

project restart

2025-04-01

```
setwd("C:/Users/conan/OneDrive/Desktop/FinalProject_ArmstrongTeam")
```

```
# Instructor: set your working directory here
```

```
library(tidyverse)
```

```
file_path <- "Data/2018-19_pbp.csv"
```

```
nba_pbp <- read_csv(file_path)
```

```
## New names:
## Rows: 582468 Columns: 34
## -- Column specification
## ----- Delimiter: "," chr
## (17): GAME_ID, HOMEDESCRIPTI... dbl
## (14): ...1, EVENTMSGACTIONTY... lgl
## (1): NEUTRALDESCRIPTION time (2):
## PCTIMESTRING, WCTIMEST...
## 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.
## * ' -> '...1'
```

```
head(nba_pbp)
```

```
## # A tibble: 6 x 34
##   ...1 EVENTMSGACTIONTYPE
##   <dbl>                  <dbl>
## 1     0                      0
## 2     1                      0
## 3     2                      1
## 4     3                      6
## 5     4                      2
## 6     5                     10
## # i 32 more variables:
## #   EVENTMSGTYPE <dbl>,
## #   EVENTNUM <dbl>, GAME_ID <chr>,
## #   HOMEDESCRIPTION <chr>,
## #   NEUTRALDESCRIPTION <lgl>,
## #   PCTIMESTRING <time>,
## #   PERIOD <dbl>, ...
```

create made column

```
nba_pbp <- nba_pbp %>%
  mutate(
    ft_text = coalesce(HOMEDESCRIPTION, VISITORDESCRIPTION),
    made = case_when(
      str_detect(ft_text, "MISS") ~ FALSE,
      str_detect(ft_text, "Free Throw") ~ TRUE,
      TRUE ~ NA
    )
  )
```

```
nba_pbp %>%
  filter(EVENTMSGTYPE == 3) %>%
  select(GAME_ID, EVENTNUM, PLAYER1_NAME, PERIOD, PCTIMESTRING, HOMEDESCRIPTION, VISITORDESCRIPTION, ft_text)
View()
```

All rows with a MISS FT contain n/a values for score margin. This is because the score isn't updated with a MISS

view table to verify plays are in chronological order

```
nba_pbp %>%
  filter(GAME_ID == "0021800001") %>% # replace with any GAME_ID you want to inspect
  arrange(EVENTNUM) %>%
  select(GAME_ID, EVENTNUM, PERIOD, PCTIMESTRING, SCORE, HOMEDESCRIPTION, VISITORDESCRIPTION) %>%
  head(50)
```

```
## # A tibble: 50 x 7
##   GAME_ID   EVENTNUM PERIOD
##   <chr>       <dbl> <dbl>
## 1 0021800001         2     1
## 2 0021800001         4     1
## 3 0021800001         7     1
## 4 0021800001         8     1
## 5 0021800001        10     1
## 6 0021800001        11     1
## 7 0021800001        12     1
## 8 0021800001        14     1
## 9 0021800001        16     1
## 10 0021800001        17     1
## # i 40 more rows
## # i 4 more variables:
## #   PCTIMESTRING <time>,
## #   SCORE <chr>,
## #   HOMEDESCRIPTION <chr>,
## #   VISITORDESCRIPTION <chr>
```

Forward-fill the SCORE within each game

```
nba_pbp_scored <- nba_pbp %>%
  arrange(GAME_ID, EVENTNUM) %>%
  group_by(GAME_ID) %>%
```

```
mutate(SCORE_filled = zoo::na.locf(SCORE, na.rm = FALSE)) %>%
ungroup()
```

update scoremargin

```
nba_pbp_scored <- nba_pbp_scored %>%
  mutate(
    score_home = as.numeric(str_extract(SCORE_filled, "[0-9]+")),
    score_away = as.numeric(str_extract(SCORE_filled, "[0-9]+$")),
    score_margin_calc = score_home - score_away
  )
```

verify:

```
nba_pbp_scored %>%
  select(GAME_ID, EVENTNUM, SCORE, SCORE_filled, score_home, score_away, score_margin_calc) %>%
  head(20)
```

```
## # A tibble: 20 x 7
##   GAME_ID   EVENTNUM SCORE
##   <chr>         <dbl> <chr>
## 1 0021800001         2 <NA>
## 2 0021800001         4 <NA>
## 3 0021800001         7 <NA>
## 4 0021800001         8 <NA>
## 5 0021800001        10 <NA>
## 6 0021800001        11 <NA>
## 7 0021800001        12 <NA>
## 8 0021800001        14 <NA>
## 9 0021800001        16 <NA>
## 10 0021800001        17 2 - 0
## 11 0021800001        19 <NA>
## 12 0021800001        20 <NA>
## 13 0021800001        21 <NA>
## 14 0021800001        22 <NA>
## 15 0021800001        23 <NA>
## 16 0021800001        24 <NA>
## 17 0021800001        25 <NA>
## 18 0021800001        26 <NA>
## 19 0021800001        27 <NA>
## 20 0021800001        28 <NA>
## # i 4 more variables:
## #   SCORE_filled <chr>,
## #   score_home <dbl>,
## #   score_away <dbl>,
## #   score_margin_calc <dbl>
```

verify

```
nba_pbp_scored %>%
  filter(GAME_ID == "0021800001") %>% # You can change this to any GAME_ID you want
  arrange(EVENTNUM) %>%
```

```
select(EVENTNUM, PERIOD, PCTIMESTRING,
       HOMEDESCRIPTION, VISITORDESCRIPTION,
       SCORE, SCORE_filled, score_home, score_away, score_margin_calc) %>%
head(100)
```

```
## # A tibble: 100 x 10
##   EVENTNUM PERIOD PCTIMESTRING
##   <dbl>   <dbl> <time>
## 1         2     1 12:00
## 2         4     1 12:00
## 3         7     1 11:40
## 4         8     1 11:40
## 5        10     1 11:15
## 6        11     1 11:13
## 7        12     1 11:08
## 8        14     1 11:03
## 9        16     1 10:58
## 10       17     1 10:55
## # i 90 more rows
## # i 7 more variables:
## #   HOMEDESCRIPTION <chr>,
## #   VISITORDESCRIPTION <chr>,
## #   SCORE <chr>, SCORE_filled <chr>,
## #   score_home <dbl>,
## #   score_away <dbl>, ...
```

```
View(nba_pbp_scored)
```

