The pandemic caused a dramatic shift of spending towards home consumption and online spending.

Keywords: Covid-19, consumer spending, real-time data, high-frequency data

JEL Classification: E21

1   Introduction

The Covid-19 crisis has shown that real-time data is crucially important in understanding the scale of the economic crisis and in determining the appropriate government response. The US government passed three Covid-19 stimulus bills before the April retail sales report was released, showing the largest ever decline in retail sales ever; data on service spending will not be available for another 2 months. It has paid out hundreds of billions in stimulus and UI payments, but there is little data available to study if they are having the intended effect.

This paper introduces a new real-time dataset of consumer spending, validates the data, and uses show that Covid-19 caused a massive decline in retail, restaurant, and service spending. Retail spending recovered somewhat through April, but the recovery for restaurant and other service spending stalled in May and there is no longer a pronounced V shaped recovery.

The data is from Earnest Research, a company that analyzes purchase data from a static panel of approximately 6mm de-identified US households. The data measures spending across credit cards, debit cards, and co-branded card paydowns, and is normalized to mitigate the effects of panel churn. More specifically, Earnest leverages a "Consistent Shopper" normalization methodology, which measures spend across a subset of panelists who exhibit consistent spending behavior throughout the history of their panel. Compared with the Census Monthly Advanced Retail Sales (MARTS), the Earnest data is available at a weekly rather than a monthly frequency. The data is also more timely — it is available with a delay of only a week, rather than a month and half for the MARTS data. Compared with the Census Quarterly Services (QSS) report, it is available with a delay of a week rather than 3 months. It has broader coverage of industries, with several service sector industries covered. Spending can be separated into online and in-store, and is available at fine geographies.

On the downside, spending is only captured for a nonrandom sample of firms and households. We correct for the non-representativeness by reweighting the data to correspond to the correct industry sizes and spread of in-store versus online spending. We validate, benchmark, and backtest the data using US government representative surveys: the MARTS, the QSS, and the quarterly online sales survey from the Census.

When properly reweighted, we find the Earnest data to be an excellent proxy for retail sales, with a correlation of monthly growth rates (m.o.m.) of .95, and year over year (y.o.y.) growth rates of .95. The correlation for service spending growth is likewise high at .79.[1] During the two months of pandemic data Earnest has done particularly well. For May the MARTS showed an increase of 12.43%, while Earnest showed an increase of 12.36%; for April, the MARTS showed -15.2%, Earnest -16.2%. The growth rates in quarterly online spending and online

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[1]This correlation is likely a lower bound on how well the service data corresponds to aggregate spending, as it is difficult to find good representative data to compare to Earnest in an apples-to-apples fashion.

share correspond very closely with census data, with a correlation of 1.

We use the data to estimate the effects of Covid-19 on consumer spending. We find that Covid-19 has led to a sharp decline in retail spending, over 20% at the nadir. Retail good spending recovered to its pre-pandemic level by the end of June, but in July there are signs of another slowdown in spending. As of the week ending July 15th, the point estimate for retail spending is still a decline of 6%. Restaurant spending saw a sharper decline and slower recovery: as of July 15th it was still down over 16.2% y.o.y.. The data contains more limited coverage of services, but aggregate service spending saw the largest decline in spending, over 50%, and was still down 39% y.o.y. as of July 15th.

In the wake of Covid-19 many payment and related companies have released real-time data on spending, and the totals have begun to be used in economic research. The unadjusted totals should be used with care, as they give misleading results. Many of the new data sources that study restaurant spending are overweight online delivery platforms such as Doordash and Uber Eats that have seen large increases in consumer spending, thus estimates for restaurant spending for the pandemic may be overestimated.

The dataset is particularly useful at this time because traditional survey methods may give noisy estimates during the pandemic as businesses close[2] and consumers and firms stop responding to surveys.[3] Even in normal times the retail sales data are noisy and subject to large revisions (Carnes and Slifer (1991)) and thus alternative data sources can provide important and timely signals.

1.1 Previous literature

The most similar paper is Baker et al. (2020), who use data from a Fintech company to study the effect of Covid-19 on consumer spending. Compared with Baker et al. (2020), we find large differences in the estimated effects of the pandemic on consumer spending. For example, Baker et al. (2020) finds that retail spending roughly doubles during the stock up week before falling around 50% in the weeks afterward; we find only a 25% increase in retail spending during the stock up week, and only 20% fall at the nadir. There are significant differences for spending during the stock up week: Baker et al. (2020) find restaurant and air traveling spending was elevated during the stock up week, while I find large declines. One potential reason for the different findings is the size of the sample and our paper's focus on matching aggregate spending. Baker et al. (2020) have a sample size of ~4,000-40,000 users.

A number of studies have also used transaction level data to study the effects of Covid-19 on consumer spending in Europe. In general, the papers find large

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[2]In the latest retail sales report, the board noted that "due to recent events surrounding Covid-19, many businesses are operating on a limited capacity or have ceased operations completely. The Census Bureau has monitored response and data quality and determined estimates in this release meet publication standards.'

[3]See, for example, https://www.bls.gov/cps/employment-situation-covid19-faq-march-2020.pdf

declines in spending due to the pandemic: Andersen et al. (2020) in Denmark (fall of 29%) and Sweden (25% decline), Bounie, Camara and Galbraith (2020) in France, and Carvalho et al. (2020) for Spain (50% fall).

The best alternative source of real-time spending data is from Aladangady et al. (2019), who use real-time data from Fiserv, a payment processor, to estimate monthly retail sales in real-time. The main advantages of Earnest is that it has more detailed spending categories, finer geographic coverage, and better ability to distinguish between online and in-store spending; for properly weighting the Earnest data this last property is critical. In addition, this paper also studies service spending, and benchmarks the spending to the quarterly retail service report, while Aladangady et al. (2019) focuses on retail spending. Both papers have non-representative data that must be adjusted, but they are nonrandom different ways: Aladangady et al. (2019) studies spending from a convenience sample of firms that use Fiserv, while this paper studies a nonrandom sample of 2000 large firms for a convenience sample of households that use the personal finance platform. For this reason both sources will give useful signals for consumer spending as the sources of bias may be orthogonal. Dunn, Hood and Driessen (2020) use the Fiserv data to study the effect of the Covid-19 pandemic.

Alexander and Karger (2020) use two sources of real-time data to study the effect of stay-home orders on consumer spending. The first is from Womply, which has data on credit and debit card transactions from small businesses. The second data source is from Second Measure, who track spending for a panel of 4.1 million consumers. It is unclear the extent to which this data is representative of aggregate spending trends.

2   Data

One concern about using this data is that households in the Earnest panel may not keep updated bank and credit card information, and thus changes in spending will reflect measurement error rather than true data. To get around this problem, Earnest developed a "Consistent Shopper Panel", a group of 1 million households that show consistent bank account and credit card use. This paper uses the Consistent Shopper Panel for all results.

The main advantages of the Earnest data are three fold: (i) it captures spending in nearly real-time at a weekly frequency and detailed geographies (ii) it captures spending from retail as well as service spending (iii) spending can be separated into in-store versus online. These features make it an ideal dataset to study the effects of Covid-19 on consumer spending.

The main drawback of the data is that it is non-representative/nonrandom in many dimensions, which makes it difficult to estimate the overall impact of Covid-19. We explicitly correct for two dimensions of the non-representative by reweighting the data using benchmark representative data from the Census. After reweighting, we show that the spending series closely matches spending

data from the MARTS and QSS.

The data is non-representative in the following ways:

1. Spending is measured for a sample of roughly 2,000 of the largest companies. The sample of firms is non-random across categories. Certain categories are very well captured by the data, while other sectors have few firms. For example, General Merchandise has excellent coverage, with most big firms such as Walmart and Amazon included in the data, while for automobile sales there are only two firms, Tesla and Harley Davidson.[4]

2. Within each industry, the Earnest tends to sample firms that have a greater percentage of their sales online.

3. Only large firms are included in the sample of firms, and thus the data does not capture spending on small businesses. The same firms are captured in the panel over time and are not resampled every period.

4. The Earnest sample of households is non-representative; households must have linked bank and credit card accounts. Because of this, they tend to skew wealthier than the average US household. In addition, the sample is not randomly distributed geographically, with the sample overweight on the coasts and Texas.

