# Appendix: Source code

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```
knitr::opts_chunk$set(echo = TRUE)
rm(list = ls())
gc()
```

```
##          used (Mb) gc trigger (Mb) max used (Mb)
## Ncells 475832 25.5    1027322 54.9   664394 35.5
## Vcells 891121  6.8    8388608 64.0  1814579 13.9
```

```
set.seed(1)
options(digits=6)
if (!require("pacman")) install.packages("pacman")
```

```
## Loading required package: pacman
```

```
pacman::p_load(
  plm,
  ggplot2,
  tidyverse,
  fixest,
  knitr,
  kableExtra,
  tidymodels,
  modelsummary,
  ggplot2,
  skimr
)
```

**Data**

```
orig_df <- read_csv("./input/WSDR.csv")
```

```
## Rows: 15600 Columns: 9
## -- Column specification --------------------------------------------------------
## Delimiter: ","
## chr (1): descrip
## dbl (8): store, upc, week, move, price, profit, custcoun, Brand
##
## i Use `spec()` to retrieve the full column specification for this data.
## i Specify the column types or set `show_col_types = FALSE` to quiet this message.
```

```
head(orig_df, 30)
```

```
## # A tibble: 30 x 9
##    store        upc  week  move  price profit descrip             custcoun Brand
##    <dbl>      <dbl> <dbl> <dbl>  <dbl>  <dbl> <chr>                  <dbl> <dbl>
##  1     5 1200000230     1   158 0.0250  20.1  PEPSI COLA N/R         18820 12000
##  2     5 1200000394     1    47 0.0195   4.02 PEPSI COLA N.R. BO~    18820 12000
##  3     5 1200000396     1    43 0.0195   4.02 DIET PEPSI N.R. BO~    18820 12000
##  4     5 1200000492     1    49 0.0250  20.1  CAFFEINE FREE PEPSI     18820 12000
##  5     5 1200000496     1    61 0.0250  20.1  DIET PEPSI CAFFEINE     18820 12000
##  6     5 3828100261     1    66 0.0208  33.6  DOM ORANGE SODA         18820 38281
##  7     5 4900000634     1    28 0.0388  22.9  COCA-COLA CLASSIC ~     18820 49000
##  8     5 4900000639     1   109 0.0250  20.1  COCA-COLA CLASSIC       18820 49000
##  9     5 4900000658     1    12 0.0388  22.9  COKE DIET CANS          18820 49000
## 10     5 5490000060     1   118 0.0176  13.4  DR PEPPER               18820 54900
## # i 20 more rows
```

## Answer to Q1

```
### Q1 Answer ###
stats <- orig_df %>%
  dplyr::select(move,price, profit, custcoun) %>%
  skimr::skim(.) %>%
  skimr::yank("numeric") %>%
  dplyr::select(skim_variable, mean, sd, p0, p100) %>%
  dplyr::mutate_at(vars(mean, sd, p0, p100), ~round(., 3)) %>%
  kable(format = "latex")
print(stats)
```

```
##
## \begin{tabular}{l|r|r|r|r}
## \hline
## skim\_variable & mean & sd & p0 & p100\\
## \hline
## move & 132.106 & 263.430 & 1.000 & 6121.00\\
## \hline
## price & 0.024 & 0.007 & 0.008 & 0.04\\
## \hline
## profit & 20.357 & 13.068 & 0.000 & 95.65\\
## \hline
## custcoun & 19154.180 & 4857.582 & 8071.000 & 35340.00\\
## \hline
## \end{tabular}
```

## Answer to Q2

```
### Q2 Answer ###

# to factor
```

```r
df <- orig_df |>
  mutate(upc = factor(upc))

# compute market share
df <- df |>
  dplyr::group_by(store, week) |>
  mutate(M_t = sum(custcoun),
         tot_quant_t = sum(move),
         s_jt = move / M_t,
         s_0t = (M_t- tot_quant_t) / M_t,
         logit_share = log(s_jt/s_0t)) |>
  ungroup() |>
  select(-c(M_t, tot_quant_t))

# compute iV
df <- df |>
  mutate(whole_p_jt = price * (1 - profit))

# OLS estimation in Berry's logit
model1_OLS <- feols(logit_share ~  price + i(upc),
               df, vcov="hetero"
)

# IV estimation in Berry's logit
model1_IV <- feols(logit_share ~  i(upc) | price ~ whole_p_jt,
               df, vcov="hetero"
)