Create the clutch column

```
nba_pbp_scored <- nba_pbp_scored %>%
  mutate(
    pct_seconds = as.numeric(PCTIMESTRING),
    clutch = case_when(
      PERIOD == 4 & !is.na(pct_seconds) & pct_seconds <= 300 & abs(score_margin_calc) <= 5 ~ 1,
      PERIOD > 4 & abs(score_margin_calc) <= 5 ~ 1,
      TRUE ~ 0
    )
  )
```

```
nba_pbp_scored %>%
  filter(EVENTMSGTYPE == 3, str_detect(coalesce(HOMEDESCRIPTION, VISITORDESCRIPTION), "MISS"), clutch == 1) %>%
  select(GAME_ID, EVENTNUM, PERIOD, PCTIMESTRING, SCORE, SCORE_filled, score_margin_calc, HOMEDESCRIPTION, VISITORDESCRIPTION) %>%
  head(10)
```

```
## # A tibble: 10 x 9
##   GAME_ID   EVENTNUM PERIOD
##   <chr>       <dbl>   <dbl>
## 1 0021800006     734     4
## 2 0021800006     742     4
## 3 0021800028     701     4
## 4 0021800028     708     4
```

```
## 5 0021800030      716      4
## 6 0021800032      748      4
## 7 0021800046      789      5
## 8 0021800046      793      5
## 9 0021800048      713      5
## 10 0021800048      719      5
## # i 6 more variables:
## #   PCTIMESTRING <time>,
## #   SCORE <chr>, SCORE_filled <chr>,
## #   score_margin_calc <dbl>,
## #   HOMEDESCRIPTION <chr>,
## #   VISITORDESCRIPTION <chr>
```

verify:

```
nba_pbp_scored %>%
  filter(EVENTMSGTYPE == 3) %>%
  select(GAME_ID, clutch, EVENTNUM, PERIOD, PCTIMESTRING, SCORE_filled, score_margin_calc, HOMEDESCRIPTION, VISITORDESCRIPTION)
View()
```

```
glimpse(nba_pbp_scored)
```

```
## Rows: 582,468
## Columns: 42
## $ ...1 <dbl> 0~
## $ EVENTMSGACTIONTYPE <dbl> 0~
## $ EVENTMSGTYPE <dbl> 1~
## $ EVENTNUM <dbl> 2~
## $ GAME_ID <chr> "~
## $ HOMEDESCRIPTION <chr> N~
## $ NEUTRALDESCRIPTION <lg1> N~
## $ PCTIMESTRING <time> ~
## $ PERIOD <dbl> 1~
## $ PERSON1TYPE <dbl> 0~
## $ PERSON2TYPE <dbl> 0~
## $ PERSON3TYPE <dbl> 0~
## $ PLAYER1_ID <dbl> 0~
## $ PLAYER1_NAME <chr> N~
## $ PLAYER1_TEAM_ABBREVIATION <chr> N~
## $ PLAYER1_TEAM_CITY <chr> N~
## $ PLAYER1_TEAM_ID <dbl> N~
## $ PLAYER1_TEAM_NICKNAME <chr> N~
## $ PLAYER2_ID <dbl> 0~
## $ PLAYER2_NAME <chr> N~
## $ PLAYER2_TEAM_ABBREVIATION <chr> N~
## $ PLAYER2_TEAM_CITY <chr> N~
## $ PLAYER2_TEAM_ID <dbl> N~
## $ PLAYER2_TEAM_NICKNAME <chr> N~
## $ PLAYER3_ID <dbl> 0~
## $ PLAYER3_NAME <chr> N~
## $ PLAYER3_TEAM_ABBREVIATION <chr> N~
## $ PLAYER3_TEAM_CITY <chr> N~
## $ PLAYER3_TEAM_ID <dbl> N~
```

```
## $ PLAYER3_TEAM_NICKNAME      <chr> N~
## $ SCORE                      <chr> N~
## $ SCOREMARGIN                <chr> N~
## $ VISITORDESCRIPTION         <chr> N~
## $ WCTIMESTRING               <time> ~
## $ ft_text                    <chr> N~
## $ made                       <lgl> N~
## $ SCORE_filled               <chr> N~
## $ score_home                 <dbl> N~
## $ score_away                 <dbl> N~
## $ score_margin_calc          <dbl> N~
## $ pct_seconds                <dbl> 4~
## $ clutch                     <dbl> 0~
```

final data set

```
ft_all <- nba_pbp_scored %>%
  filter(EVENTMSGTYPE == 3) %>%
  select(
    GAME_ID, EVENTNUM, PERIOD, PCTIMESTRING,
    PLAYER1_NAME, PLAYER1_ID, PLAYER1_TEAM_ABBREVIATION, PLAYER1_TEAM_ID, PLAYER1_TEAM_CITY, PLAYER1_TEAM_NICKNAME,
    made, clutch,
    SCORE_filled, score_home, score_away, score_margin_calc,
    HOMEDESCRIPTION, VISITORDESCRIPTION,

    everything()
  )
```

verify:

```
View(ft_all)
```

```
ft_all %>%
  filter(!is.na(made)) %>%
  group_by(clutch) %>%
  summarise(
    attempts = n(),
    made_ft = sum(made),
    ft_pct = mean(made)
  )
```

```
## # A tibble: 2 x 4
##   clutch attempts made_ft ft_pct
##   <dbl>    <int>    <int>  <dbl>
## 1     0     56001    42925  0.767
## 2     1       757      569   0.752
```

```
reg1 <- lm(made ~ clutch, data = ft_all)
summary(reg1)
```

```
##
## Call:
```

```
## lm(formula = made ~ clutch, data = ft_all)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.7665  0.2335  0.2335  0.2335
##      0.2483
##
## Coefficients:
##              Estimate Std. Error
## (Intercept)  0.766504   0.001788
## clutch      -0.014853   0.015484
##              t value Pr(>|t|)
## (Intercept) 428.631   <2e-16 ***
## clutch      -0.959    0.337
## ---
## Signif. codes:
##  0 '***' 0.001 '**' 0.01 '*' 0.05
##  '.' 0.1 ' ' 1
##
## Residual standard error: 0.4232 on 56756 degrees of freedom
## Multiple R-squared:  1.621e-05, Adjusted R-squared:  -1.408e-06
## F-statistic: 0.9201 on 1 and 56756 DF,  p-value: 0.3375
```

made = 0.7665 - 0.0149(clutch)