5. Cash transactions are not measured in the data.[5]

Table A.1 presents unadjusted summary statistics. There are 80 weeks of data: 52 for 2019, and 28 for 2020. The sample period is divided in 4: 2019, the "pre-pandemic" 2020 weeks 1-10, the "stocking up" week 11, and the pandemic weeks 12-28. Average total weekly spending for the sample is $451 million; in-store spending is $264 million, 59% of spending, while online averages $160.9 million, 36% of spending. The remainder of spending is made up of store card spending, a relatively small share.

2.1   Retail sales and food services

Earnest has spending categories that roughly correspond to the industry breakdown of consumer spending from the MARTS, and it will be seen that industry

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[4]For this reason, we exclude auto sales from all analysis below.

[5]Since cash transactions are not measured in the data, changes in card spending may not accurately reflect aggregate spending changes due to Covid-19. In fact, it would be expected that the virus would significantly curtail cash transactions, as (i) more purchases are made online (ii) consumers are wary about the spread of Covid-19 through contact with cash. To the extent that cash expenditures fall more than card spending, the totals in this paper would be a lower bound on the spending effects of Covid-19. According to the 2017 Diary of Consumer Payment Choice, consumers use credit and debit cards for 30.3% of payments, compared to using cash for 8.5% of payments.

level data closely match national trends. Table 1 compare 3-digit NAICS industries for Earnest and the MARTS.[6] Included in the table is the "coverage" of Earnest spending, which is a measure of how well Earnest data represents overall spending for the industry:

$$\text{Coverage}_{I,t} = \frac{\text{Earnest spending}_{I,t}}{\text{Census spending}_{I,t}}. \tag{1}$$

Also included is the correlation coefficient between Earnest m.o.m. $\%\Delta$ and MARTS m.o.m. $\%\Delta$. For most industries, the correlation in month over month spending growth is over .90.

Given the non-random sample of individuals and firms, a priori we should not necessarily expect that simply adding the industries together should be representative of national spending trends. Figure 2 (a) compares m.o.m. percentage changes in retail and food service spending ex autos from Earnest to data from the MARTS. Figure 2 (a) shows a very tight correlation between Earnest MARTS spending growth, with $\rho = .87$. Table A.3 shows the mean error and absolute error for Earnest monthly growth minus Census. The mean error is 1.1 p.p., and the mean absolute error is 3.3 p.p.. There are particularly large errors over the past two months, with mean absolute errors equal of 6.8 p.p..

There is a very strong seasonal component to retail sales, and a potential concern of the results of figure 2 is that they are driven by a common seasonal component, with little predictive power beyond seasonal effects. The y.o.y. correlation, which removes seasonal differences, is .36, although note this is for a very small sample size of 18 y.o.y. observations. Given that only a little more than two years of observations is available, it will not be possible to adjust for the seasonality of the Earnest data through standard methods. For this reason, the focus of the main analysis will be on y.o.y. spending changes. Figure A.1 shows Earnest minus MARTS monthly growth rates, and allows a rough view of differences in seasonality. Although there are only two years of data, a rough pattern emerges: the Earnest data shows a greater increase during the holiday season, and a sharper corresponding fall after it is over. There are large positive errors in November and December, a large negative error in January, and positive errors in February. From March to October, the seasonality appears to be roughly similar between the two data sources.

2.1.1 Reweighting spending

Figure 1 (a) compares the share of retail spending for major NAICS categories for Earnest versus MARTS data. Earnest is overweight on grocery stores and general merchandise, and underweight on restaurants. The fact that Earnest is underweight restaurant and overweight general merchandise should not be surprising, since as it only captures spending on large corporations, while many

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[6]Figures A.2, A.3, and A.4 present time series comparisons.

Table 1: Comparison of Census and Earnest data

Panel A: Retail sales and food services

	Coverage (%)	Corr m.o.m.	Corr y.o.y.
Retail food services	0.29	0.87	0.36
Retail food ex auto	0.35	0.91	0.32
R1 Retail food service ex auto	0.35	0.93	0.73
R2 Retail food service ex auto	0.35	0.95	0.95
Vehicles and parts	0.024	0.68	0.62
Home furnishing and furniture	0.38	0.96	0.97
Electronics	0.46	0.94	0.92
Building materials	0.30	0.76	0.71
Food and beverage	0.39	0.92	0.83
Health and personal care	0.20	0.72	0.91
Clothing and accessories	0.38	0.96	0.99
Sporting goods	0.47	0.97	0.89
General merchandise	0.41	0.96	0.62
Miscellaneous store retailers	0.25	0.66	0.83
Restaurants	0.30	0.94	0.99

Panel B: Other services

	Coverage (%)	Corr q.o.q.
Agg services comp	0.44	0.59
R1 Services Agg	0.44	0.79
Events and entertainment	0.32	-0.0016
Newspapers and magazines	0.070	0.091
Couriers and delivery	0.15	0.96
Wired telecom	0.32	0.063
Wireless telecom	1.27	0.68
Ground transportation	0.23	0.60
Air transportation	0.41	0.39
Cruises	0.33	-0.48
Hotels	0.23	0.99
Travel agencies	0.73	0.53
Car rental	0.41	0.84

restaurants are single location and most general merchandise are large chains.[7] Because the relative sizes of Earnest industries is different than their actual sizes, simply summing up spending across industries may give a misleading picture of aggregate spending trends.
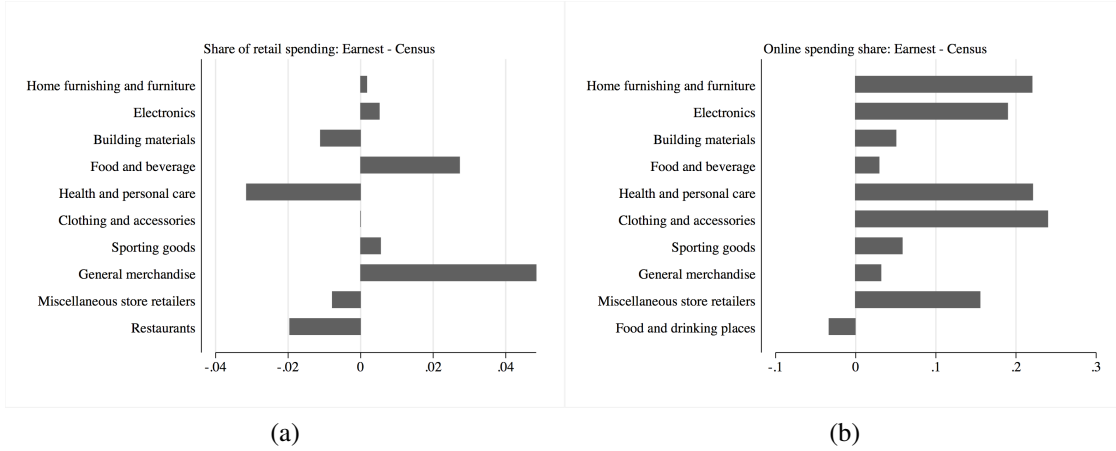

Figure 1: (a) Comparison of Earnest and Census share of spending (b) Comparison of Earnest and Census online share of spending.

To correct for these differences in industry size, we will reweight the data when estimating changes in aggregate spending. We form reweighted industry sizes through the following process: (i) the initial size of each industry is set to equal the size of the corresponding MARTS industry in January 2018 (ii) we use growth rates from Earnest industries to update spending for each month after January 2018. For categories that are not available for the MARTS, we use data from IBIS industry reports or other public sources.[8] Spending constructed this way is termed Reweighted 1 ("R1") spending. Industry adjustment increases the m.o.m. and y.o.y, growth correlation with the MARTS (.93 and .73, respectively). Table A.3 shows mean and absolute errors are also lower.

Earnest industries also have a greater percentage of sales that are online compared with aggregate data. Figure 1 (b) compares the share of spending that is online for Earnest compared with the Census quarterly E-commerce report. About 20% of Earnest spending is online, compared with 12.5% for the Census data. Although the levels are off, spending growth is tightly correlated between the two sources. Figure A.8 compares the correlation of online spending growth for Earnest vs Census data, and finds a correlation of 1.

If in-store and online spending grew at a similar rate around the pandemic, the fact that Earnest is overweight on online spending would not be a problem in estimating aggregate spending growth. However, the pandemic itself

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[7]IBIS estimates that 55% of restaurant spending is on single origin.

