The Effect of the U.S. Great Recession on Consumer Attitudes

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Introduction

After the Great Depression of the 1930's, the next largest economic plunge in the United States occurred only in the past few decades. This relatively recent period of economic struggle called the Great Recession, which spanned from the years 2007 to 2009, shattered financial markets globally ("The Great Recession", n.d.). Particularly, the United States received the largest hits during this time ("The Great Recession", n.d.). Consequently, researchers in this field of study have found that the behavior of consumer attitudes, values, and expectations in the U.S. have changed in response to the financial difficulties caused by the Great Recession (Benhabib & Spiegel, 2018; Gerzema & D'Antonio, 2011). Thus, the main research question of this report is "How does the U.S. Great Recession affect consumer attitude?" In our study, we seek to delve further into this question by analyzing potential household characteristics that may impact the effect of the Great Recession on the attitudes of consumers.

Data and Methods

Survey of Consumer Attitudes and Behavior Series

In order to answer the research question, we used the data from the Survey of Consumer Attitudes and Behavior Series (Survey of Consumers) from October 2007 - March 2008 and March 2009 - August 2009. Essentially, the Survey of Consumers is an ongoing monthly study that estimates changes in aggregate consumer behavior through a repeated cross-sectional method, which integrates a rotating panel sample design (Curtin, n.d.; "Survey of Consumer

Attitudes and Behavior Series", n.d.). For each month's sample, a cross-sectional sample of households is gathered independently, and the chosen respondents in the drawing are re-interviewed in intervals of six months (Curtin, n.d.).

This survey consists of adult men and women (18+ years old) living in households with telephones in the coterminous United States (Curtin, n.d.; Curtin et al., 2000). The survey uses a national sampling of dwelling units selected by area probability sampling, and it is administered using computer-assisted telephone interview (CATI) (Curtin, n.d.; Curtin et al., 2000).

Stacking Datasets

Before we proceed with our main analysis, we have merged twelve monthly datasets from the Survey of Consumer Attitudes and Behavior Series. Six of these monthly datasets were pulled from the months ranging from October 2007 to March 2008, and another six months range from March 2009 to August 2009. These specific months parallel the time period in which the Great Recession began and ended. We have deemed those twelve monthly datasets sufficient for our analysis. Those twelve monthly datasets were selected and combined in order to avoid multiple recordings of the same respondents since in the sample design, chosen respondents were re-interviewed in six-month intervals (Curtin, n.d.). Moreover, the merged dataset includes a total of 6,050 respondents ("Survey of Consumer Attitudes and Behavior Series", n.d.).

Variables

In the Survey of Consumers codebook, Curtin (n.d.) explained that the ICS variable was constructed by using the following formula, where X_1 , …, X_5 are the relative scores[1] of the

[1] "The relative scores of the 5 component questions are used in the equation and are defined as the percent giving favorable replies minus the percent giving unfavorable replies, plus 100. Each relative score is rounded to the nearest whole number" (Curtin, n.d.).

respective questionnaire items listed in Appendix A, 6.7558 is the 1966 base period total score, and n is a constant to correct for sample design changes ($n = 2.7$ before December 1981, and $n = 2.0$ after December 1981):

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

In our study, we used ICS as our measure to explain consumer attitude. The values of ICS range from 2 to 150 with higher values indicating more positive consumption attitudes.

Besides ICS, we worked with a number of other variables. Centered at the seventh month when the Great Recession was approaching its end, we used the quadratic form of "month" to better explain the effect of this financial event based on its relationship with ICS (Figure 1). We selected 12 other covariates of interest including demographics and attitudinal measures such as opinion on current government policy. We have also included a dummy variable to distinguish the first and last six months of the Great Recession. The descriptive statistics of the continuous variables are presented in Table 1.