Se = 0.0155 p = 0.33

Fixed Effects:

```
lm(made ~ clutch + factor(PAYER1_ID), data = ft_all)
```

```
##
## Call:
## lm(formula = made ~ clutch + factor(PAYER1_ID), data = ft_all)
##
## Coefficients:
##              (Intercept)
##              0.7133217
##              clutch
##             -0.0396158
## factor(PAYER1_ID)1717
##              0.0666783
## factor(PAYER1_ID)2037
##              0.1321329
## factor(PAYER1_ID)2199
##             -0.1271148
## factor(PAYER1_ID)2200
##             -0.0113409
## factor(PAYER1_ID)2225
##              0.0205493
## factor(PAYER1_ID)2403
##             -0.0520614
## factor(PAYER1_ID)2544
```

```

##          -0.0478708
## factor(P1AYER1_ID)2546
##          -0.0315035
## factor(P1AYER1_ID)2548
##          -0.0048271
## factor(P1AYER1_ID)2585
##          0.0689364
## factor(P1AYER1_ID)2594
##          0.1091388
## factor(P1AYER1_ID)2617
##          0.0366783
## factor(P1AYER1_ID)2730
##          -0.1091550
## factor(P1AYER1_ID)2733
##          0.0709920
## factor(P1AYER1_ID)2734
##          0.0484636
## factor(P1AYER1_ID)2736
##          0.0009640
## factor(P1AYER1_ID)2738
##          -0.1312321
## factor(P1AYER1_ID)2747
##          0.0866783
## factor(P1AYER1_ID)2772
##          0.0800859
## factor(P1AYER1_ID)101106
##          0.2866783
## factor(P1AYER1_ID)101107
##          0.0541202
## factor(P1AYER1_ID)101108
##          0.1487473
## factor(P1AYER1_ID)101109
##          0.2097552
## factor(P1AYER1_ID)101112
##          0.0723926
## factor(P1AYER1_ID)101123
##          0.1249136
## factor(P1AYER1_ID)101133
##          -0.0247971
## factor(P1AYER1_ID)101139
##          0.1142645
## factor(P1AYER1_ID)101141
##          0.1110026
## factor(P1AYER1_ID)101150
##          0.1637021
## factor(P1AYER1_ID)101161
##          0.0427759
## factor(P1AYER1_ID)101162
##          0.0158450
## factor(P1AYER1_ID)101181
##          0.1048601
## factor(P1AYER1_ID)200746
##          0.1350157
## factor(P1AYER1_ID)200752

```



```

##          0.1043523
## factor(PPLAYER1_ID)200755
##          0.1818834
## factor(PPLAYER1_ID)200757
##         -0.0769581
## factor(PPLAYER1_ID)200765
##         -0.0744328
## factor(PPLAYER1_ID)200768
##          0.1173920
## factor(PPLAYER1_ID)200782
##         -0.0184064
## factor(PPLAYER1_ID)200794
##          0.0142223
## factor(PPLAYER1_ID)200826
##         -0.0081935
## factor(PPLAYER1_ID)201142
##          0.1726801
## factor(PPLAYER1_ID)201143
##          0.1085650
## factor(PPLAYER1_ID)201144
##          0.1322865
## factor(PPLAYER1_ID)201145
##          0.1761817
## factor(PPLAYER1_ID)201147
##          0.0094511
## factor(PPLAYER1_ID)201149
##          0.0022746
## factor(PPLAYER1_ID)201152
##         -0.0688772
## factor(PPLAYER1_ID)201158
##          0.1905431
## factor(PPLAYER1_ID)201160
##          0.1616783
## factor(PPLAYER1_ID)201162
##         -0.0176695
## factor(PPLAYER1_ID)201163
##          0.0066783
## factor(PPLAYER1_ID)201188
##          0.0468243
## factor(PPLAYER1_ID)201229
##          0.0713322
## factor(PPLAYER1_ID)201563
##          0.0046270
## factor(PPLAYER1_ID)201565
##          0.1434235
## factor(PPLAYER1_ID)201566
##         -0.0558605
## factor(PPLAYER1_ID)201567
##          0.1908821
## factor(PPLAYER1_ID)201568
##          0.1911071
## factor(PPLAYER1_ID)201569
##          0.0716581
## factor(PPLAYER1_ID)201571

```

```

##          0.1532757
## factor(PPLAYER1_ID)201572
##          0.1299750
## factor(PPLAYER1_ID)201573
##         -0.1376486
## factor(PPLAYER1_ID)201577
##          0.0108997
## factor(PPLAYER1_ID)201580
##         -0.0812215
## factor(PPLAYER1_ID)201583
##          0.0366783
## factor(PPLAYER1_ID)201584
##         -0.0466550
## factor(PPLAYER1_ID)201585
##         -0.2966550
## factor(PPLAYER1_ID)201586
##          0.0493902
## factor(PPLAYER1_ID)201587
##          0.1518468
## factor(PPLAYER1_ID)201588
##          0.1102077
## factor(PPLAYER1_ID)201599
##         -0.0084761
## factor(PPLAYER1_ID)201601
##         -0.3133217
## factor(PPLAYER1_ID)201609
##          0.0688565
## factor(PPLAYER1_ID)201933
##          0.0408462
## factor(PPLAYER1_ID)201935
##          0.1665743
## factor(PPLAYER1_ID)201936
##          0.0054283
## factor(PPLAYER1_ID)201937
##          0.1422890
## factor(PPLAYER1_ID)201939
##          0.2037448
## factor(PPLAYER1_ID)201942
##          0.1169696
## factor(PPLAYER1_ID)201949
##          0.0009640
## factor(PPLAYER1_ID)201950
##          0.0549369
## factor(PPLAYER1_ID)201952
##          0.0908588
## factor(PPLAYER1_ID)201954
##          0.1190913
## factor(PPLAYER1_ID)201956
##         -0.0409079
## factor(PPLAYER1_ID)201959
##          0.0437405
## factor(PPLAYER1_ID)201960
##          0.0476637
## factor(PPLAYER1_ID)201961

```

```

##          0.0825967
## factor(PPLAYER1_ID)201967
##          0.0644561
## factor(PPLAYER1_ID)201973
##          0.0866783
## factor(PPLAYER1_ID)201975
##          0.2866783
## factor(PPLAYER1_ID)201976
##          0.0684544
## factor(PPLAYER1_ID)201980
##          0.1320892
## factor(PPLAYER1_ID)201988
##          0.1410472
## factor(PPLAYER1_ID)202066
##          0.0343419
## factor(PPLAYER1_ID)202083
##          0.0964943
## factor(PPLAYER1_ID)202322
##         -0.0143678
## factor(PPLAYER1_ID)202323
##         -0.0050271
## factor(PPLAYER1_ID)202324
##         -0.0378831
## factor(PPLAYER1_ID)202325
##         -0.0291112
## factor(PPLAYER1_ID)202326
##          0.0233396
## factor(PPLAYER1_ID)202327
##         -0.0799884
## factor(PPLAYER1_ID)202328
##         -0.0883217
## factor(PPLAYER1_ID)202329
##          0.1551043
## factor(PPLAYER1_ID)202330
##          0.1213266
## factor(PPLAYER1_ID)202331
##          0.1265209
## factor(PPLAYER1_ID)202334
##         -0.0960377
## factor(PPLAYER1_ID)202335
##         -0.0799884
## factor(PPLAYER1_ID)202339
##          0.0366783
## factor(PPLAYER1_ID)202340
##          0.1514322
## factor(PPLAYER1_ID)202347
##          0.0962021
## factor(PPLAYER1_ID)202355
##         -0.2647620
## factor(PPLAYER1_ID)202357
##          0.0484091
## factor(PPLAYER1_ID)202362
##         -0.0278475
## factor(PPLAYER1_ID)202391