[8]For example, the size of the Online Restaurant Delivery industry is set from publicly available data from Grubhub, Uber Eats, and news articles.

shifted spending from in-store to online, and because Earnest is overweight on-line spending, the data will tend to overestimate spending growth in the pandemic. Figure 2 confirms this logic: for March and April of 2020 the Earnest spending growth is significantly above the Census numbers.

To better match the aggregate date, we reweight the Earnest data. For each industry, we initialize total retail sales using the MARTS for January 2018. We then initialize spending for January 2018 between online and in-store spending for each using the shares for Q1 2018 from the Census E-commerce report. After January 2018, spending for online and in-store spending are updated using growth rates from Earnest, and total spending formed by adding in-store and online. Spending constructed this way is termed "R2" spending.

Figure 2 shows the results. The m.o.m. and y.o.y. correlation of R2 spending MARTS is higher, and in addition the March and April spending growth are much closer to the Census retail sales. Table A.3 shows mean and absolute errors are now substantially lower.
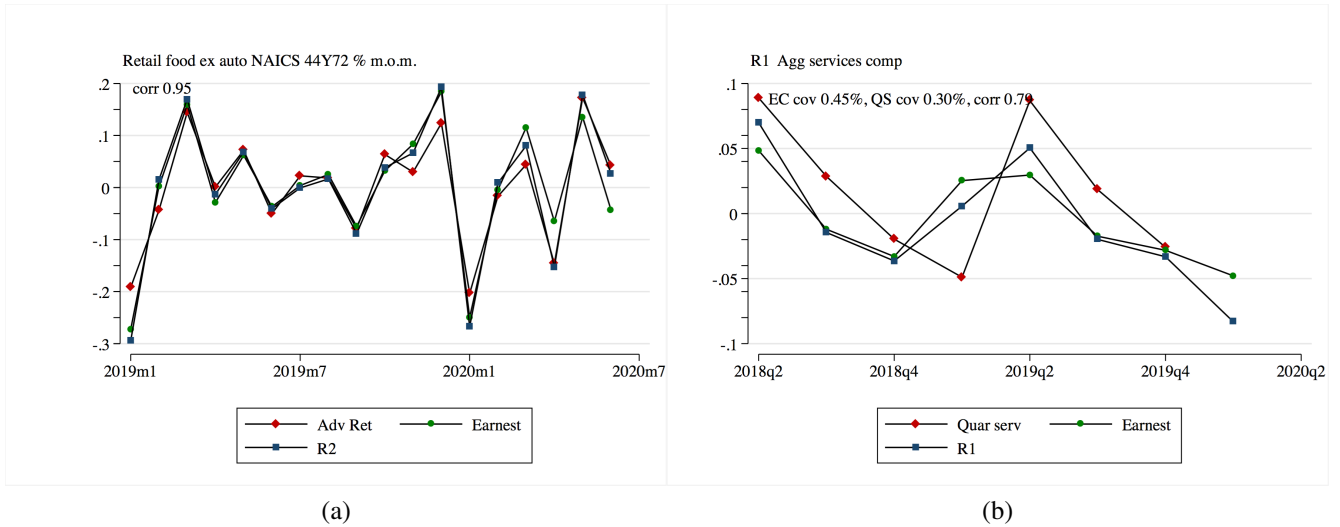

(a)   (b)

Figure 2: (a) Comparison of Earnest R2 and Census advanced retail sales and food services ex autos (b) Comparison of Earnest R1 service aggregate and quarterly census.

One remaining concern for the data is that Earnest's sample of large firms will have larger online spending growth in the pandemic than smaller firms, who may have less of an online presence. To the extent that this is true, Earnest will tend to overstate spending growth in the pandemic.

2.2 Services spending

Earnest has data on a several categories of service spending, but it is more limited than the retail goods coverage. There are categories for many aspects of

travel and leisure, cable and wireless telephone and internet, newspapers and magazines, and online services such as video streaming.

To benchmark the Earnest service data, we use the Quarterly Services Survey of the Census bureau. Benchmarking services is more difficult than retail sales, for two reasons: (i) the data is quarterly rather than monthly, so there are fewer observations (ii) the correspondence between Earnest categories and service NAICS codes is worse than retail sales so an apples-to-apples comparison is difficult. For example, Earnest has data on household spending on cruises, but this can only be compared to Census data that includes freight spending. The correlation of quarterly growth between the two data sources is -.47. Earnest has excellent coverage of many of the large cruise ship operators, and thus it is likely the negative correlation is due to the fact that the comparison is not like-to-like.

To study changes in aggregate service spending, we reweight the service industries following the procedure of section 2.1.1. To correct industry weights, we initially set the relative sizes of the industries to correspond to either the Economic Census data for 2017 (updated to 2018 using growth rates from the Service Annual Survey), the Service Annual Survey (SAS) for 2018, or IBIS industry reports. Sometimes the SAS has more detailed breakdown on whether revenue for an industry comes from households or businesses; whenever possible we use household revenue. For example, for Newspapers the SAS breaks down revenue into subscriptions and sales and advertising; for the purposes of constructing initial industry sizes, we only use revenue from subscriptions and sales. After setting initial industry sizes, we then use growth rates from Earnest industries to update spending afterwards.

Table 1, panel B, shows coverage ratios for the Earnest service categories, as well as the correlation of quarterly growth rates. The average overall coverage for the categories Earnest has available is .44, moderately higher than retail sales. Figure 2 (b) compares Earnest data to the QSS for an aggregate of the 11 NAICS codes that can be closely compared. The R1 services index shows a fairly close correlation of .79 with service spending from the SAS data, however recall there are only 8 quarterly observations.[9]

3   Effect of Covid-19 on consumer spending

3.1   Prepandemic, stock up, pandemic

For retail goods spending, the effect of Covid-19 can be summarized by: stock-up week, sharp depression, slow recovery, signs of a stalled recovery. For restaurants there is an immediate fall in spending, even larger than for retail goods, and more pronounced evidence of a stalled recovery. For other services there is a decline in spending even before the stockup week, followed by a massive decline in spending, with little pronounced recovery pattern.

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[9]Appendix figures A.5, A.6, and A.7 present time series comparisons of detailed industries.

Figures 3 panel (a) shows R2 retail and food service ex auto spending growth pre-and post pandemic. Table A.2 gives tabular results. Pre-pandemic, spending growth was relatively constant in 2020, growing at about 3.6% y.o.y.. When the pandemic hits, there is a stocking up week, and total spending on retail and food services increases to 19% y.o.y.. The primary driver of the increase is grocery spending, which saw an increase in spending of 84%. After the stocking up week, there is a massive decline in consumer spending, with total retail and food service spending down 9.2% y.o.y. on average during the 16 weeks of the pandemic.

Panels (b) and (c) of figure 3 show the corresponding figures for the two sub-components, retail sales and restaurants. Retail spending saw a massive increase during the stocking up week, up 26% y.o.y.. During the first weeks of lockdown retail spending plunged dramatically. In April spending recovered somewhat, but this stalled in May, with spending roughly flat during the month. In June the revival continued, and even saw positive y.o.y. spending growth by the end of the month. In July there are signs of a reversion, however, with the week ending July 15th seeing y.o.y. spending dropping back to negative. Restaurant spending fell 21% y.o.y. in the stocking up week, and has since plunged further, averaging a decline of 26% y.o.y. during the pandemic. Spending on restaurants remains depressed as of July 15th, and there is no longer a clear upward trend.

Panel (d) of figure 3 shows R1 service spending, and shows that service spending began to fall even before the stocking up week, as consumers stopped traveling several weeks before the full effects of the pandemic were felt. Beginning in week 11 the decline in service spending accelerates, with aggregate service spending declining an average of 41% y.o.y. during the pandemic. Service spending has not recovered significantly as of July 15th, and is still down almost 40% y.o.y..

The spending response to the pandemic can be compared to other recent upheavals: the response to Hurricanes Harvey and Irma in Houston and Florida, and the onset of the great recession. The hurricanes had very dramatic temporary effects on spending: close to the epicenters of both hurricanes, spending dropped to almost nothing in Texas and Florida (see Aladangady et al. (2019)). Spending mostly recovered within 20 days, and there was no "make-up" spending afterwards — the spending that was lost seemed to be gone for good. For Hurricane Irma there is also evidence of "stock up"' spending on groceries and building materials.