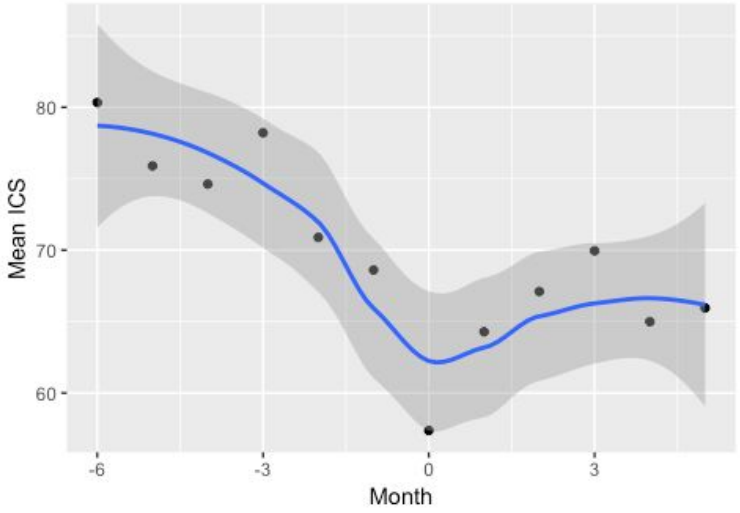

Figure 1: Relationship between month and ICS

Covariate	Mean	Min	Max	Obs	Reference**
ICS	69.83	2	150.02	6050	N/A
Age	54.07	18	97	6026	53.93
Annual Household Income	78924	2184	999995	5616	$55,551.29
Number of Kids	0.59	0	9	6047	0
Number of Adults	1.87	1	7	6050	4

**Actual value when variables in the model equal to 0

Table 1: Descriptive statistics of continuous variables

Notably, annual household income is of a different scale compared to other covariates. We centered the log transformed annual household income at $55,551.29 (original scale). There is considered to be a positive linear relationship between income and ICS after transformation, shown in Figure 2.

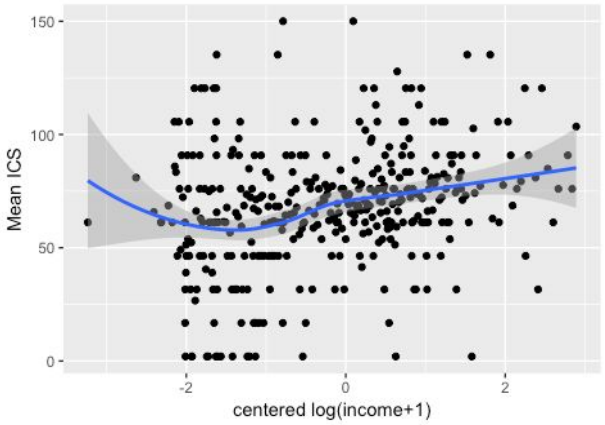

Figure 2: Mean ICS for each reported income value

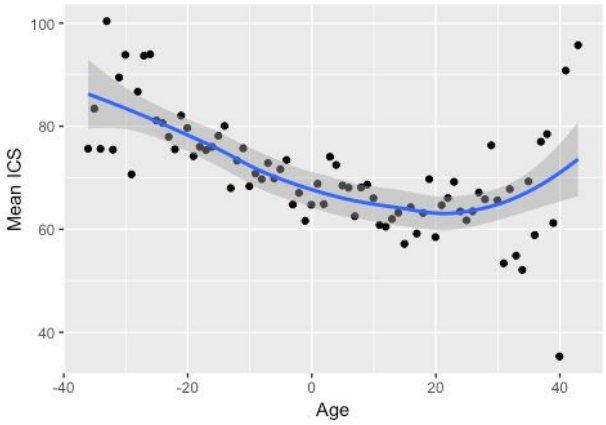

Figure 3: Mean ICS at every year of age

We also centered the age of household head at the mean age of 53.39 and the number of adults in the household at 4. Quadratic format of age was implemented based on its relationship with ICS (Figure 3).

To further explore how household characteristics affect the trend of consumer attitude, we conducted exploratory analysis in which eight categorical covariates were re-coded to form distinguishable categories in terms of its effect on consumer attitude (Table 2).