```

```

##          0.1247735
## factor(PPLAYER1_ID)202397
##          0.0447428
## factor(PPLAYER1_ID)202498
##          0.0366783
## factor(PPLAYER1_ID)202681
##          0.1607945
## factor(PPLAYER1_ID)202683
##          0.0734803
## factor(PPLAYER1_ID)202684
##          -0.0718123
## factor(PPLAYER1_ID)202685
##          0.0825577
## factor(PPLAYER1_ID)202687
##          -0.0759591
## factor(PPLAYER1_ID)202688
##          0.0807960
## factor(PPLAYER1_ID)202689
##          0.1320911
## factor(PPLAYER1_ID)202690
##          0.2866783
## factor(PPLAYER1_ID)202691
##          0.1031340
## factor(PPLAYER1_ID)202692
##          0.1096543
## factor(PPLAYER1_ID)202693
##          0.0588480
## factor(PPLAYER1_ID)202694
##          0.1306089
## factor(PPLAYER1_ID)202695
##          0.1421613
## factor(PPLAYER1_ID)202696
##          0.0759226
## factor(PPLAYER1_ID)202697
##          0.0866783
## factor(PPLAYER1_ID)202699
##          0.1546763
## factor(PPLAYER1_ID)202700
##          -0.7133217
## factor(PPLAYER1_ID)202702
##          -0.0668570
## factor(PPLAYER1_ID)202703
##          0.1340915
## factor(PPLAYER1_ID)202704
##          0.1524280
## factor(PPLAYER1_ID)202705
##          -0.0163520
## factor(PPLAYER1_ID)202709
##          -0.0156473
## factor(PPLAYER1_ID)202710
##          0.1421240
## factor(PPLAYER1_ID)202711
##          0.0932357
## factor(PPLAYER1_ID)202714

```

```

##          -0.0219023
## factor(PPLAYER1_ID)202718
##          0.1666783
## factor(PPLAYER1_ID)202720
##          0.0286138
## factor(PPLAYER1_ID)202722
##          0.1700116
## factor(PPLAYER1_ID)202734
##          0.0493902
## factor(PPLAYER1_ID)202738
##          -0.0836921
## factor(PPLAYER1_ID)202954
##          0.1438212
## factor(PPLAYER1_ID)203076
##          0.0814101
## factor(PPLAYER1_ID)203077
##          0.0590360
## factor(PPLAYER1_ID)203078
##          0.0957752
## factor(PPLAYER1_ID)203079
##          -0.2133217
## factor(PPLAYER1_ID)203081
##          0.1998857
## factor(PPLAYER1_ID)203082
##          0.1622285
## factor(PPLAYER1_ID)203083
##          -0.1225543
## factor(PPLAYER1_ID)203084
##          0.1107043
## factor(PPLAYER1_ID)203085
##          -0.1870059
## factor(PPLAYER1_ID)203086
##          0.1298156
## factor(PPLAYER1_ID)203087
##          0.1755970
## factor(PPLAYER1_ID)203089
##          -0.1133217
## factor(PPLAYER1_ID)203090
##          -0.0420888
## factor(PPLAYER1_ID)203092
##          0.0644561
## factor(PPLAYER1_ID)203093
##          -0.7133217
## factor(PPLAYER1_ID)203095
##          0.0946580
## factor(PPLAYER1_ID)203098
##          0.1200116
## factor(PPLAYER1_ID)203101
##          -0.1799884
## factor(PPLAYER1_ID)203107
##          0.1064187
## factor(PPLAYER1_ID)203109
##          0.0074905
## factor(PPLAYER1_ID)203110

```

```

##          -0.0210140
## factor(PPLAYER1_ID)203112
##          -0.0133217
## factor(PPLAYER1_ID)203114
##          0.1238876
## factor(PPLAYER1_ID)203115
##          0.0569486
## factor(PPLAYER1_ID)203118
##          -0.0466550
## factor(PPLAYER1_ID)203121
##          0.0770846
## factor(PPLAYER1_ID)203124
##          0.0962021
## factor(PPLAYER1_ID)203145
##          0.0132981
## factor(PPLAYER1_ID)203159
##          0.2866783
## factor(PPLAYER1_ID)203200
##          0.1851471
## factor(PPLAYER1_ID)203210
##          0.0787575
## factor(PPLAYER1_ID)203263
##          0.2866783
## factor(PPLAYER1_ID)203382
##          0.1415170
## factor(PPLAYER1_ID)203457
##          -0.0297774
## factor(PPLAYER1_ID)203458
##          -0.0638897
## factor(PPLAYER1_ID)203459
##          0.0188212
## factor(PPLAYER1_ID)203463
##          -0.0466550
## factor(PPLAYER1_ID)203468
##          0.1156286
## factor(PPLAYER1_ID)203469
##          0.0739124
## factor(PPLAYER1_ID)203471
##          0.1060616
## factor(PPLAYER1_ID)203473
##          0.1015388
## factor(PPLAYER1_ID)203476
##          0.1168670
## factor(PPLAYER1_ID)203477
##          0.0783450
## factor(PPLAYER1_ID)203482
##          0.1087282
## factor(PPLAYER1_ID)203484
##          0.1542684
## factor(PPLAYER1_ID)203485
##          0.2866783
## factor(PPLAYER1_ID)203486
##          -0.1527156
## factor(PPLAYER1_ID)203487

