Data Documentation

Webpage 4

Consumer Consternation for the US and NC

a. **Data Source**: data for the calculation required by this page is from Opportunity Insight, Morning Consult and Safegraph.
b. **Update Schedule:**
    i. **Data from Opportunity Insight:** the common available period for all daily series from Jan 8, 2020 the most recent observation are updated irregularly.
    ii. **Data from Morning Consult:** semi-month frequency data from Jan 1, 2020 to the most recent observation are updated at the beginning and the middle of the month.
    iii. **Data from Safegraph:** weekly data updated on each Friday.
c. **Input Series Calculation:**
    i. **Consumer Consternation** = First Principle Comonent {**Spend ACF, Spend AER, Google Non-essential Mobility, Safegraph Non-essential Mobility, Consumer Confidence**}
    ii. **Spend ACF**: data for spend_acf is from Opportunity Insight as percentage change of seasonally adjusted credit/debit card spending relative to Jan, 2020 in accommodation and food service MCCs, 7 day moving average. We convert the percentage change to index with Jan 2020 =100.
    iii. **Spend AER**: data for spend_aer is from Opportunity Insight as percentage change of seasonally adjusted credit/debit card spending relative to Jan, 2020 in art, entertainment, and recreation MCCs, 7 day moving average. We convert the percentage change to index with Jan 2020 =100.
    iv. **Google Non-essential Mobility** = (GPS Retail and Recreation + GPS Parks)/(GPS Residential + GPS Away from Home)
        1. GPS Retail and Recreation: data for gps_retail_and_recreation is from Opportunity Insight as percentage change of time spent at retail and recreation locations relative to Jan, 2020. We convert the percentage change to index with Jan 2020 =100.
        2. GPS Parks: data for gps_parks is from Opportunity Insight as percentage change of time spent at parks relative to Jan, 2020. We convert the percentage change to index with Jan 2020 =100.
        3. GPS Residental: data for gps_residential is from Opportunity Insight as percentage change of time spent at residential localtions relative to Jan, 2020. We convert the percentage change to index with Jan 2020 =100.
        4. GPS Away from Home: data for gps_away_from_home is from Opportunity Insight as percentage change of time spent outside of residential localtions relative to Jan, 2020. We convert the percentage change to index with Jan 2020 =100.
    v. **Safegraph Non-essential Mobility** = Non-essential Visit Counts/Total Visit Counts

1. Data for raw visit counts to 6 million points-of-interest (POI) in North America is from Safegraph.
2. We aggregate the raw visit counts to POI by industry. Non-essential Visit Counts is the total visit counts to the POIs in non-essential industries during the week and Total Visit Counts is the total visit counts to all the POIs during the week.

vi. **Consumer Confidence:** data for consumer confidence is from Morning Consult in semi-month frequency. Weekly data is constructed by equate the data for week {t} to the value of the nearest date with available data.

d. **Index Calculation**

i. The principle components for the above series are estimated for the period Feb 2, 2020 to June 26, 2020. The index is a transformation of the first principle component (PC1):

Index = - PC1 + level, where the level equals to 3 for the US and 2.96 for NC.

PC1 = C1 x standardized{Spend AER} + C2 x standardized{Spend ACF} + C3 x standardized{Google Non-essential Mobility} + C4 x standardized{Safegraph Non-essential Mobility} + C5 x standardized{Consumer Confidence}

The values of coefficients C1, C2, C3, C4 and C5 are provided in the following table:

	C1	C2	C3	C4	C5
US	0.5224	0.5337	0.4600	0.3343	0.3446
NC	0.5475	0.5703	0.3658	0.2258	0.4359

Standardized{X} = (X – mean{X})/standard deviation{X}

The values of the mean for each variable are provided in the following table:

	Spend AER	Spend ACF	Google Non-essential Mobility	Safegraph Non-essential Mobility	Consumer COnfidence
US	52.11	61.64	96.86	97.05	97.32
NC	55.81	59.40	106.83	97.26	101.96

The values of the standard deviation for each variable are provided in the following table:

	Spend AER	Spend ACF	Google Non-essential Mobility	Safegraph Non-essential Mobility	Consumer COnfidence
US	28.20	23.84	17.57	5.37	14.24
NC	28.95	24.93	14.84	6.04	14.36