A Report on Surveys of Consumers (UM)

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INTRODUCTION

Consumer Sentiment Index (CSI), an economic indicator used to predict changes in the outlook of a nation's economy is based on consumer interests and how likely they are to spend money, often in the succeeding 12 months. The most popular U.S. CSI, based on the University of Michigan's 'Surveys of Consumers', has been conducted since 1946. The type of questions that may be asked by surveyors in these indices range from the likelihood of customers spending money in near future to addressing their fears of getting laid off from work.

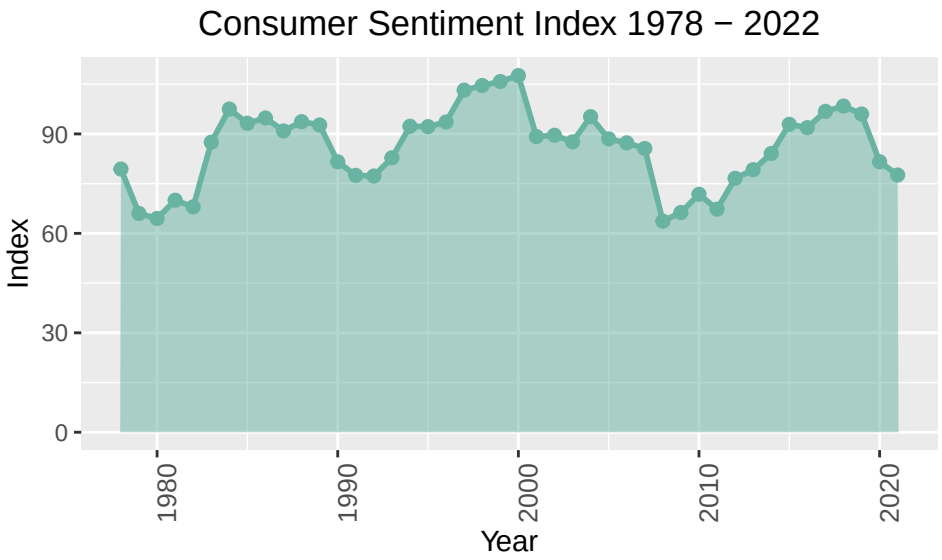
CALCULATING THE INDEX

To calculate CSI, the relative scores (the % giving favorable replies minus the % giving unfavorable replies, plus 100) are computed for each of the five index questions (x1 to x5). Round each relative score to the nearest whole number. Using the formula shown below, the five relative scores are summed, and divided by the 1966 base period total of 6.7558, and 2.0 is added (a constant to correct for sample design changes from the 1950s).

$$ICS = \frac{X_1 + X_2 + X_3 + X_4 + X_5}{6.7558} + 2.0$$

A. The Index of Consumer Sentiment

```
# Loading relevant libraries
library(ggplot2)
library(dplyr)
library(hrbrthemes)
library(reshape2)
library(readxl)
library(quantmod)
hrbrthemes::import_roboto_condensed()

# Loading data set from UM website
myfileA <- read_excel("/Users/mac/Desktop/FINC Assgn 02/Table1A.xls")

# Visualizing with an area chart
  ggplot(myfileA, aes(x=Year, y=Index)) + geom_area(fill="#69b3a2", alpha=0.5) +
   geom_line(color="#69b3a2", size=1) + geom_point(size=2, color="#69b3a2") +
    ggtitle("Consumer Sentiment Index 1978 - 2022") +
     theme(plot.title = element_text(hjust = 0.5)) +
      theme(axis.text.x = element_text(angle = 90, size = 10))
```