Figure A.12 compares retail sales during the pandemic recession to that of the great recession. The trough during the pandemic recession is about twice the magnitude of the great recession. It took almost a year for retail sales to fall significantly during the great recession, but once spending fell it remained depressed for a significant period, with no pronounced "V" shape.

Figure A.13 compares real personal consumption expenditures of the pandemic recession with all other post-1960 recessions. The initial drop in consumption expenditures outstrips by far all recessions for which data is available.

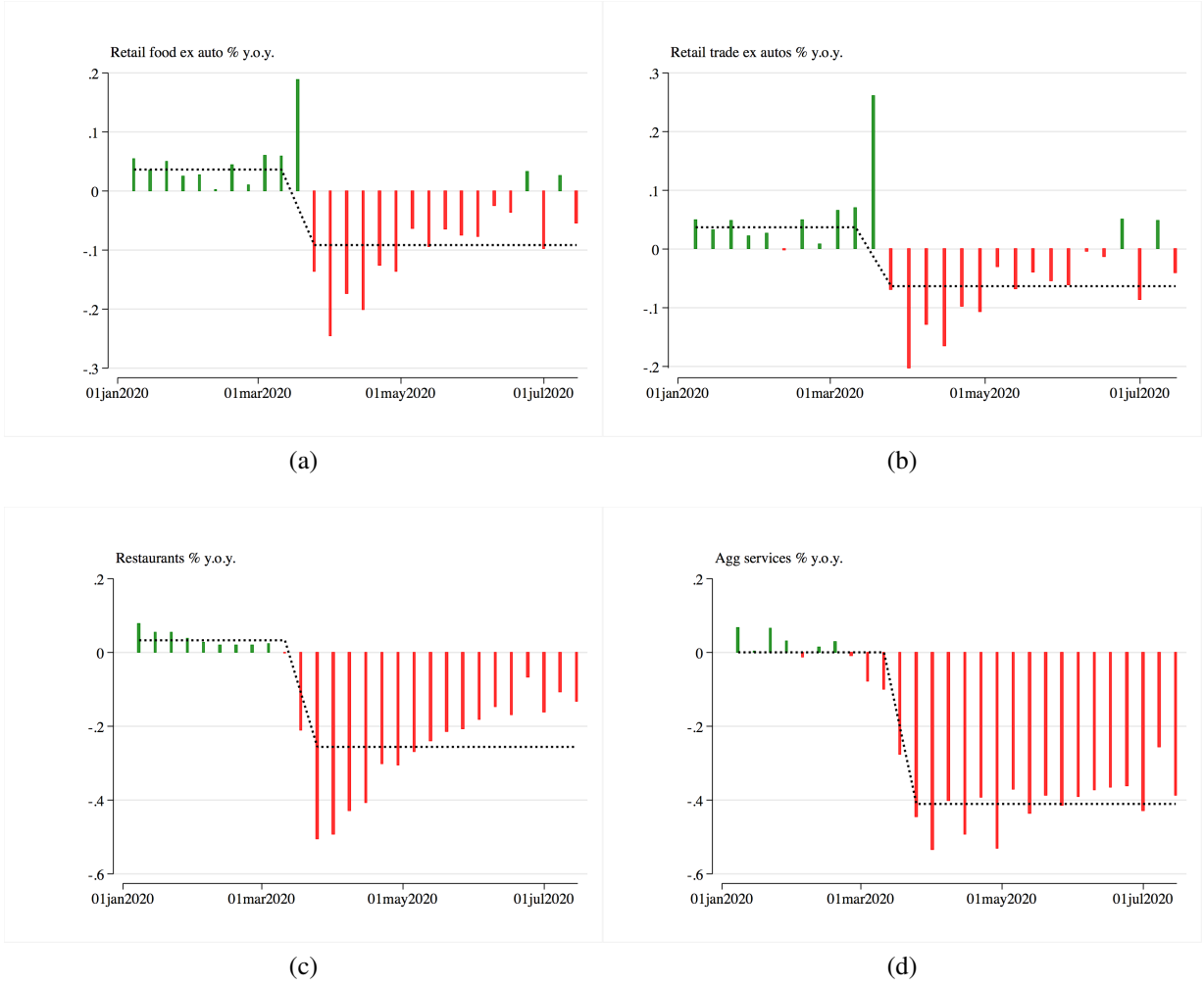To formally estimate the effect of the pandemic on consumer spending and

Figure 3: Effect on consumer spending on components of consumer spending.

compute standard errors, we estimate a simple event study model that regresses year over year spending growth on a time trend and 28 dummy variables for each week in 2020:

$$\text{Spend \% y.o.y} = \alpha + \gamma \cdot t + \sum_{j=1}^{28} \beta_j \mathbb{1}\{Week == j\} \tag{2}$$

The regression contain 80 observations: 52 weeks in 2019, 28 in 2020. Figure 4 (a) shows the regression coefficients for the 22 dummy variables for retail and food service spending, one for each week in 2020. Before week 11, i.e. the stocking up week, there is no change in spending from trend, with the estimated coefficients not significantly different from zero. The stocking up week sees a large increase in retail and food spending (point estimate 17.6%, CI [.10,.25]), followed by a plunge of -14.9% the next week, then a nadir of -25.7% during the second week of the pandemic. In April retail and food spending slowly

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recovered. In May spending was roughly flat, but the recovery continued again in June. The most recent point estimate for the week ending July 15th, -6.5%, suggests that the recovery may be stalling as a second wave of Covid-19 cases hits.

Panels (b) and (c) show the effect on retail sales and restaurant spending separately. As of the week ending July 15th, retail trade spending is still down 5.0% y.o.y., while restaurant spending depressed 16.2% y.o.y.. Panel (d) shows that the most dramatic declines have come for the service sector; at its lowest point in week 13 the point estimate shows a decline in spending of 53.7%, which by the week ending July 15th has only moderately recovered to a decline of 38.6% (CI [-.471,-.317]).
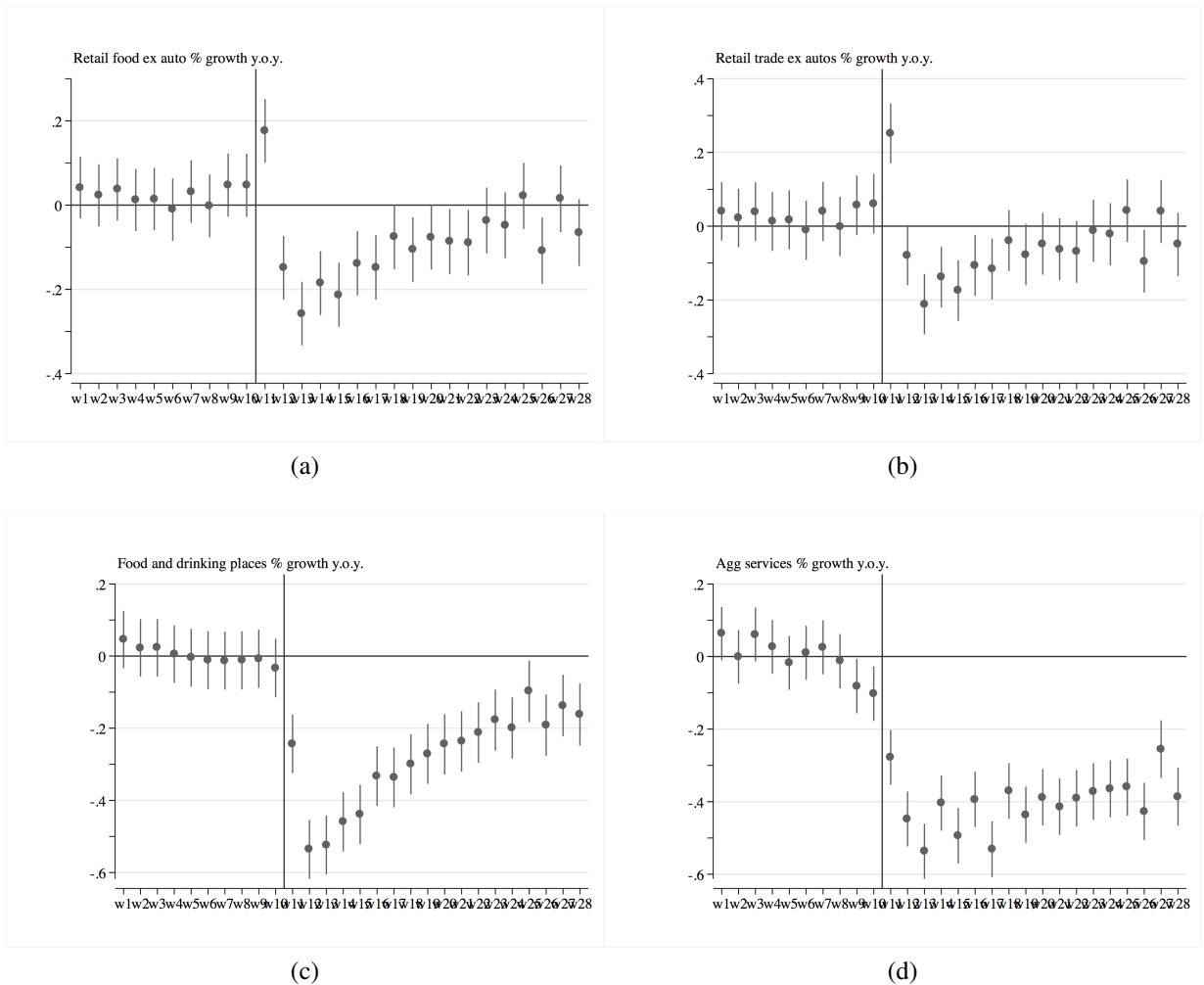