```

```

##          -0.1080532
## factor(PLOYER1_ID)203488
##          0.1102077
## factor(PLOYER1_ID)203490
##          0.1004163
## factor(PLOYER1_ID)203493
##          0.1473661
## factor(PLOYER1_ID)203496
##          0.0507233
## factor(PLOYER1_ID)203497
##          -0.0770028
## factor(PLOYER1_ID)203500
##          -0.2130504
## factor(PLOYER1_ID)203501
##          0.1275451
## factor(PLOYER1_ID)203503
##          0.1676307
## factor(PLOYER1_ID)203504
##          0.1189209
## factor(PLOYER1_ID)203506
##          0.0180177
## factor(PLOYER1_ID)203507
##          0.0160033
## factor(PLOYER1_ID)203516
##          0.0027277
## factor(PLOYER1_ID)203518
##          0.2097552
## factor(PLOYER1_ID)203521
##          0.0974180
## factor(PLOYER1_ID)203524
##          0.0079043
## factor(PLOYER1_ID)203526
##          0.1351632
## factor(PLOYER1_ID)203546
##          0.1785702
## factor(PLOYER1_ID)203552
##          0.1358795
## factor(PLOYER1_ID)203564
##          0.2866783
## factor(PLOYER1_ID)203584
##          0.0692870
## factor(PLOYER1_ID)203585
##          0.0089005
## factor(PLOYER1_ID)203613
##          0.0289463
## factor(PLOYER1_ID)203710
##          -0.7133217
## factor(PLOYER1_ID)203894
##          0.1205858
## factor(PLOYER1_ID)203895
##          0.0866783
## factor(PLOYER1_ID)203897
##          0.1200517
## factor(PLOYER1_ID)203901

```

```

##          0.0325983
## factor(PPLAYER1_ID)203903
##          0.1308410
## factor(PPLAYER1_ID)203914
##          0.0858396
## factor(PPLAYER1_ID)203915
##          0.0937483
## factor(PPLAYER1_ID)203917
##          0.1773033
## factor(PPLAYER1_ID)203918
##          0.1710604
## factor(PPLAYER1_ID)203920
##          -0.0145265
## factor(PPLAYER1_ID)203922
##          0.0866783
## factor(PPLAYER1_ID)203924
##          -0.0025559
## factor(PPLAYER1_ID)203925
##          0.1149374
## factor(PPLAYER1_ID)203926
##          0.1221213
## factor(PPLAYER1_ID)203932
##          0.0179036
## factor(PPLAYER1_ID)203933
##          0.1021529
## factor(PPLAYER1_ID)203935
##          0.0934941
## factor(PPLAYER1_ID)203937
##          -0.1345777
## factor(PPLAYER1_ID)203939
##          0.0583319
## factor(PPLAYER1_ID)203943
##          -0.0017832
## factor(PPLAYER1_ID)203944
##          0.0183352
## factor(PPLAYER1_ID)203952
##          -0.0131943
## factor(PPLAYER1_ID)203953
##          -0.0009346
## factor(PPLAYER1_ID)203954
##          0.0916031
## factor(PPLAYER1_ID)203957
##          0.0773760
## factor(PPLAYER1_ID)203960
##          0.0962021
## factor(PPLAYER1_ID)203967
##          0.1666783
## factor(PPLAYER1_ID)203991
##          -0.0773064
## factor(PPLAYER1_ID)203992
##          0.1150615
## factor(PPLAYER1_ID)203994
##          0.0597152
## factor(PPLAYER1_ID)203998

```



```

##          0.1266783
## factor(P1AYER1_ID)203999
##          0.1079261
## factor(P1AYER1_ID)204020
##          0.0347098
## factor(P1AYER1_ID)204025
##          0.0459376
## factor(P1AYER1_ID)204038
##          0.1308410
## factor(P1AYER1_ID)204060
##         -0.0060046
## factor(P1AYER1_ID)204456
##          0.0704621
## factor(P1AYER1_ID)1626143
##         -0.0504003
## factor(P1AYER1_ID)1626144
##          0.0617238
## factor(P1AYER1_ID)1626145
##          0.1272580
## factor(P1AYER1_ID)1626147
##          0.0295355
## factor(P1AYER1_ID)1626149
##         -0.0703312
## factor(P1AYER1_ID)1626150
##          0.2311228
## factor(P1AYER1_ID)1626153
##          0.0800116
## factor(P1AYER1_ID)1626154
##         -0.2133217
## factor(P1AYER1_ID)1626155
##         -0.1046260
## factor(P1AYER1_ID)1626156
##          0.0689053
## factor(P1AYER1_ID)1626157
##          0.1229381
## factor(P1AYER1_ID)1626158
##          0.0181069
## factor(P1AYER1_ID)1626159
##         -0.0855845
## factor(P1AYER1_ID)1626161
##         -0.1621406
## factor(P1AYER1_ID)1626162
##          0.0615932
## factor(P1AYER1_ID)1626163
##          0.0249961
## factor(P1AYER1_ID)1626164
##          0.1529279
## factor(P1AYER1_ID)1626166
##          0.0915564
## factor(P1AYER1_ID)1626167
##          0.0229967
## factor(P1AYER1_ID)1626168
##         -0.0150458
## factor(P1AYER1_ID)1626169

```

```

##          0.0679283
## factor(PLOYER1_ID)1626170
##          -0.0633217
## factor(PLOYER1_ID)1626171
##          0.0813096
## factor(PLOYER1_ID)1626172
##          -0.0942741
## factor(PLOYER1_ID)1626174
##          0.0188212
## factor(PLOYER1_ID)1626178
##          -0.0685129
## factor(PLOYER1_ID)1626179
##          0.0716245
## factor(PLOYER1_ID)1626181
##          0.1133450
## factor(PLOYER1_ID)1626184
##          -0.0197733
## factor(PLOYER1_ID)1626185
##          0.1048601
## factor(PLOYER1_ID)1626188
##          0.0559091
## factor(PLOYER1_ID)1626192
##          0.0116783
## factor(PLOYER1_ID)1626195
##          -0.0188772
## factor(PLOYER1_ID)1626196
##          0.1490077
## factor(PLOYER1_ID)1626203
##          0.1048601
## factor(PLOYER1_ID)1626204
##          0.0030962
## factor(PLOYER1_ID)1626209
##          0.0498362
## factor(PLOYER1_ID)1626210
##          -0.2133217
## factor(PLOYER1_ID)1626220
##          0.0485831
## factor(PLOYER1_ID)1626224
##          0.0656838
## factor(PLOYER1_ID)1626245
##          -0.0283902
## factor(PLOYER1_ID)1626246
##          0.0353747
## factor(PLOYER1_ID)1626257
##          -0.0883217
## factor(PLOYER1_ID)1626259
##          0.0366783
## factor(PLOYER1_ID)1627215
##          0.0211539
## factor(PLOYER1_ID)1627395
##          0.0366783
## factor(PLOYER1_ID)1627732
##          -0.1124842
## factor(PLOYER1_ID)1627733