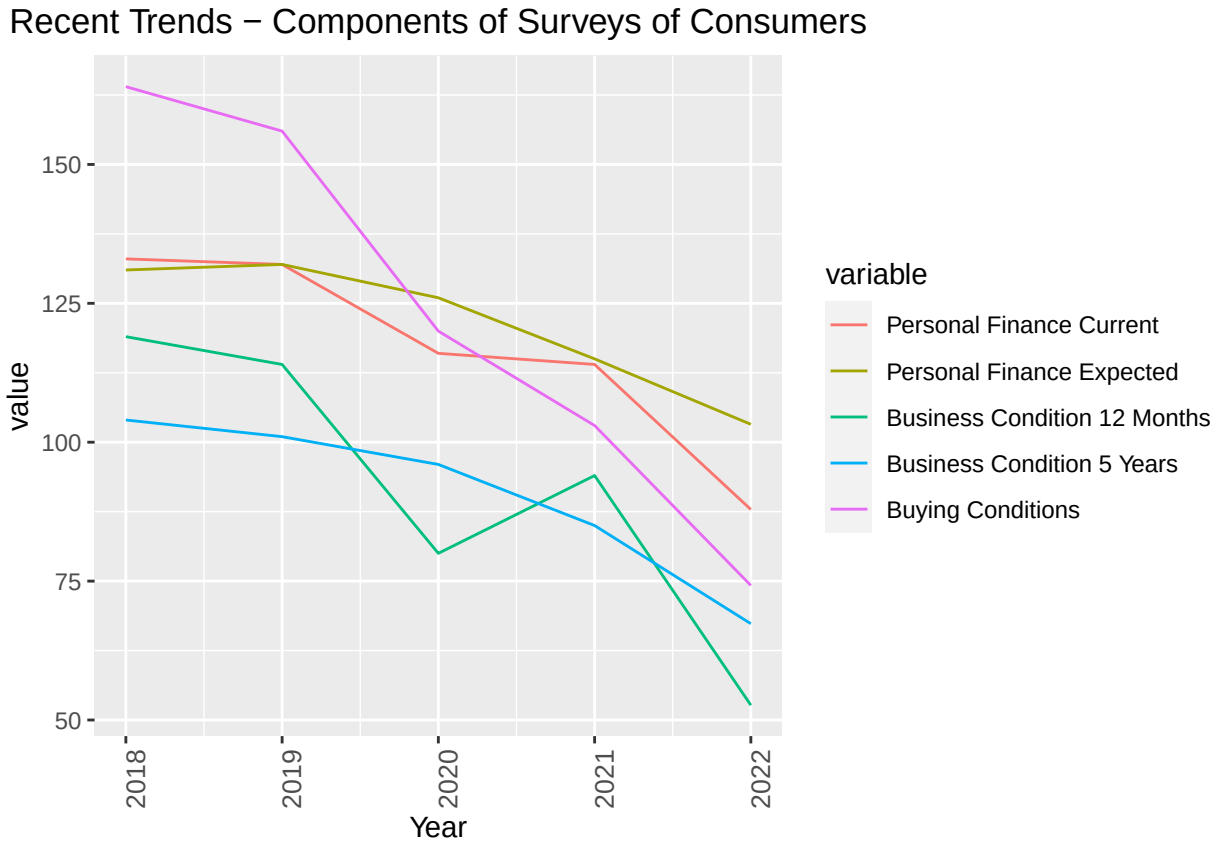


B. Components of the Survey

The data set is derived each month based on a survey that contains approximately 50 core questions, each of which tracks a different aspect of consumer attitudes and expectations. The samples for the Surveys of Consumers are statistically designed to be representative of all American households, excluding those in Alaska and Hawaii. Each month, a minimum of 600 interviews are conducted by telephone from the Ann Arbor facility.

The core questions cover three broad components of consumer sentiment: personal finances, business conditions, and buying conditions. Specific questionnaire items concerning expected changes in inflation, unemployment, and interest rates, as well as confidence in governmental policies, supplement the general assessments. Finally, several questions probe for the respondent's appraisal of present market conditions for large household durables, vehicles, and houses.