(a)   (b)

(c)   (d)

Figure 4: Estimated effect of pandemic on consumer spending.

3.2   Composition of spending

There have been large shifts in the composition of consumer spending since the pandemic: figure A.11 breaks down y.o.y. % changes by major category. The key pattern is a shift away from spending on goods and activities that happen outside of the house or are primarily useful outside, with large declines in travel, clothing and apparel, and transportation. Spending on these categories has shifted towards spending on home improvement, groceries, and general merchandise.

The travel sector has been particularly hard hit. Spending on airlines is down 80% y.o.y., cruises 80% y.o.y., hotels 75%, and rental cars 55%. It is unclear when this spending is going to come back as consumers remain wary to travel and spending totals show little indications of a recovery. As of July 15th the estimated effect of the pandemic on airline spending was still -76%, cruises -84%, hotels -61%.

With consumers spending most of their time inside and many retailers closed, spending on clothing has collapsed, down 37% y.o.y.. The declines are spread throughout all subcategories. With most department stores closed, spending has likewise declined precipitously, with total pandemic spending down 45% y.o.y.. Mass transit spending is down 90% and ride sharing 82%.

Spending on events and entertainment is down 88% and movie theatre spending is down 98%, as consumers move away from in person events and towards at home entertainment. On the positive side, spending on news media is up 16%, video streaming is up 34%, and gaming is up 79% y.o.y..

Three components of spending that are associated with home consumption saw significant increases: grocery (an average of 7.5% y.o.y. post pandemic), home improvement spending increased (42% y.o.y.), and general merchandise / nonstore retail spending (7% y.o.y). Grocery spending increased 84% during the stocking up week, but since then has reverted to trend, with the estimated effect of the pandemic no longer significant as of July 15th. Spending on home improvement jumped early on in the pandemic and has only increased further since stimulus checks began paying out in week 16 of 2020.

With consumers in lockdown, there was a large shift of retail and food service spending from in-store to online spending. Figure A.10 presents online spending share by source. During the first 10 weeks of 2020 online spending was 11% of retail and food service spending, increasing to 17% during the pandemic. The increase in the share of restaurant spending is even more dramatic, from 8% pre-pandemic to 22% post. As more states have opened up throughout May and June, the online share of retail and food has decreased from its peak of 20% to around 16%.

In some categories the shift to online has been dramatic; figure A.9 presents the change in the share of online spending by category. 49% of spending on apparel and accessories is now online, from 12% pre-pandemic. Home furnishing online share increased to 31% from 9%, sporting goods 6% to 21%. The largest categories of spending have increased, but not to the same extent: gen-

eral merchandise and nonstore retailors from 25% to 32%, grocers from 2% to 3%, restaurants from 8% to 22%, and home improvement from 3.9% to 4.4%.

4   Conclusion

The real-time data from Earnest shows an alarming drop in retail spending, restaurant spending, and other service spending caused by the pandemic. The pandemic's initial effects on spending reassembles that of a natural disaster such as a hurricane: a stocking up period, followed by a dramatic fall, followed by a jump upwards. However, unlike in natural disasters, spending is still well below pre-pandemic levels, and upward trend in spending has stalled.

This decline in spending has come about despite a large increase in government transfer payments, with personal income increasing by 10.5% in April due to stimulus and UI payments.[10] The data raises the specter of a critical lack of demand as the pandemic wears on into the fall, which could prolong and extend the record unemployment rates and depressed economic conditions.

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[10]See https://www.bea.gov/news/2020/personal-income-and-outlays-april-2020.

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Online Appendix for
Effect of Covid-19 on Consumer Spending

Jacob A. Robbins
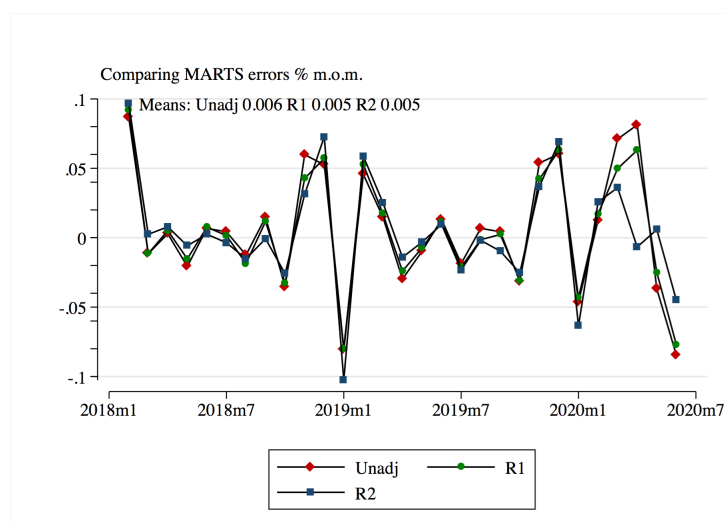
A   Figures

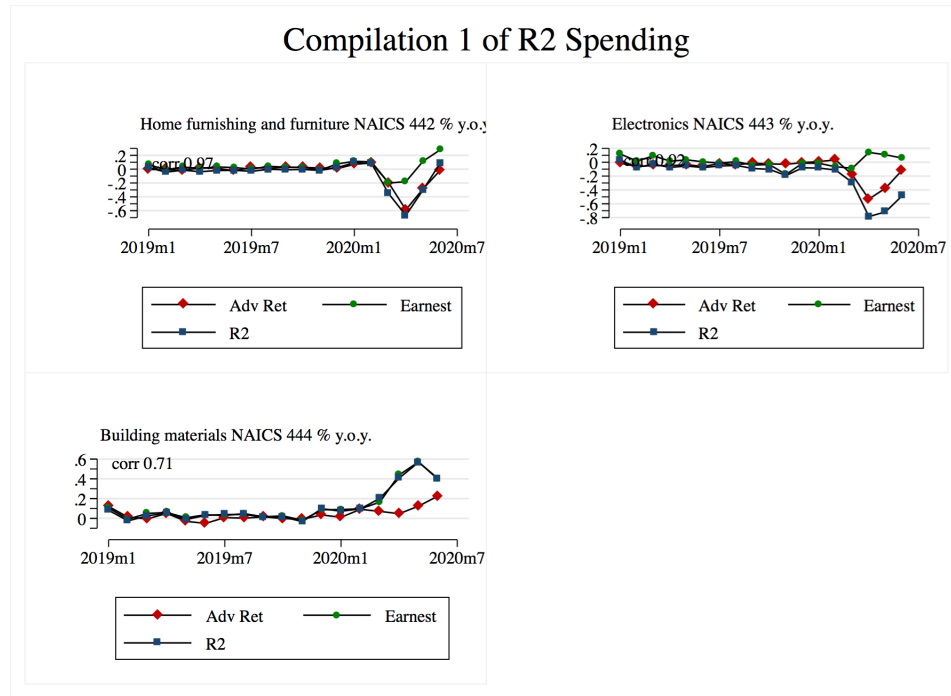Figure A.1: Earnest minus MARTS m.o.m spending growth: unadj, R1, R2.