Variable Description	Level 1	Level 2	Level 3
Gender	Female	Male*	
Education	Below: Grade 0-12 with no high school diploma	Grade 0-12 with High school diploma*	Above: Grade 13-17 with at least some college
Marital status	Married	Unmarried*	
Attitude on government economic policy	Negative: Government is doing a poor job	Neutral*: Government if doing fair	Positive: Government is doing a poor job
Region of residence	West: Pacific, Mountain	Central*: East North Central, West North Central, East South Central, West South Central	East: Mid-Atlantic, South-Atlantic, New England
News heard of changes in business conditions	Unfavorable: Heard of unfavorable changes in business conditions	Neutral*: Heard of new changes	Favorable: Heard of favorable changes in business conditions
Own/rent home	Non-homeowner	Homeowner*	
Race	Non-Hispanic Black	Non-Hispanic White*	Other

Reference level is indicated with *

Table 2: Levels of categorical variables

Furthermore, taking household as the decision-making unit, we used the household weights accounting for multiple phone-line ownership to yield a representative sample of all U.S. households.

Simple Linear Regression Model Without Interaction Terms

Since the interest of study is the relationship between time and consumer attitude, we chose the simple linear regression model as an ample method of determining the extent to which there is a relationship. In order to determine the trend of consumer attitude over time, we fitted a simple linear regression model, using the software RStudio, with ICS as the dependent variable and the squared term of month as the independent variable.

Not only may the consumer attitude have been affected by specific months during the Great Recession, but there may have been other factors that have an influence on the consumer attitude. Thus, we added all other covariates of interest to our model (full list shown in Appendix B). Not only did this help us answer our research question in depth, but it also strengthened our model fitting.

Simple Linear Regression Model With Interaction Terms

Since the simple linear regression model without interaction term resulted in significant trends of consumer attitude over time (in addition to significant correlation between consumer attitude and other covariates), we moved forward to fit a simple linear regression model with interaction terms to study whether the association between selected covariates and consumer attitude is significantly different at the beginning and end of the Great Recession.

We selected the two covariates (attitude towards government economic policy and race) that have the highest correlation with ICS to study the interaction. As the Great Recession was a financially damaging event, we felt that the annual household income would be an important additional covariate to analyze. Thus, we added these three interaction terms to our simple linear regression model.

Results

The relevant results of our models can be found in Table 3, referencing variable descriptions explained in Tables 1 and 2. The outcome of fitting a simple linear regression model for our merged dataset showed evidence of significant effect of the Great Recession on consumer attitude. Specifically, during the beginning months of the Great Recession, consumer attitude

was negatively affected while towards the end of the Great Recession, consumer attitude was more positive and was increasing. We also found that demographics and other attributes of a consumer can help explain the impact of the Great Recession on consumption attitudes. We found that the household characteristics of marital status and region of residence were not significantly correlated with consumer attitude.

While there were many factors that significantly affected the consumer attitude during the Great Recession in an intuitive way (i.e. higher income, less adults, higher education, positive attitude towards government policy and favorable news resulted in higher consumer attitude), being a homeowner and having smaller number of kids led to lower consumer attitude. We can infer that this may be because if someone who owns a home was obliged to continue with monthly payments during a financial crisis, this would cause frustration and dissatisfaction, so their consumption attitude would be negatively affected by the Great Recession. In regards to smaller number of kids leading to lower consumer attitude, we can reason that having more children elicited more positive attitudes, and these positive attitudes outweighed the financial stress of the Great Recession.

It is notable that the attitude towards government policy and race are highly correlated with consumer attitude. Households with positive attitudes toward government policies during the Great Recession had higher consumption attitude by about 30 units (on average) compared to those with negative attitudes toward government policies. Moreover, we found that the positive attitudes towards government policy had a smaller effect on consumer attitudes at the end of the Great Recession than at the beginning, while negative attitudes towards government policy had the contrary. In addition, we observed that non-Hispanic Black had the highest consumer attitude

while non-Hispanic White had the lowest consumer attitude. Overall, however, the effect of race is not significantly different between the beginning and the end of the Great Recession.