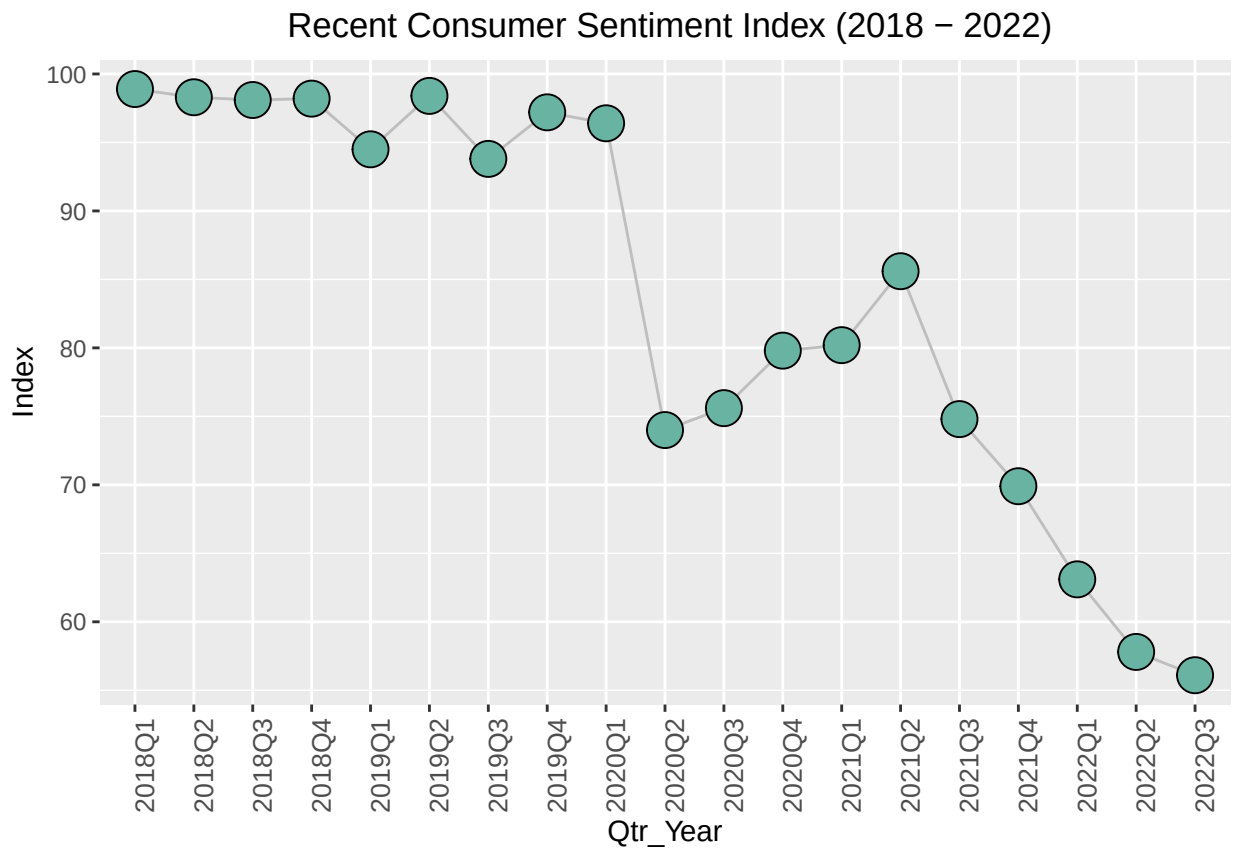
```
DATAFFILE5 <- read_excel("/Users/mac/Desktop/FINC Assgn 02/Table5.xlsx")
  library(reshape2)
   datafile5X <- DATAFFILE5[c('Year', 'Personal Finance Current','Personal Finance Expected',
      'Business Condition 12 Months', 'Business Condition 5 Years', 'Buying Conditions')]

DATAFILEX5 <- melt(datafile5X , id.vars = c("Year"))

ggplot(data =DATAFILEX5) + geom_line(mapping = aes(x=Year, y=`value`, color= variable))+
  ggtitle("Recent Trends - Components of Surveys of Consumers")+
    theme(plot.title = element_text(hjust = 0.5)) +
     theme(axis.text.x = element_text(angle = 90, size = 10))
```



C. Recent Trends in CSI

We have analyzed the recent trends of CSI based on the following categories - age subgroups, income terciles and regions. We have also analyzed recent trends of components that make up the CSI, that is, the current personal finances of the consumers, what they expected their finances will be, the current business conditions within the next twelve months as well as the business conditions in the next five years. Lastly, we also consider the component that explains the buying condition of consumers.

```
df2 <- read_excel("/Users/mac/Desktop/FINC Assgn 02/LTable1.xlsx")
  df2 %>%
    ggplot( aes(x=Qtr_Year, y=Index, group = 1)) +
      geom_line( color="grey") +
        geom_point(shape=21, color="black", fill="#69b3a2", size=6) +
           ggtitle(" Recent Consumer Sentiment Index (2018 - 2022)")+
            theme(plot.title = element_text(hjust = 0.5)) +
              theme(axis.text.x = element_text(angle = 90, size = 10))
```