Figure A.2: Comparison of R2 Earnest Research and Census Advanced Retail Sales
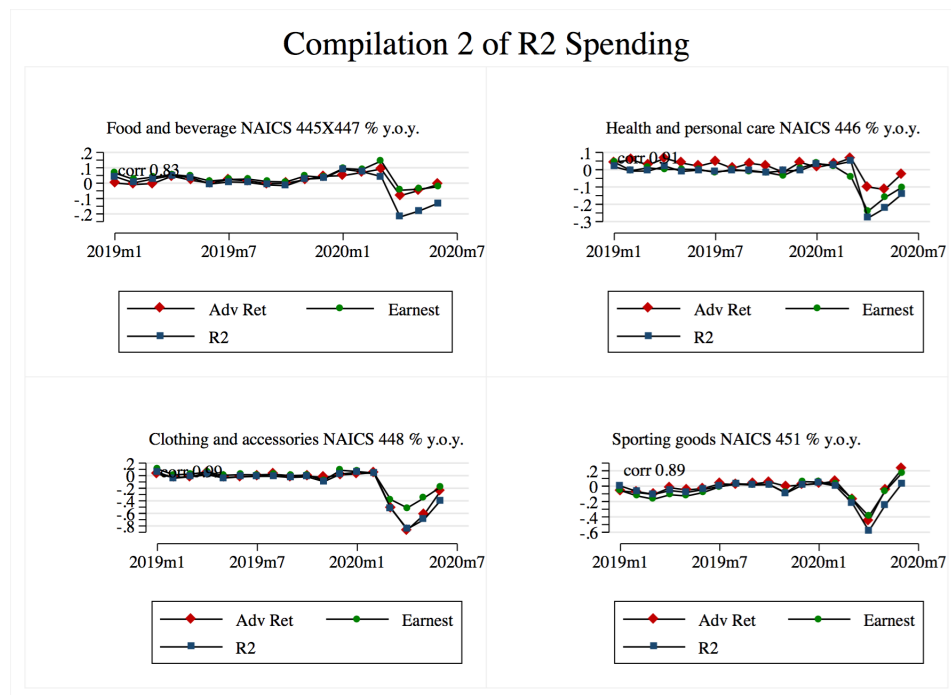

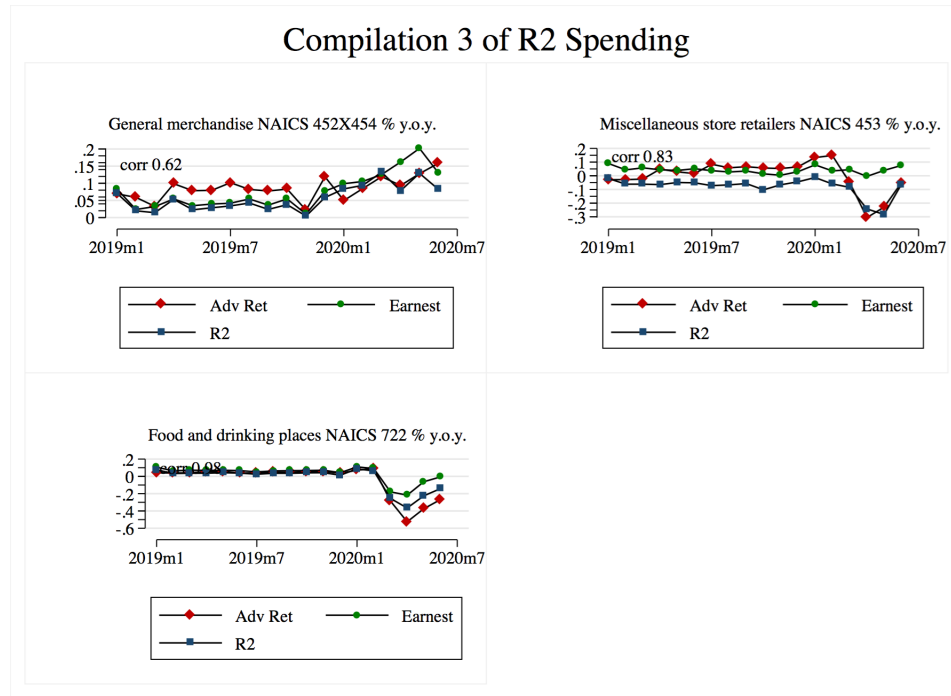Figure A.3: Comparison of R2 Earnest Research and Census Advanced Retail Sales

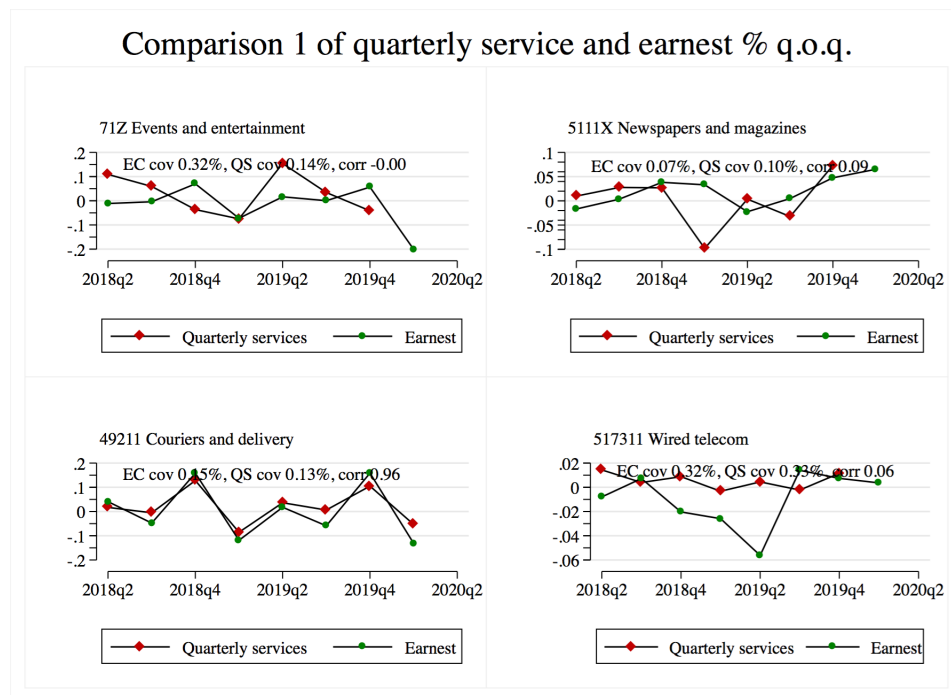Figure A.4: Comparison of R2 Earnest Research and Census Advanced Retail Sales

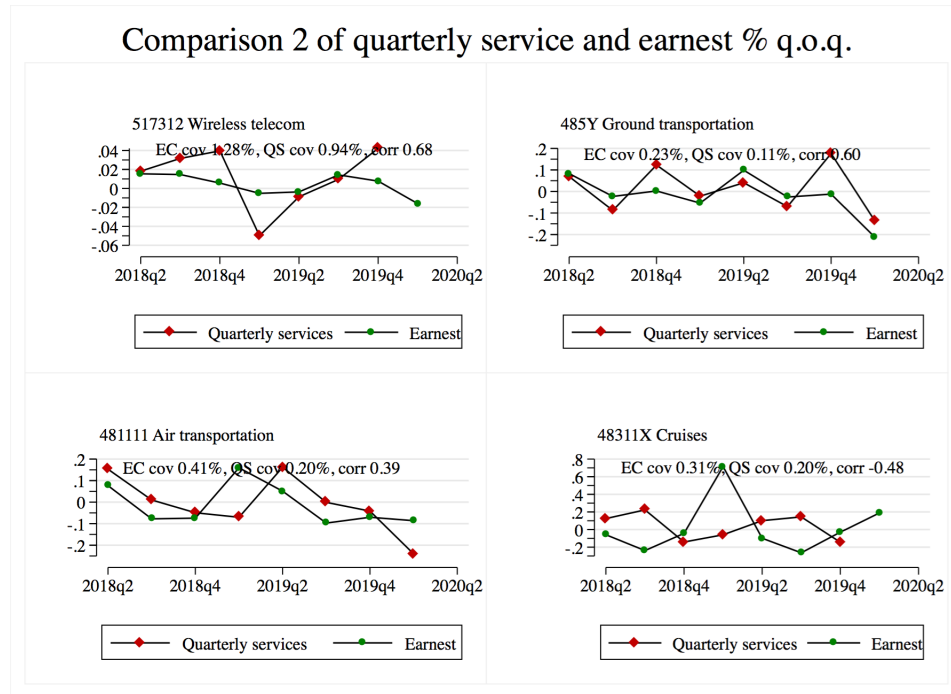Figure A.5: Comparison of Earnest and Census Quarterly Services sales 1

Comparison 2 of quarterly service and earnest % q.o.q.