Finally, the value of the R-square statistic in a simple linear regression model increased from 0.01235 when only the effect of the Great Recession is considered to 0.206 when all covariates and interaction terms were included. This increase in the R-square value suggests that adding covariates helped explain the variability in consumer attitude.

Variable	**Estimate** * indicates significance at the 95% confidence level		
	Simple Linear Regression Model with month as the only covariate	**Simple Linear Regression Model including all covariates and excluding interaction terms**	**Simple Linear Regression Model with interaction terms and all covariates**
intercept	67.03685*	61.6688723*	61.2879017*
Month (squared)	0.37466*	0.38563941*	0.39342568*
Age (squared)	-	0.01461834*	0.01471182*
Gender (female)	-	-5.4163289*	-5.3250979*
Number of kids	-	1.52550346*	1.46023687*
Number of adults	-	-2.3713836*	-2.4234845*
Income (log transformed)	-	5.47592156*	5.72374393*
Below-level education	-	-6.4088122*	-6.3695471*
Above-level education	-	2.31177639*	2.080260
Marital status (unmarried)	-	0.57686257*	0.784644
Government policy (positive)	-	12.8953005*	16.858055*
Government policy (negative)	-	-18.048858*	-16.248501*
News heard (unfavorable)	-	-6.3838857*	-6.163902*
News heard (favorable)	-	8.98944284*	9.981349*
Non-homeowner	-	4.8666429*	4.817498*
Non-Hispanic Black	-	10.9363444*	11.113501*
Race other than non-Hispanic Black/White	-	4.16678904*	3.640945*
Region (West)	-	2.33642437	2.144043
Region (East)	-	-0.9348433	-0.940534

Interaction with time (0 beginning of the Great Recession, 1 end of the Great Recession):			
time:income	-	-	-0.733309
time:government policy (positive attitude)	-	-	-9.997761*
time:government policy (negative attitude)	-	-	-6.813411*
time:race (Non-Hispanic Black)	-	-	0.039346
time:race (race other than non-Hispanic Black/White)	-	-	1.856382
R-squared	*0.01235*	*0.2012*	*0.206*
F-statistic	*75.61*	*71.65*	*57.71*
p-value	*< 2.2e-16**	*< 2.2e-16**	*< 2.2e-16**

Table 3: Comparison of simple linear regression model with "month" as the only covariate, simple linear regression model including all covariates and excluding interaction terms, and simple linear regression model with interaction terms and all covariates.

Figure 4 shows the model diagnostics of the third model with interaction terms. According to the Q-Q plot, there is no obvious departure from the normality assumption of residuals. The constant variance assumption is also confirmed based on the relationship between residuals and fitted values.

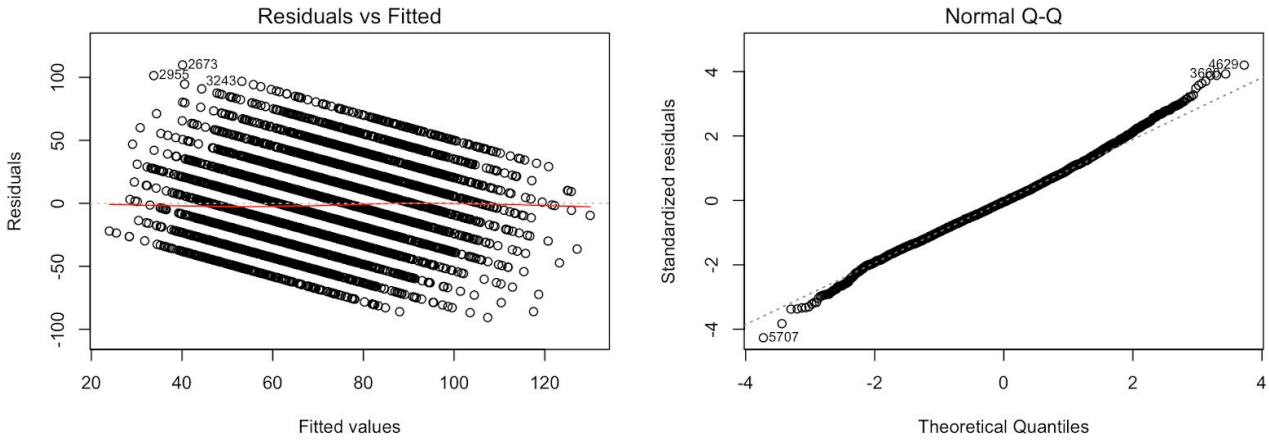

Figure 4: Residual diagnostics for simple linear regression model with interaction terms and all covariates