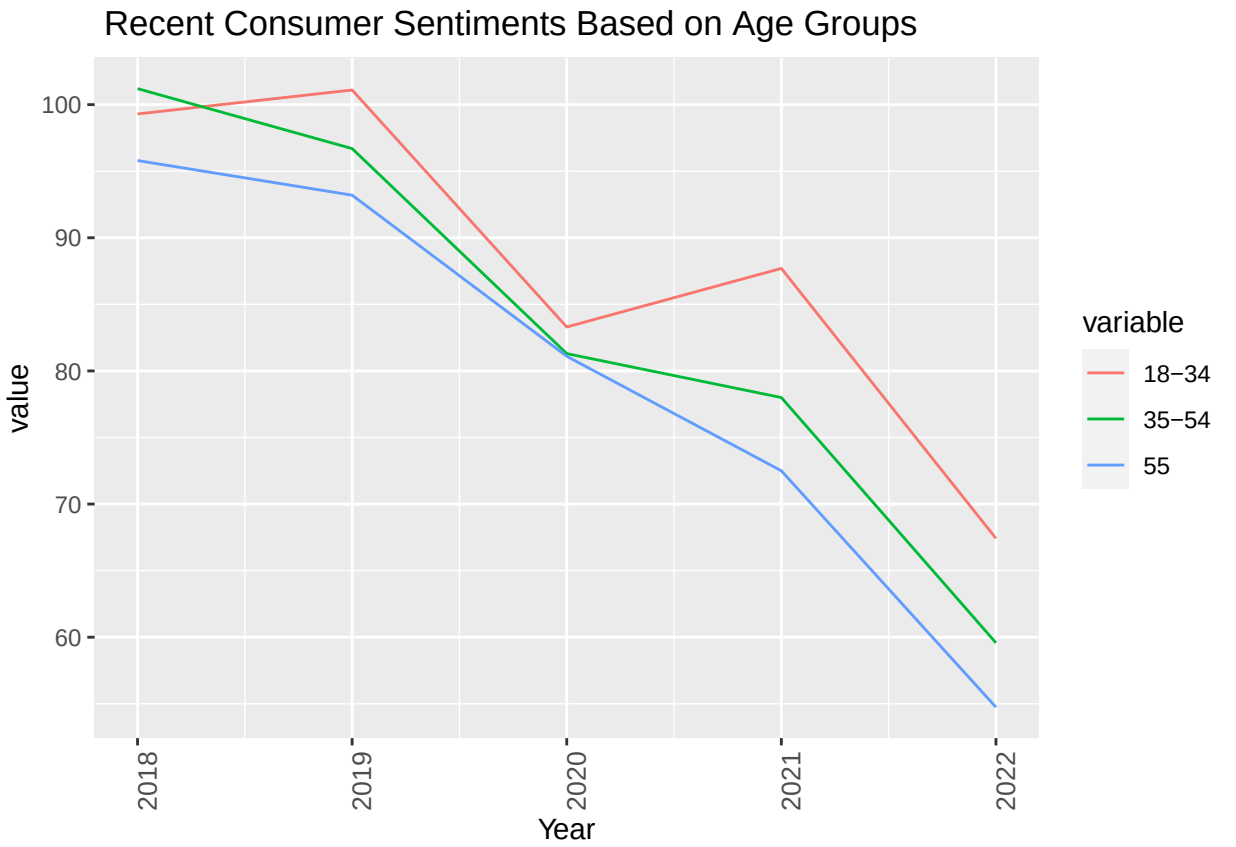


From the line chart above, we can deduce that in 2018, through the first quarter of 2020, the consumer index was above 90. The effect of COVID-19 can be seen during the second quarter of 2020, even though the index recovered during the next year, only to decline to a record-low sentiment index of 54.7 in Nov'22.

Higher interest rates, a potential recession and persistently high prices could be the reasons that have made consumers substantially less confident about the current state of the economy as well as where things are headed. Overall, sentiment decreased across the spectrum of age, education, income, region, and political affiliation, demonstrating the flimsiness of the recent CSI improvements.