517312 Wireless telecom
EC cov 1.28%, QS cov 0.94%, corr 0.68

485Y Ground transportation
EC cov 0.23%, QS cov 0.11%, corr 0.60

481111 Air transportation
EC cov 0.41%, QS cov 0.20%, corr 0.39

48311X Cruises
EC cov 0.31%, QS cov 0.20%, corr -0.48

Figure A.6: Comparison of Earnest and Census Quarterly Services sales 2

Comparison 3 of quarterly service and earnest % q.o.q.

7211X Hotels
EC cov 0.24%, QS cov 0.15%, corr 0.99

561X Travel agencies
EC cov 0.72%, QS cov 0.66%, corr 0.53

532111 Car rental
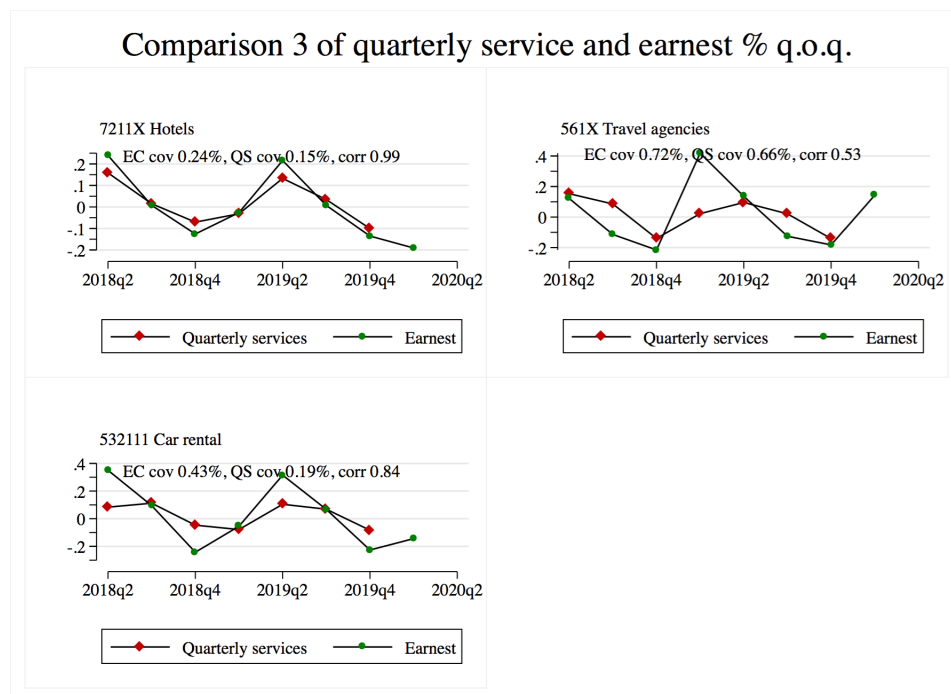EC cov 0.43%, QS cov 0.19%, corr 0.84

Figure A.7: Comparison of Earnest and Census Quarterly Services sales 3

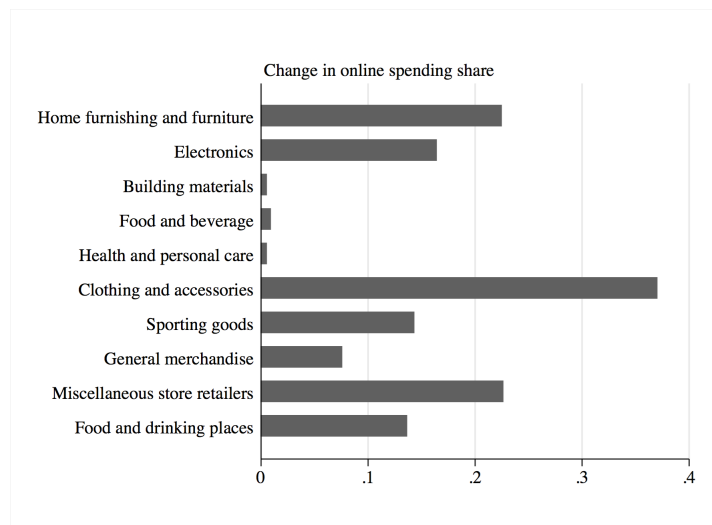Figure A.8: Comparison of Earnest and Quarterly Census online spending growth.

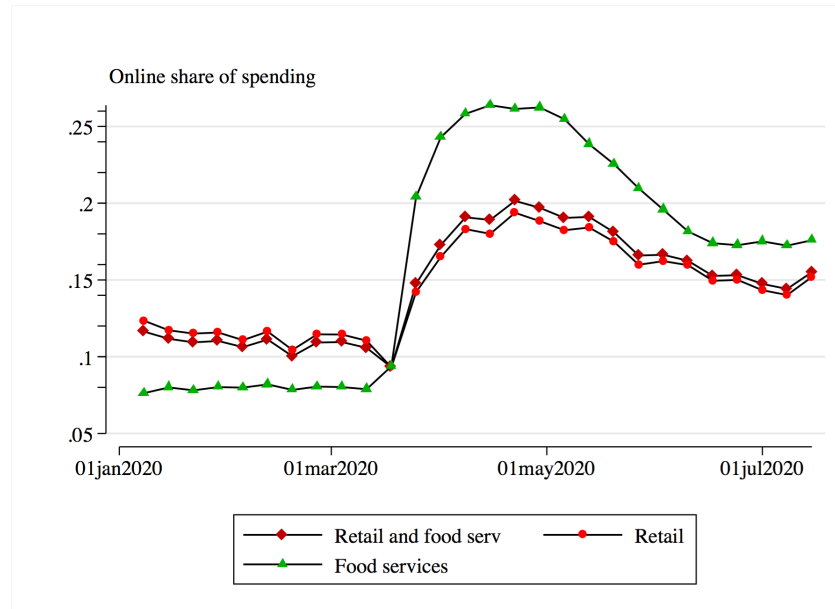Figure A.9: Change in online spending share, pre vs post pandemic, p.p.

Figure A.10: R2 online share of spending
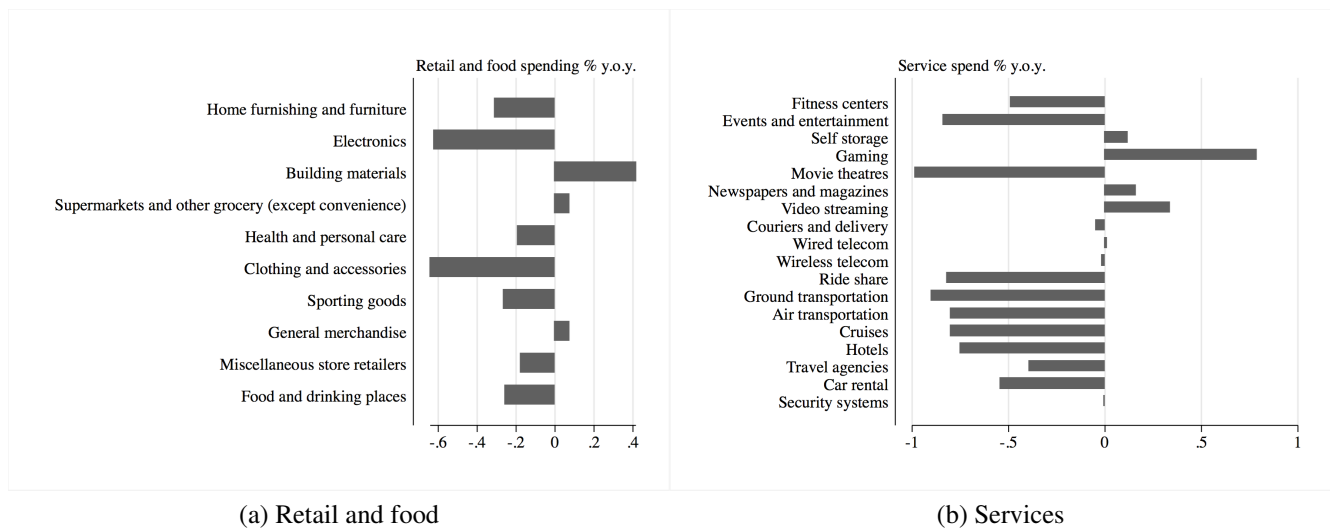