Conclusion

Overall, the results of our analyses show that the U.S. Great Recession significantly affected consumer attitudes. The results of our analyses support the findings in the literature regarding the fact that the behavior of consumer attitudes and values in the United States are affected by the Great Recession. Moreover, we conclude that time (i.e. beginning vs. end of the Great Recession) significantly affected consumer attitude. In particular, the beginning of the Great Recession had a negative impact on consumer attitude. On the other hand, the end of the Great Recession had a positive impact, likely due to positive attitudes caused by the decrease of financial burdens. Additionally, certain household characteristics – such as being a homeowner and having a smaller number of kids – yielded more negative consumer attitudes. Attitudes toward government economic policies had a stronger correlation with consumer attitudes at the end of the Great Recession than it did in the beginning, which shows the importance of government policy in increasing consumer attitudes and in disentangling the financial crisis during that time.

Finally, one limitation of this study is that the reported income was asked in "current" dollars; however, this value is very likely to be altered due to the financial crisis. This might cause inaccurate results on the effect of household income on consumer attitude. Also, the data used in this study were collected using CATI, which would require all respondents to own a telephone and a phone plan. However, in the thick of a financial crisis, it is not guaranteed that all households would possess telephones nor is it guaranteed that they would be willing to sacrifice the cost of minutes spent on the phone.

References

Benhabib, J., & Spiegel, M. M. (2018). Sentiments and Economic Activity: Evidence from US States. The Economic Journal, 129(618), 715–733. doi: 10.1111/ecoj.12605

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Appendix A: Questionnaire Items Deriving ICS (Curtin, n.d.)

The Index of Consumer Sentiment is derived from the following five questions:

x_1 = "We are interested in how people are getting along financially these days. Would you say that you (and your family living there) are better off or worse off financially than you were a year ago?"

x_2 = "Now looking ahead--do you think that a year from now you (and your family living there) will be better off financially, or worse off, or just about the same as now?"

x_3 = "Now turning to business conditions in the country as a whole--do you think that during the next twelve months we'll have good times financially, or bad times, or what?"

x_4 = "Looking ahead, which would you say is more likely--that in the country as a whole we'll have continuous good times during the next five years or so, or that we will have periods of widespread unemployment or depression, or what?"

x_5 = "About the big things people buy for their homes--such as furniture, a refrigerator, stove, television, and things like that. Generally speaking, do you think now is a good or bad time for people to buy major household items?"

Appendix B: Table of Covariates

Label in R	**Variable Description**
month_sq	Month (squared)
time	Beginning/End of the Great Recession
age_sq	Age of respondent (squared)
SEX	Gender of respondent
NUMKID	Number of children <18 in household
numadt	Number of adults 18+ in household
income	Total household income in current dollars (log transformed)
educ	Education of respondent
marry	Marital status of respondent
govt	Attitude on government economic policy
region	Region of residence
news	News heard of changes in business conditions
homeown	Own/rent home
race	Race
WT_HH	Household weight

Appendix C: Additional Figures and Results Tables

Distribution of the dependent variable ICS indicates that there is no need to do any transformation on ICS.