Based on Age Groups

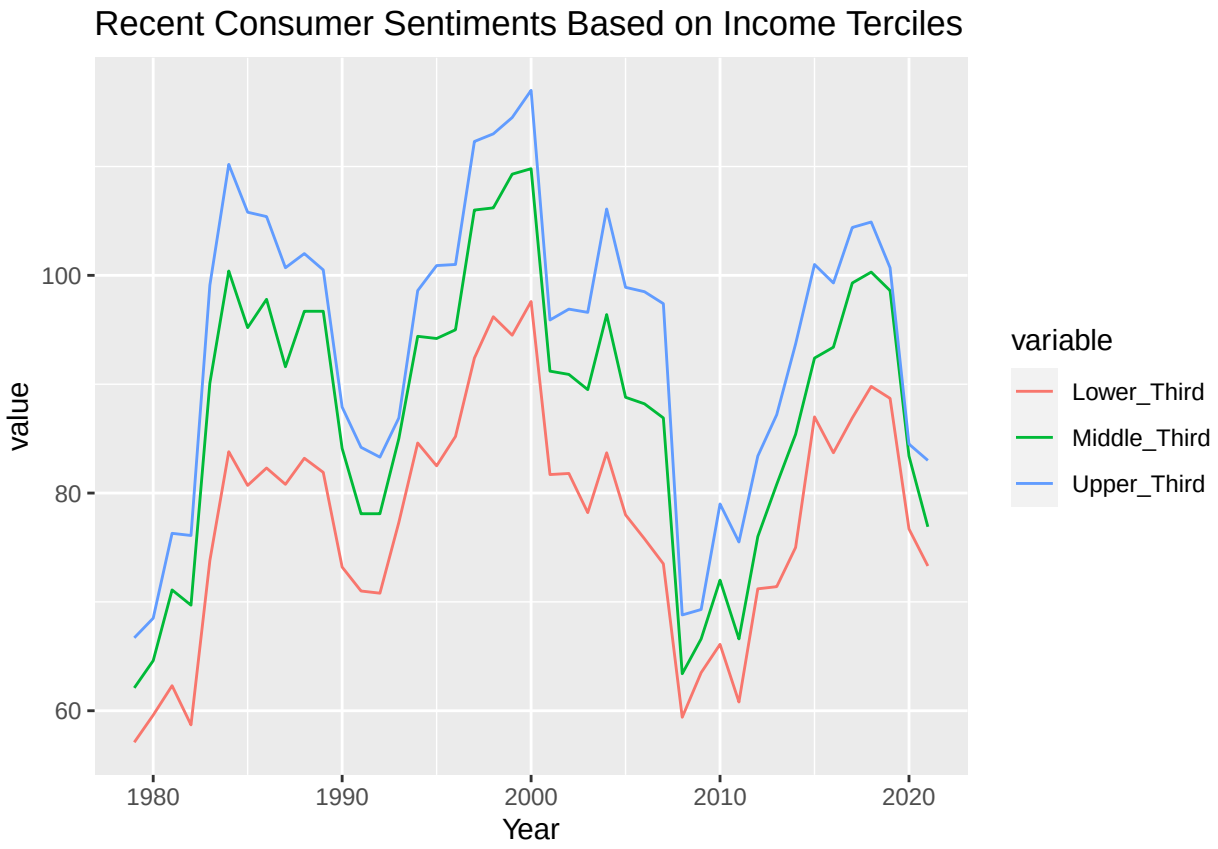
```
DATAFILE3 <- read_excel("/Users/mac/Desktop/FINC Assgn 02/Table3.xlsx")
DATAFILEX3 <- melt(DATAFILE3, id.vars = c("Year"))
ggplot(data = DATAFILEX3) +
  geom_line(mapping = aes(x=Year, y=`value`, color= variable)) +
      ggtitle(" Recent Consumer Sentiments Based on Age Groups") +
        theme(axis.text.x = element_text(angle = 90, size = 10))
```



Sentiment across age groups showed a similar trend of one age group (55+) showing a marked difference, probably owing to the constrained sources of income.

Based on Income Terciles

```
knitr::opts_chunk$set(echo = FALSE)
file1 <- read_excel("/Users/mac/Desktop/FINC Assgn 02/Table22.xls")
file2 <- melt(file1, id.vars = c("Year"))
ggplot(data = file2) +
  geom_line(mapping = aes(x=Year, y=`value`, color= variable)) +
      ggtitle("Recent Consumer Sentiments Based on Income Terciles")
```



Though there is a marked decline in the sentiment coinciding with the arrival of COVID-19, it appears that the brunt of the disruptions were faced by those in the lowest income tercile. The recovery graph, since 2020, paints a similar picture, with a gloomier sentiment for consumers in the lowest-income tercile.

D. Cross-Correlation Analysis

In this part of our report, we have tried to assess how consumer expectations match the actual events through the method of Cross-Correlation. Cross-Correlation measures the degree of resemblance between a time series and a lagged version of another time series to find out whether one-time series is a leading signal for another.

Stock Prices, Inflation and CSI: The Standard and Poor's 500, or simply the S&P 500, is a stock market index tracking the stock performance of 500 large companies listed on stock exchanges in the United States. Here, we have traced the monthly close of ^GSPC (S&P500) and CSI from UM Survey from the year 2000 to see if there any correlation between stock prices and consumer sentiment. Surprisingly there seems to be almost no correlation between the two metrics.