```

```

## -0.1199955
## factor(PLAYER1_ID)1627734
## 0.0014549
## factor(PLAYER1_ID)1627735
## 0.0139510
## factor(PLAYER1_ID)1627736
## 0.1351632
## factor(PLAYER1_ID)1627737
## -0.0004499
## factor(PLAYER1_ID)1627738
## -0.1133217
## factor(PLAYER1_ID)1627739
## 0.0866505
## factor(PLAYER1_ID)1627740
## 0.0466783
## factor(PLAYER1_ID)1627741
## 0.1739203
## factor(PLAYER1_ID)1627742
## -0.0383070
## factor(PLAYER1_ID)1627743
## 0.2866783
## factor(PLAYER1_ID)1627745
## -0.0646730
## factor(PLAYER1_ID)1627746
## -0.1792492
## factor(PLAYER1_ID)1627747
## -0.0216206
## factor(PLAYER1_ID)1627748
## -0.0466550
## factor(PLAYER1_ID)1627750
## 0.1354555
## factor(PLAYER1_ID)1627751
## -0.1807130
## factor(PLAYER1_ID)1627752
## 0.1056438
## factor(PLAYER1_ID)1627758
## 0.1200116
## factor(PLAYER1_ID)1627759
## -0.0549059
## factor(PLAYER1_ID)1627761
## -0.0730332
## factor(PLAYER1_ID)1627763
## 0.2148311
## factor(PLAYER1_ID)1627767
## 0.0341295
## factor(PLAYER1_ID)1627772
## -0.2133217
## factor(PLAYER1_ID)1627774
## -0.0090963
## factor(PLAYER1_ID)1627775
## 0.1533450
## factor(PLAYER1_ID)1627777
## 0.1216623
## factor(PLAYER1_ID)1627781

```

```

##          0.0866783
## factor(PPLAYER1_ID)1627782
##          0.0158004
## factor(PPLAYER1_ID)1627783
##          0.0721024
## factor(PPLAYER1_ID)1627786
##         -0.1133217
## factor(PPLAYER1_ID)1627788
##          0.1048601
## factor(PPLAYER1_ID)1627789
##          0.0427759
## factor(PPLAYER1_ID)1627790
##         -0.0087762
## factor(PPLAYER1_ID)1627812
##          0.1822007
## factor(PPLAYER1_ID)1627814
##          0.1503147
## factor(PPLAYER1_ID)1627816
##         -0.0926320
## factor(PPLAYER1_ID)1627820
##         -0.1870059
## factor(PPLAYER1_ID)1627823
##          0.0541202
## factor(PPLAYER1_ID)1627824
##         -0.0315035
## factor(PPLAYER1_ID)1627826
##          0.0898377
## factor(PPLAYER1_ID)1627827
##         -0.0045838
## factor(PPLAYER1_ID)1627832
##          0.1301566
## factor(PPLAYER1_ID)1627846
##          0.0366783
## factor(PPLAYER1_ID)1627853
##          0.1592273
## factor(PPLAYER1_ID)1627854
##          0.1712937
## factor(PPLAYER1_ID)1627863
##          0.0754107
## factor(PPLAYER1_ID)1627883
##         -0.0096180
## factor(PPLAYER1_ID)1627884
##         -0.1067643
## factor(PPLAYER1_ID)1627885
##         -0.0460109
## factor(PPLAYER1_ID)1627936
##          0.0835533
## factor(PPLAYER1_ID)1628021
##         -0.0309688
## factor(PPLAYER1_ID)1628035
##         -0.1508217
## factor(PPLAYER1_ID)1628070
##          0.1048601
## factor(PPLAYER1_ID)1628249

```

```

##          0.0009640
## factor(P1AYER1_ID)1628365
##          -0.1457541
## factor(P1AYER1_ID)1628366
##          -0.2966550
## factor(P1AYER1_ID)1628367
##          -0.0415882
## factor(P1AYER1_ID)1628368
##          0.0136770
## factor(P1AYER1_ID)1628369
##          0.1431577
## factor(P1AYER1_ID)1628370
##          0.1694196
## factor(P1AYER1_ID)1628371
##          0.1014931
## factor(P1AYER1_ID)1628372
##          -0.0771826
## factor(P1AYER1_ID)1628373
##          0.0533450
## factor(P1AYER1_ID)1628374
##          0.1600984
## factor(P1AYER1_ID)1628378
##          0.0930342
## factor(P1AYER1_ID)1628379
##          0.1240428
## factor(P1AYER1_ID)1628380
##          0.0327101
## factor(P1AYER1_ID)1628381
##          0.0499851
## factor(P1AYER1_ID)1628382
##          0.0714884
## factor(P1AYER1_ID)1628383
##          -0.2133217
## factor(P1AYER1_ID)1628384
##          -0.1326765
## factor(P1AYER1_ID)1628385
##          -0.0759591
## factor(P1AYER1_ID)1628386
##          -0.0042611
## factor(P1AYER1_ID)1628388
##          -0.1004185
## factor(P1AYER1_ID)1628389
##          0.0218927
## factor(P1AYER1_ID)1628390
##          0.0121685
## factor(P1AYER1_ID)1628391
##          -0.1601302
## factor(P1AYER1_ID)1628392
##          0.0723926
## factor(P1AYER1_ID)1628395
##          -0.1035656
## factor(P1AYER1_ID)1628396
##          -0.2133217
## factor(P1AYER1_ID)1628397

```

```

##          -0.0031768
## factor(P1AYER1_ID)1628398
##          0.0386783
## factor(P1AYER1_ID)1628399
##          -0.3799884
## factor(P1AYER1_ID)1628400
##          -0.0979371
## factor(P1AYER1_ID)1628401
##          0.0593581
## factor(P1AYER1_ID)1628402
##          0.0280324
## factor(P1AYER1_ID)1628403
##          -0.0466550
## factor(P1AYER1_ID)1628404
##          -0.0238409
## factor(P1AYER1_ID)1628405
##          -0.1133217
## factor(P1AYER1_ID)1628407
##          0.0258087
## factor(P1AYER1_ID)1628408
##          -0.2133217
## factor(P1AYER1_ID)1628410
##          -0.0833697
## factor(P1AYER1_ID)1628411
##          0.1022123
## factor(P1AYER1_ID)1628412
##          -0.0291112
## factor(P1AYER1_ID)1628413
##          -0.2318402
## factor(P1AYER1_ID)1628414
##          0.0219724
## factor(P1AYER1_ID)1628415
##          0.0200116
## factor(P1AYER1_ID)1628416
##          -0.0884226
## factor(P1AYER1_ID)1628417
##          0.0559091
## factor(P1AYER1_ID)1628418
##          0.0685677
## factor(P1AYER1_ID)1628420
##          0.0901256
## factor(P1AYER1_ID)1628421
##          -0.0704645
## factor(P1AYER1_ID)1628422
##          0.0327890
## factor(P1AYER1_ID)1628425
##          -0.0228455
## factor(P1AYER1_ID)1628436
##          0.1127653
## factor(P1AYER1_ID)1628439
##          0.0866783
## factor(P1AYER1_ID)1628443
##          0.0644561
## factor(P1AYER1_ID)1628449