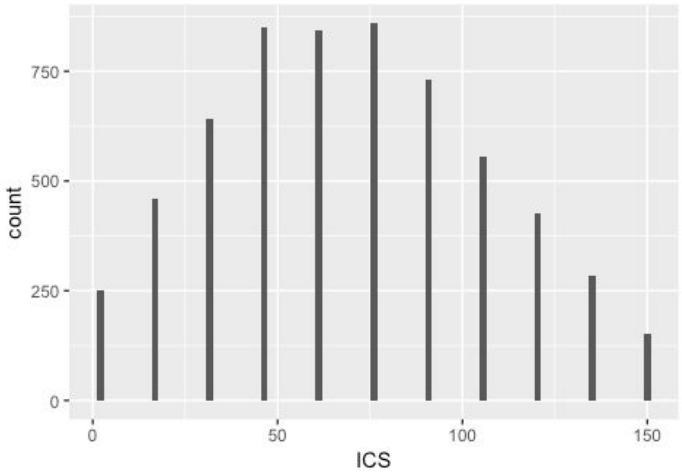

Figure 5: Response Variable ICS: normally distributed

Residual Diagnostics for the other models:

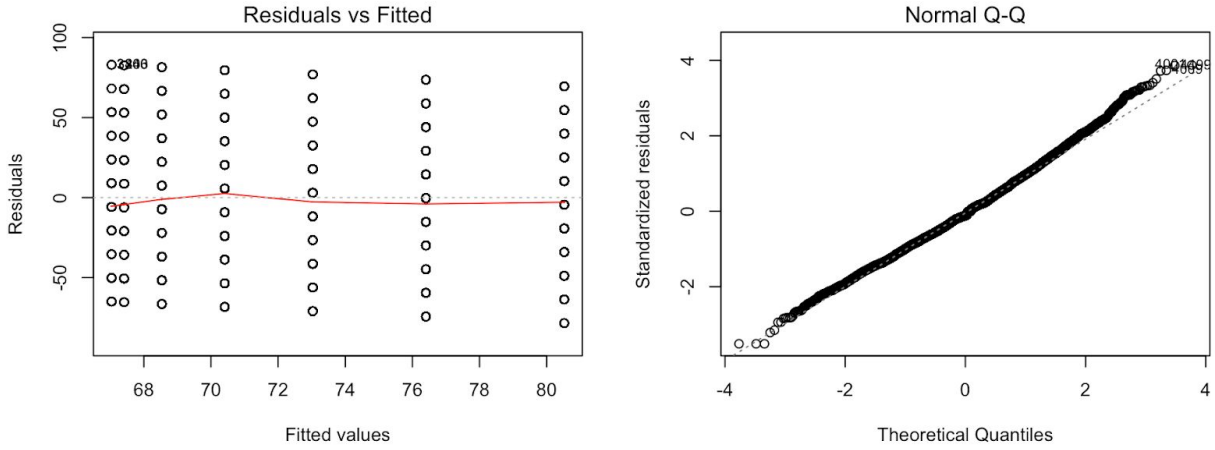

Figure 6: Residual diagnostics for simple linear regression model with "month" as the only covariate

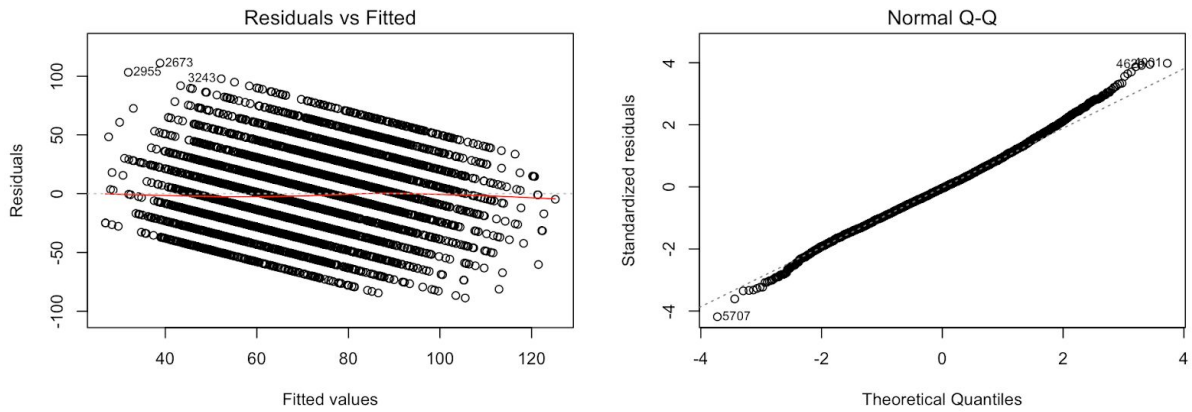

Figure 7: Residual diagnostics for simple linear regression model including all covariates and excluding interaction terms