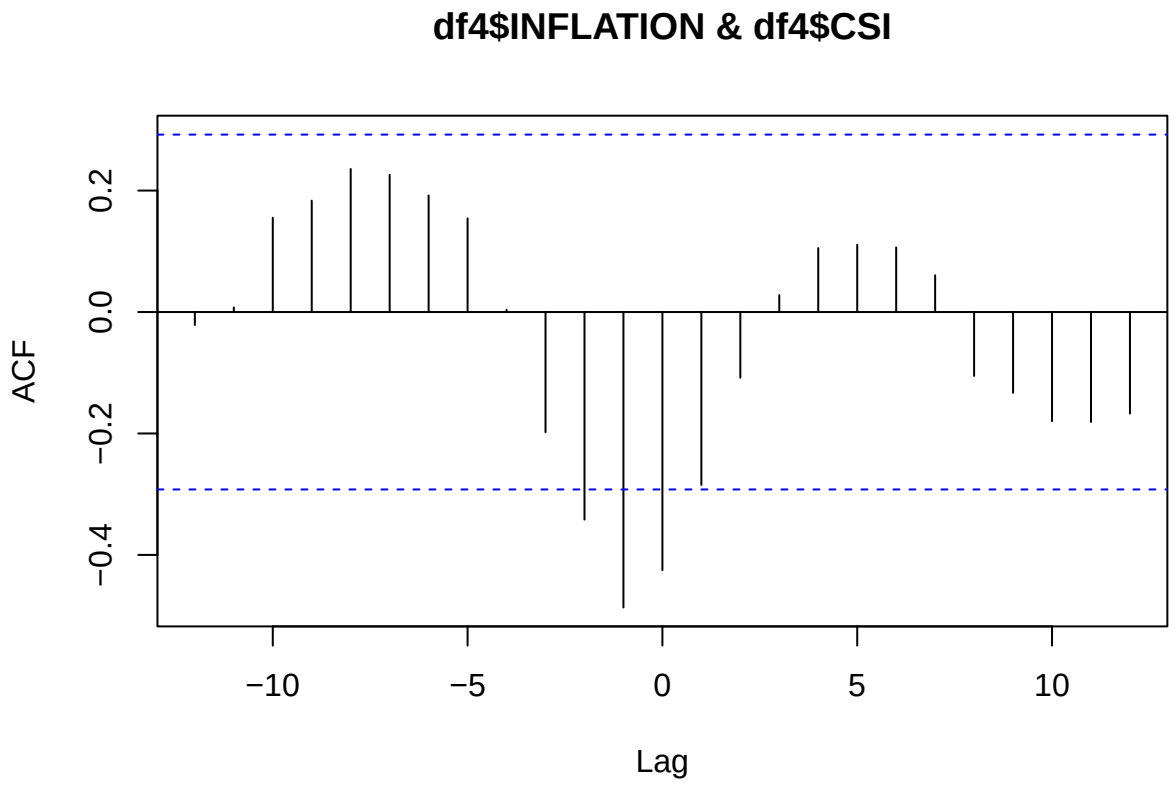
```
## [1] "^GSPC"
```

```
##
##  Pearson's product-moment correlation
##
## data:  df2$Index and df2$GSPC.Adjusted
## t = -0.00000000000000000028496, df = 75346, p-value = 1
```

```
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
##  -0.007140251  0.007140251
## sample estimates:
##                             cor
## -0.000000000000000000000103814
```

Correlation Between Inflation and CSI: In continuation, we have attempted to find whether there is any correlation between Inflation and Consumer Sentiment. Not surprisingly, there is a negative correlation between the two. Analysing the time series of both the metrics, we can see there is a 1 to 2 month lag. Effectively, CSI is a leading indicator for inflation.

```
##
##  Pearson's product-moment correlation
##
## data:  df4$INFLATION and df4$CSI
## t = -3.0795, df = 43, p-value = 0.003606
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
##  -0.6388977 -0.1503035
## sample estimates:
##        cor
## -0.4250831
```