```

```

##          0.1533450
## factor(PLOYER1_ID)1628462
##          -0.1418931
## factor(PLOYER1_ID)1628463
##          0.2866783
## factor(PLOYER1_ID)1628464
##          0.0235204
## factor(PLOYER1_ID)1628467
##          0.0704621
## factor(PLOYER1_ID)1628469
##          -0.0554270
## factor(PLOYER1_ID)1628470
##          -0.0133217
## factor(PLOYER1_ID)1628513
##          0.2866783
## factor(PLOYER1_ID)1628515
##          -0.1363986
## factor(PLOYER1_ID)1628518
##          0.1616783
## factor(PLOYER1_ID)1628537
##          -0.2133217
## factor(PLOYER1_ID)1628605
##          0.2866783
## factor(PLOYER1_ID)1628656
##          0.2866783
## factor(PLOYER1_ID)1628769
##          -0.7133217
## factor(PLOYER1_ID)1628959
##          -0.0466550
## factor(PLOYER1_ID)1628960
##          0.0366783
## factor(PLOYER1_ID)1628961
##          -0.2133217
## factor(PLOYER1_ID)1628963
##          -0.0224820
## factor(PLOYER1_ID)1628964
##          -0.1260201
## factor(PLOYER1_ID)1628966
##          -0.0676348
## factor(PLOYER1_ID)1628969
##          0.0917631
## factor(PLOYER1_ID)1628970
##          0.0399251
## factor(PLOYER1_ID)1628971
##          0.0366783
## factor(PLOYER1_ID)1628972
##          -0.0324706
## factor(PLOYER1_ID)1628973
##          0.0129988
## factor(PLOYER1_ID)1628975
##          0.0991783
## factor(PLOYER1_ID)1628976
##          0.0820286
## factor(PLOYER1_ID)1628977

```

```

## -0.1031522
## factor(P1AYER1_ID)1628978
## 0.0366783
## factor(P1AYER1_ID)1628980
## -0.7133217
## factor(P1AYER1_ID)1628982
## -0.4633217
## factor(P1AYER1_ID)1628983
## 0.0866783
## factor(P1AYER1_ID)1628984
## 0.0475479
## factor(P1AYER1_ID)1628988
## 0.1066783
## factor(P1AYER1_ID)1628989
## 0.0202360
## factor(P1AYER1_ID)1628990
## -0.1080585
## factor(P1AYER1_ID)1628991
## 0.0535780
## factor(P1AYER1_ID)1628993
## -0.2133217
## factor(P1AYER1_ID)1628995
## 0.0041936
## factor(P1AYER1_ID)1629001
## 0.0366783
## factor(P1AYER1_ID)1629002
## 0.0513842
## factor(P1AYER1_ID)1629003
## 0.0009640
## factor(P1AYER1_ID)1629004
## -0.1133217
## factor(P1AYER1_ID)1629006
## 0.0155625
## factor(P1AYER1_ID)1629010
## -0.0466550
## factor(P1AYER1_ID)1629011
## -0.1133217
## factor(P1AYER1_ID)1629012
## 0.1258940
## factor(P1AYER1_ID)1629013
## 0.0939819
## factor(P1AYER1_ID)1629014
## -0.1458697
## factor(P1AYER1_ID)1629015
## 0.0366783
## factor(P1AYER1_ID)1629016
## -0.0022106
## factor(P1AYER1_ID)1629017
## -0.0769581
## factor(P1AYER1_ID)1629018
## -0.2847503
## factor(P1AYER1_ID)1629019
## 0.0893689
## factor(P1AYER1_ID)1629020

```



```

##          -0.1133217
## factor(P1AYER1_ID)1629021
##          0.0979991
## factor(P1AYER1_ID)1629022
##          0.0866783
## factor(P1AYER1_ID)1629026
##          -0.0291112
## factor(P1AYER1_ID)1629027
##          0.1157549
## factor(P1AYER1_ID)1629028
##          0.0333389
## factor(P1AYER1_ID)1629029
##          0.0008155
## factor(P1AYER1_ID)1629033
##          0.1503147
## factor(P1AYER1_ID)1629034
##          -0.3799884
## factor(P1AYER1_ID)1629045
##          0.1755672
## factor(P1AYER1_ID)1629057
##          -0.1133217
## factor(P1AYER1_ID)1629058
##          -0.7133217
## factor(P1AYER1_ID)1629059
##          0.0739124
## factor(P1AYER1_ID)1629061
##          0.2866783
## factor(P1AYER1_ID)1629066
##          0.0697176
## factor(P1AYER1_ID)1629067
##          -0.1133217
## factor(P1AYER1_ID)1629094
##          0.0866783
## factor(P1AYER1_ID)1629102
##          -0.0466550
## factor(P1AYER1_ID)1629109
##          0.2866783
## factor(P1AYER1_ID)1629116
##          -0.2133217
## factor(P1AYER1_ID)1629118
##          -0.2133217
## factor(P1AYER1_ID)1629121
##          0.0644561
## factor(P1AYER1_ID)1629123
##          -0.2133217
## factor(P1AYER1_ID)1629126
##          -0.0466550
## factor(P1AYER1_ID)1629130
##          -0.0466550
## factor(P1AYER1_ID)1629133
##          -0.1305743
## factor(P1AYER1_ID)1629139
##          -0.0133217
## factor(P1AYER1_ID)1629140

```

```
##           -0.1508217
## factor(PLAYER1_ID)1629150
##           -0.2133217
## factor(PLAYER1_ID)1629151
##           0.0803221
## factor(PLAYER1_ID)1629152
##           -0.2133217
## factor(PLAYER1_ID)1629164
##           0.1048601
## factor(PLAYER1_ID)1629168
##           0.2866783
## factor(PLAYER1_ID)1629203
##           -0.2133217
## factor(PLAYER1_ID)1629234
##           0.1328322
## factor(PLAYER1_ID)1629244
##           0.1755672
## factor(PLAYER1_ID)1629312
##           -0.7133217
```