Appendix D: R Codes

```
#6-month data at the beginning of the recession
oct07<-da35402.0001
nov07<-da35403.0001
dec07<-da35404.0001
jan08<-da35405.0001
feb08<-da35406.0001
mar08<-da35407.0001

#6-month data at the end of the recession
mar09<-da35419.0001
apr09<-da35420.0001
may09<-da35421.0001
jun09<-da35422.0001
jul09<-da35423.0001
aug09<-da35424.0001

library(tidyverse)
library(lme4)
library(Hmisc)

#stack the data for first and last six month of the recession separately with selected covariates
DATA <- list(oct07,nov07,dec07,jan08,feb08,mar08,mar09,apr09,may09,jun09,jul09,aug09)
FRAME<-data.frame()
SELECTION<-function(DATA,i){
  for (data in DATA) {
    sele<-dplyr::select(data,NUMKID,MARRY,NUMADT,INCOME,NEWS1,GOVT,EDUC,SE
    X,AGE,HOMEOWN,RACE,REGION9,ICS,WT_HH)
    sele$month<-rep(i,nrow(sele))
    FRAME<-rbind(FRAME,sele)
    i=i+1
  }
  return(FRAME)
}
stacked <- SELECTION(DATA,i=-6)

# Variables Transformation
#square month
stacked$month_sq <- stacked$month^2
#resclae weights so that the sum of weights euqal to 500 for each month
for (i in -6:5) {
  stacked$WT_HH[stacked$month==i] <-
    stacked$WT_HH[stacked$month==i]*(500/length(which(stacked$month==i)))
}
```

```
#center and square age
stacked$age<-stacked$AGE-mean(stacked$AGE,na.rm=TRUE)
stacked$age_sq<-stacked$age^2
#center number of adults
stacked$numadt<-stacked$NUMADT-4
#recode based on codebook
stacked$NUMKID[which(stacked$NUMKID==96)]<-0
#log transform and center income
stacked$income<-log(stacked$INCOME+1)-mean(log(stacked$INCOME+1),na.rm=TRUE)
#recode categorical variables
stacked <- stacked %>%
 mutate(educ=case_when(
  EDUC=="(1) Grade 0-8 no high school diploma" | EDUC=="(2) Grade 9-12 no high school
       diploma" ~ 1,
  EDUC=="(3) Grade 0-12 with high school diploma" ~ 0,
  EDUC=="(4) Grade 13-17 with some college"|EDUC=="(5) Grade 13-16 with bachelors
       degree"|EDUC=="(6) Grade 17 with college degree" ~ 2
 )) %>%
 mutate(marry=case_when(
  MARRY %in% c("(3) Divorced","(4) Widowed","(5) Never married")~0,
  MARRY %in% c("(2) Separated",
           "(6) Married, but spouse away in service; in nursing home, or living in a separate
       location",
           "(1) Married (Living with a partner)")~1
 )) %>%
 mutate(news=case_when(
  grepl("UNFAV",NEWS1)==TRUE ~ 1,
  grepl("FAV",NEWS1)==TRUE ~ 2,
  grepl("(00)",NEWS1)==TRUE ~ 0
 ))  %>%
 mutate(homeown=case_when(
  HOMEOWN=="(1) Owns or is buying" ~ 0,
  HOMEOWN!="(1) Owns or is buying" ~ 1
 ))  %>%
 mutate(region=case_when(
  REGION9 %in% c("(9) Pacific","(8) Mountain") ~ 1,
  REGION9 %in% c("(3) East North Central","(4) West North Central","(6) East South
       Central","(7) West South Central") ~ 2,