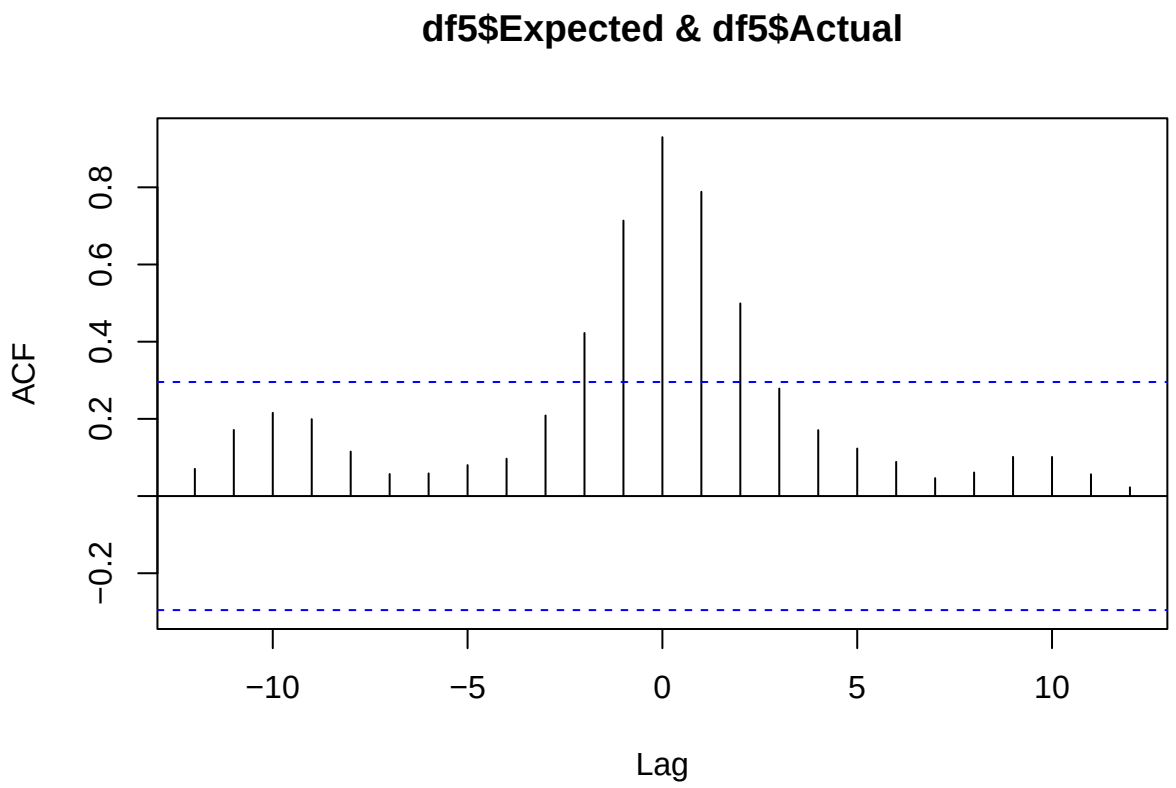



```
##
```

```
## Autocorrelations of series 'X', by lag
##
##    -12    -11    -10     -9     -8     -7     -6     -5     -4     -3     -2
## -0.021  0.008  0.155  0.183  0.236  0.226  0.192  0.154  0.004 -0.198 -0.342
##     -1      0      1      2      3      4      5      6      7      8      9
## -0.487 -0.425 -0.285 -0.108  0.028  0.105  0.111  0.106  0.060 -0.105 -0.133
##     10     11     12
## -0.180 -0.181 -0.167
```

Correlation Between Expected and Actual Inflation: Here, we have tried to find out how accurate are consumers, when it comes to predicting inflation. By analysing the correlation between the expected versus actual inflation, consumers are astonishingly accurate in gauging the price levels with lag of 1 quarter.

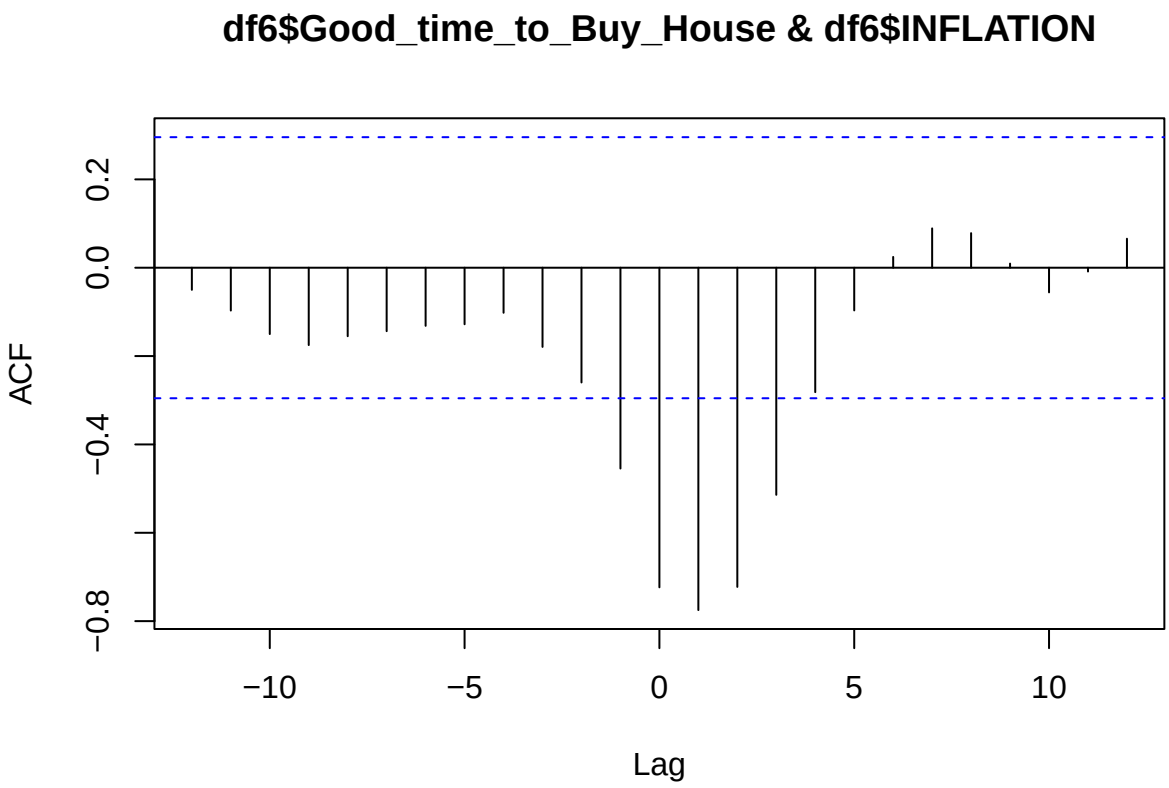
```
##
##  Pearson's product-moment correlation
##
## data:  df5$Expected and df5$Actual
## t = 16.383, df = 42, p-value < 0.00000000000000022
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
##  0.8744015 0.9613687
## sample estimates:
##       cor
## 0.9298894
```



```
##
## Autocorrelations of series 'X', by lag
##
##   -12   -11   -10    -9    -8    -7    -6    -5    -4    -3    -2    -1     0
## 0.070 0.171 0.216 0.199 0.115 0.057 0.059 0.080 0.097 0.209 0.422 0.714 0.930
##     1     2     3     4     5     6     7     8     9    10    11    12
## 0.788 0.499 0.278 0.171 0.123 0.088 0.046 0.061 0.102 0.101 0.056 0.023
```