(a) Retail and food

(b) Services

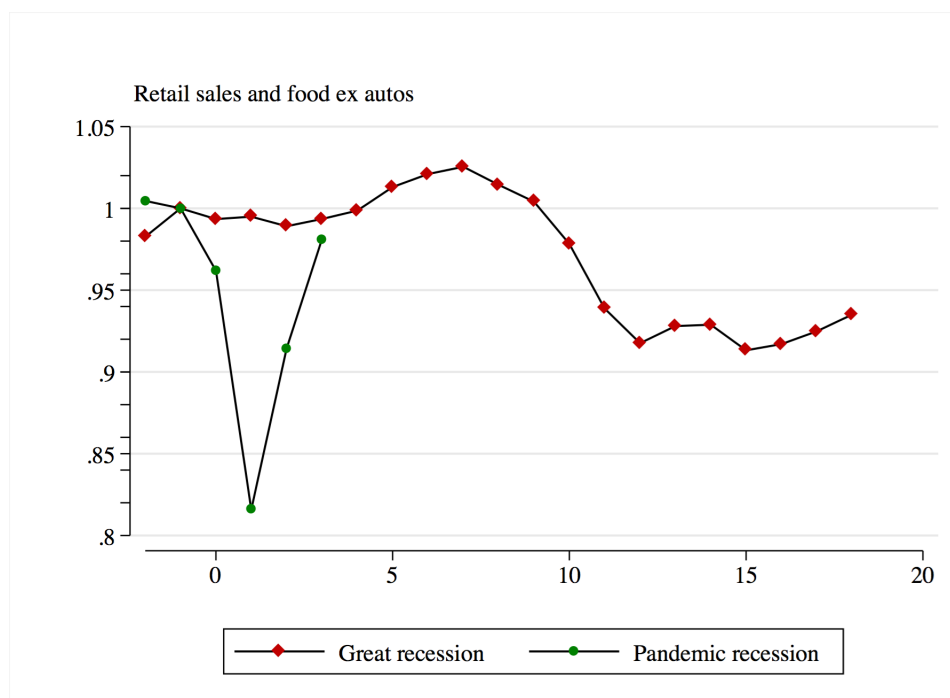Figure A.11: Changes in composition of spending

Figure A.12: Comparing the great recession with the pandemic recession. 0 represents the start of both recessions: December 2007 for the great recession, March 2020 for the pandemic recession.
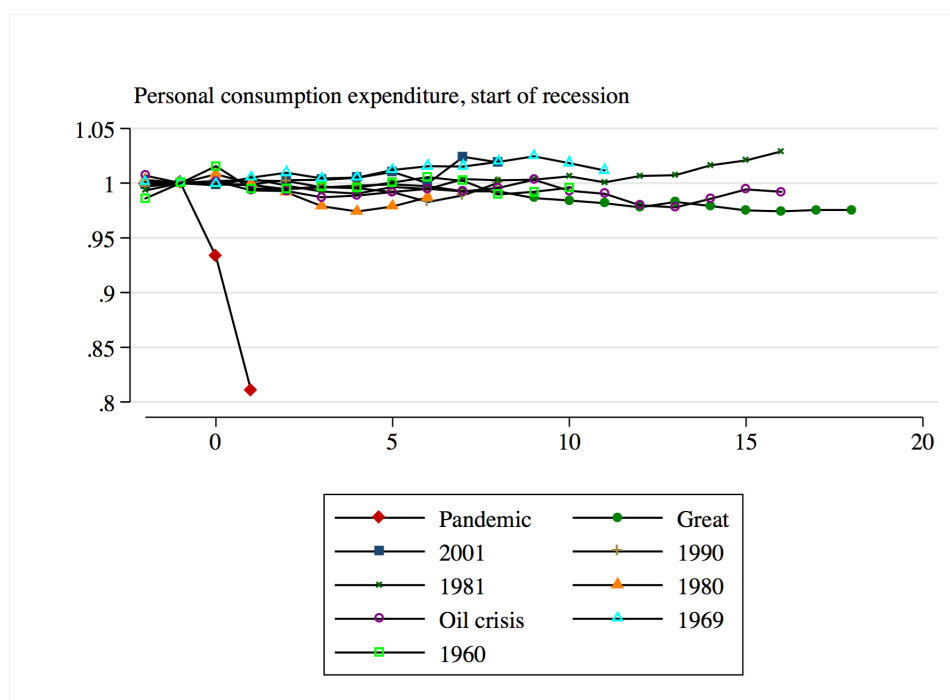

Figure A.13: Comparing pandemic recession with previous recessions. 0 represents the start of all recessions.

B   Tables

Table A.1: Weekly spending by channel, 2019-present, $ millions.

	All	2019	2020 Wk 1-10	2020 Wk 11	2020 Wk 12-28
Total spend	450.8	454.5	443.7	508.5	440.2
% Δ y.o.y.	0.020	0.032	0.041	0.12	-0.034
Δ y.o.y.	8.48	13.9	17.1	52.9	-15.9
In-store spend	264.0	274.3	255.6	329.1	233.4
% Δ y.o.y.	-0.029	0.0035	0.018	0.19	-0.17
Δ y.o.y.	-8.33	0.82	4.69	53.3	-47.6
% total	0.59	0.60	0.58	0.65	0.53
Online spend	160.9	154.7	159.9	152.9	181.1
% Δ y.o.y.	0.11	0.083	0.075	-0.0034	0.21
Δ y.o.y.	15.5	11.7	10.8	-0.53	30.9
% total	0.36	0.34	0.36	0.30	0.41
Goods	306.1	303.3	291.8	374.7	319.3
% Δ y.o.y.	0.040	0.028	0.048	0.27	0.059
% total	0.68	0.67	0.66	0.74	0.73
Services	144.6	151.2	151.9	133.8	120.9
% Δ y.o.y.	-0.018	0.041	0.027	-0.16	-0.22
% total	0.32	0.33	0.34	0.26	0.27
N	80	52	10	1	17

Table A.2: Effect of pandemic on consumer spending, $ millions.

	All	2019	2020 Wk 1-10	2020 Wk 11	2020 Wk 12-28
R2 Retail food ex auto	327.6	335.0	314.1	391.1	309.4
% Δ y.o.y.	-0.0032	0.014	0.036	0.19	-0.092
% online	0.11	0.094	0.11	0.093	0.17
R2 Retail sales ex autos	282.0	286.7	266.7	351.0	272.5
% Δ y.o.y.	0.0017	0.011	0.037	0.26	-0.063
% online	0.11	0.099	0.11	0.093	0.17
R2 Food services	45.7	48.3	47.5	40.1	36.9
% Δ y.o.y.	-0.030	0.035	0.033	-0.21	-0.26
% online	0.097	0.062	0.079	0.094	0.22
R1 Service index	85.9	94.2	92.0	74.0	57.5
% Δ y.o.y.	-0.084	0.011	0.00030	-0.28	-0.41
% online	0.64	0.62	0.63	0.62	0.73
N	80	52	10	1	17

Table A.3: Mean and absolute errors, Earnest - MARTS % m.o.m.

	(1)	(2)	(3)	(4)	(5)
	All	2018	2019	2020 M1-2	2020 M3-6
Unadj	0.0060	0.013	0.0024	-0.017	0.0077
abs	0.035	0.028	0.031	0.029	0.068
R1	0.0051	0.013	0.0020	-0.013	0.0027
abs	0.032	0.027	0.029	0.030	0.054
R2	0.0046	0.015	0.0016	-0.019	-0.0025
abs	0.029	0.024	0.032	0.045	0.023
N	29	11	12	2	4