  REGION9 %in% c("(2) Mid-Atlantic","(5) South-Atlantic","(1) New England") ~ 3
 )) %>%
 mutate(race=case_when(
  RACE=="(1) WHITE EXCEPT HISPANIC" ~ 0,
  RACE=="(2) BLACK EXCEPT HISPANIC" ~ 1,
  RACE!="(1) WHITE EXCEPT HISPANIC" & RACE!="(2) BLACK EXCEPT
       HISPANIC"~2
```

```
  )) %>%
  mutate(govt=ifelse(GOVT=="(3) Only fair",0,GOVT)) %>%
  mutate(time=case_when(
    month <=1 ~ 0,
    month >=0 ~ 1
  ))
#Data Exploration
#check the distribution of ICS: almost normally distributed
ggplot(stacked,aes(x=ICS))+
  geom_bar()
#descriptive statistics of continuous covariates (mean, range, number of obs)
stacked %>% select(AGE,INCOME,NUMKID,NUMADT) %>% describe()
#check the relationship between ICS and selected covariates
#month
stacked %>%
  group_by(month) %>%
  summarise(Mean_ICS=mean(ICS)) %>%
  ggplot(aes(month,Mean_ICS))+
  geom_point()+
  ylab("Mean ICS")+
  xlab("Month")+
  geom_smooth()
#AGE: Distribution before & after centering
ggplot(stacked)+
  geom_bar(aes(x=age))+
  geom_bar(aes(x=AGE),color="light blue")
#AGE: relationship with ICS
stacked %>%
  dplyr::select(age,ICS) %>%
  group_by(age) %>%
  summarise(Mean_ICS=mean(ICS,na.rm=TRUE)) %>%
  ggplot(aes(x=age,y=Mean_ICS))+
  geom_point()+
  ylab("Mean ICS")+
  xlab("Age")+
  geom_smooth()
#NUMKID
ggplot(stacked,aes(x=NUMKID,y=ICS))+
  geom_jitter(alpha=0.3)
stacked %>%
  select(NUMKID,ICS) %>%
  group_by(NUMKID) %>%
  summarise(Mean_ICS=mean(ICS,na.rm=TRUE)) %>%
  ggplot(aes(x=NUMKID,y=Mean_ICS))+
  geom_point()
```

```
#INCOME
stacked %>%
  dplyr::select(income,ICS) %>%
  group_by(income) %>%
  summarise(Mean_ICS=mean(ICS,na.rm=TRUE)) %>%
  ggplot(aes(x=income,y=Mean_ICS))+
  geom_point()+
  ylab("Mean ICS")+
  xlab("centered log(income+1)")+
  geom_smooth()
#NUMADT
stacked %>%
  select(numadt,ICS) %>%
  group_by(numadt) %>%
  summarise(Mean_ICS=mean(ICS,na.rm=TRUE)) %>%
  ggplot(aes(x=numadt,y=Mean_ICS))+
  geom_point()+
  geom_smooth(method = "lm")

#Simple Linear Regression
stacked.1 <- lm(ICS~month_sq,
            data = stacked,
            weights = WT_HH)
stacked.2 <-
          lm(ICS~month_sq+age_sq+SEX+NUMKID+numadt+income+factor(educ)+marry+facto
          r(govt)+factor(news)+factor(homeown)+factor(race)+factor(region),
             data = stacked,
             weights = WT_HH)
summary(stacked.1)
summary(stacked.2)
#add interaction term
stacked.3 <-
          lm(ICS~month_sq+age_sq+SEX+NUMKID+numadt+income+time:income+factor(educ)
          +marry+factor(govt)+time:factor(govt)+factor(news)+factor(homeown)+factor(race)+tim
          e:factor(race)+factor(region),
              data = stacked,
              weights = WT_HH)
summary(stacked.3)
#diagnostics
plot(stacked.1)
plot(stacked.2)
plot(stacked.3)
par(mfrow=c(2,2))
```