Advanced Buying Behavior: For this part, we have tried to test the 'Advance Buying Motive' behavior of consumers. It is the psychology of a minority of consumers to buy a house or property, when the prices are rising, anticipating further increase in price. This behavior is justified by the strong negative correlation between those consumers who think that it is a 'good time to buy a house' and inflation.

```
##
##  Pearson's product-moment correlation
##
## data:  df6$Good_time_to_Buy_House and df6$INFLATION
## t = -6.7921, df = 42, p-value = 0.00000002884
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
##  -0.8399605 -0.5433166
## sample estimates:
##        cor
## -0.7234969
```



```
##
## Autocorrelations of series 'X', by lag
##
##    -12    -11    -10     -9     -8     -7     -6     -5     -4     -3     -2
## -0.050 -0.097 -0.150 -0.175 -0.155 -0.144 -0.132 -0.128 -0.102 -0.179 -0.260
##     -1      0      1      2      3      4      5      6      7      8      9
## -0.455 -0.723 -0.775 -0.723 -0.514 -0.282 -0.097  0.024  0.089  0.078  0.009
##     10     11     12
## -0.056 -0.009  0.066
```

E. Corporate Uses of the Data

1. **Manufacturers:** With the COVID-19 pandemic retreating worldwide, demand is surging for many products largely due to pent-up consumer demand, and more money in wallets due to stimulus checks. Yet manufacturers, who have dealt with a steady stream of supply chain disruptions were cautious about large-scale production escalation. Ongoing analysis of U.S. consumer sentiment, as well as industry specific buyer sentiment, are critical to help individual manufacturers gauge whether making major investments in ramping up production and inventory is wise, or if the demand represents a short-term bubble that will deflate and return business activities back to pre-pandemic levels. For instance, if the economy heats up, demand for luxury items might continue to soar. But if headwinds start blowing, consumer staples might see growth while luxury items falter. For a company, conducting audience panels are key for this as they can reveal unique needs and characteristics that could tip the scales in either direction depending on the products being manufactured and what demand might be for them beyond the short term.

2. **Retailers:** Retailers look at consumer sentiment in an effort to maximize profits and inform strategies and activities. When consumer attitudes change quickly, as was seen in early 2020, the products consumers demand will also change – Case in point: The great toilet paper rush of spring 2020. A consumer's view of both their personal financial situation and the national economic situation will directly affect the things they want to buy.

3. **Finance:** When demand for new loans is high, banks can be in a position to raise interest rates and/or invest more in marketing and sales to juice loan volume. When the outlook turns pessimistic, banks will often lower interest rates in an attempt to gain more market share or encourage existing customers to take advantage of the low-rate environment. The latter scenario played out across 2020. Despite a negative overall consumer outlook, historically low mortgage rates led to consumers continuing to refinance and, as the year progressed, look to buy a new home.

CONCLUSION

Ultimately, the usefulness of consumer sentiment surveys can be seen in pretty much every level of the supply chain. The many moving pieces of our economy are not independent, but rather, they are deeply reliant on one another and work as a collective organism. Understanding consumer sentiment in the status quo can help a business make short-term adjustments and long-term forecasts. As long as the business is directly affected by the economy's broader movements - something that is true for essentially every business - then monitoring consumer sentiment will be a make or break for any business.