# First stage
etable(model1_IV, stage = 1, fitstat=~ . + ivfall + ivwaldall.p,
       signif.code=c("***"=0.01,"**"=0.05,"*"=0.10),
       style.tex = style.tex("aer"),  tex = TRUE,
       digits=3, digits.stats=3)
```

```
## \begingroup
## \centering
## \begin{tabular}{lc}
##    \toprule
##                             & price\\
##                             & (1)\\
##    \midrule
##    Constant                 & 0.019$^{***}$\\
##                             & (0.0001)\\
##    whole\_p\_jt             & -0.006$^{***}$\\
##                             & (0.0002)\\
##    upc $=$ 1200000394       & 0.003$^{***}$\\
##                             & (0.0001)\\
##    upc $=$ 1200000396       & 0.003$^{***}$\\
##                             & (0.0001)\\
##    upc $=$ 1200000492       & 0.0003$^{**}$\\
##                             & (0.0001)\\
##    upc $=$ 1200000496       & 0.0003$^{**}$\\
##                             & (0.0001)\\
```

```
##    upc $=$ 3828100261      & -0.004$^{***}$\\
##                            & (0.0001)\\
##    upc $=$ 4900000634      & 0.012$^{***}$\\
##                            & (0.0002)\\
##    upc $=$ 4900000639      & $3.88\times 10^{-5}$\\
##                            & (0.0001)\\
##    upc $=$ 4900000658      & 0.012$^{***}$\\
##                            & (0.0002)\\
##    upc $=$ 5490000060      & $-1.58\times 10^{-5}$\\
##                            & (0.0001)\\
##     \\
##    Observations            & 15,600\\
##    R$^2$                   & 0.656\\
##    Adjusted R$^2$          & 0.656\\
##    F-test (IV only)        & 1,525.2\\
##    Wald (IV only), p-value & $2.37\times 10^{-174}$\\
##    \bottomrule
## \end{tabular}
## \par\endgroup
```

```
# Estimation result
etable(model1_OLS, model1_IV, stage = 2, fitstat=~ . + ivfall + ivwaldall.p,
       signif.code=c("***"=0.01,"**"=0.05,"*"=0.10),
       style.tex = style.tex("aer"),  tex = TRUE,
       digits=3, digits.stats=3)
```

```
## \begingroup
## \centering
## \begin{tabular}{lcc}
##    \toprule
##     & \multicolumn{2}{c}{logit\_share}\\
##                            & (1)            & (2)\\
##    \midrule
##    Constant                & -3.54$^{***}$  & -5.37$^{***}$\\
##                            & (0.033)        & (0.118)\\
##    price                   & -156.0$^{***}$ & -68.6$^{***}$\\
##                            & (1.34)         & (5.75)\\
##    upc $=$ 1200000394      & -1.56$^{***}$  & -1.84$^{***}$\\
##                            & (0.022)        & (0.035)\\
##    upc $=$ 1200000396      & -1.93$^{***}$  & -2.22$^{***}$\\
##                            & (0.022)        & (0.035)\\
##    upc $=$ 1200000492      & -1.23$^{***}$  & -1.28$^{***}$\\
##                            & (0.022)        & (0.028)\\
##    upc $=$ 1200000496      & -1.20$^{***}$  & -1.26$^{***}$\\
##                            & (0.021)        & (0.027)\\
##    upc $=$ 3828100261      & -1.01$^{***}$  & -0.771$^{***}$\\
##                            & (0.025)        & (0.030)\\
##    upc $=$ 4900000634      & 0.783$^{***}$  & -0.476$^{***}$\\
##                            & (0.032)        & (0.091)\\
##    upc $=$ 4900000639      & -0.300$^{***}$ & -0.300$^{***}$\\
##                            & (0.020)        & (0.026)\\
##    upc $=$ 4900000658      & 0.575$^{***}$  & -0.684$^{***}$\\
##                            & (0.033)        & (0.091)\\
##    upc $=$ 5490000060      & -2.09$^{***}$  & -2.12$^{***}$\\
```

```
##                            & (0.021)        & (0.027)\\
##     \\
##    Observations            & 15,600         & 15,600\\
##    R$^2$                   & 0.679          & 0.584\\
##    Adjusted R$^2$          & 0.679          & 0.583\\
##    F-test (IV only)        &                & 131.8\\
##    Wald (IV only), p-value &                & $1.27\times 10^{-32}$\\
##    \bottomrule
## \end{tabular}
## \par\endgroup
```