fatigue could be an omitted variable. Now being accounted for via period:

```
reg_full <- lm(made ~ clutch + factor(PLAYER1_ID) + factor(PERIOD), data = ft_all)
summary(reg_full)
```

```
##
## Call:
## lm(formula = made ~ clutch + factor(PLAYER1_ID) + factor(PERIOD),
##     data = ft_all)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.93870  0.08879  0.17478  0.25690  0.75000
##
## Coefficients:
##              Estimate
## (Intercept)    0.7174593
## clutch        -0.0367859
## factor(PLAYER1_ID)1717    0.0646431
## factor(PLAYER1_ID)2037    0.1315679
## factor(PLAYER1_ID)2199   -0.1287168
## factor(PLAYER1_ID)2200   -0.0110922
## factor(PLAYER1_ID)2225    0.0190371
## factor(PLAYER1_ID)2403   -0.0530890
## factor(PLAYER1_ID)2544   -0.0482888
## factor(PLAYER1_ID)2546   -0.0334726
## factor(PLAYER1_ID)2548   -0.0056768
## factor(PLAYER1_ID)2585    0.0664611
## factor(PLAYER1_ID)2594    0.1082468
## factor(PLAYER1_ID)2617    0.0462759
## factor(PLAYER1_ID)2730   -0.1093053
```

```

## factor(PLOYER1_ID)2733      0.0695655
## factor(PLOYER1_ID)2734      0.0470251
## factor(PLOYER1_ID)2736      0.0002010
## factor(PLOYER1_ID)2738     -0.1325536
## factor(PLOYER1_ID)2747      0.0821790
## factor(PLOYER1_ID)2772      0.0781244
## factor(PLOYER1_ID)101106     0.2916975
## factor(PLOYER1_ID)101107     0.0525477
## factor(PLOYER1_ID)101108     0.1476173
## factor(PLOYER1_ID)101109     0.2063960
## factor(PLOYER1_ID)101112     0.0749406
## factor(PLOYER1_ID)101123     0.1266894
## factor(PLOYER1_ID)101133    -0.0259076
## factor(PLOYER1_ID)101139     0.1137190
## factor(PLOYER1_ID)101141     0.1090936
## factor(PLOYER1_ID)101150     0.1635849
## factor(PLOYER1_ID)101161     0.0431419
## factor(PLOYER1_ID)101162     0.0116133
## factor(PLOYER1_ID)101181     0.1053135
## factor(PLOYER1_ID)200746     0.1334112
## factor(PLOYER1_ID)200752     0.1029989
## factor(PLOYER1_ID)200755     0.1810639
## factor(PLOYER1_ID)200757    -0.0724746
## factor(PLOYER1_ID)200765    -0.0740765
## factor(PLOYER1_ID)200768     0.1137548
## factor(PLOYER1_ID)200782    -0.0174628
## factor(PLOYER1_ID)200794     0.0125537
## factor(PLOYER1_ID)200826    -0.0106386
## factor(PLOYER1_ID)201142     0.1710123
## factor(PLOYER1_ID)201143     0.1102230
## factor(PLOYER1_ID)201144     0.1311342
## factor(PLOYER1_ID)201145     0.1734994
## factor(PLOYER1_ID)201147     0.0113792
## factor(PLOYER1_ID)201149     0.0010588
## factor(PLOYER1_ID)201152    -0.0712820
## factor(PLOYER1_ID)201158     0.1896133
## factor(PLOYER1_ID)201160     0.1606868
## factor(PLOYER1_ID)201162    -0.0209362
## factor(PLOYER1_ID)201163     0.0046036
## factor(PLOYER1_ID)201188     0.0454153
## factor(PLOYER1_ID)201229     0.0711702
## factor(PLOYER1_ID)201563     0.0047432
## factor(PLOYER1_ID)201565     0.1428592
## factor(PLOYER1_ID)201566    -0.0563473
## factor(PLOYER1_ID)201567     0.1902734
## factor(PLOYER1_ID)201568     0.1902313
## factor(PLOYER1_ID)201569     0.0694495
## factor(PLOYER1_ID)201571     0.1529730
## factor(PLOYER1_ID)201572     0.1292402
## factor(PLOYER1_ID)201573    -0.1406881
## factor(PLOYER1_ID)201577     0.0101779
## factor(PLOYER1_ID)201580    -0.0835640
## factor(PLOYER1_ID)201583     0.0334147
## factor(PLOYER1_ID)201584    -0.0454660

```

```

## factor(PLOYER1_ID)201585 -0.3013579
## factor(PLOYER1_ID)201586 0.0488697
## factor(PLOYER1_ID)201587 0.1510343
## factor(PLOYER1_ID)201588 0.1096272
## factor(PLOYER1_ID)201599 -0.0096975
## factor(PLOYER1_ID)201601 -0.3206995
## factor(PLOYER1_ID)201609 0.0662924
## factor(PLOYER1_ID)201933 0.0393745
## factor(PLOYER1_ID)201935 0.1657867
## factor(PLOYER1_ID)201936 0.0043237
## factor(PLOYER1_ID)201937 0.1418884
## factor(PLOYER1_ID)201939 0.2023094
## factor(PLOYER1_ID)201942 0.1157927
## factor(PLOYER1_ID)201949 -0.0003418
## factor(PLOYER1_ID)201950 0.0551212
## factor(PLOYER1_ID)201952 0.0899486
## factor(PLOYER1_ID)201954 0.1193004
## factor(PLOYER1_ID)201956 -0.0421171
## factor(PLOYER1_ID)201959 0.0424542
## factor(PLOYER1_ID)201960 0.0460438
## factor(PLOYER1_ID)201961 0.0833000
## factor(PLOYER1_ID)201967 0.0672638
## factor(PLOYER1_ID)201973 0.0874684
## factor(PLOYER1_ID)201975 0.2962759
## factor(PLOYER1_ID)201976 0.0677154
## factor(PLOYER1_ID)201980 0.1275973
## factor(PLOYER1_ID)201988 0.1396255
## factor(PLOYER1_ID)202066 0.0321537
## factor(PLOYER1_ID)202083 0.0964934
## factor(PLOYER1_ID)202322 -0.0153326
## factor(PLOYER1_ID)202323 -0.0040302
## factor(PLOYER1_ID)202324 -0.0383444
## factor(PLOYER1_ID)202325 -0.0360103
## factor(PLOYER1_ID)202326 0.0228463
## factor(PLOYER1_ID)202327 -0.0767292
## factor(PLOYER1_ID)202328 -0.0878671
## factor(PLOYER1_ID)202329 0.1533643
## factor(PLOYER1_ID)202330 0.1207395
## factor(PLOYER1_ID)202331 0.1259076
## factor(PLOYER1_ID)202334 -0.0990029
## factor(PLOYER1_ID)202335 -0.0820724
## factor(PLOYER1_ID)202339 0.0367326
## factor(PLOYER1_ID)202340 0.1496281
## factor(PLOYER1_ID)202347 0.1019929
## factor(PLOYER1_ID)202355 -0.2655724
## factor(PLOYER1_ID)202357 0.0462260
## factor(PLOYER1_ID)202362 -0.0259353
## factor(PLOYER1_ID)202391 0.1233345
## factor(PLOYER1_ID)202397 0.0432757
## factor(PLOYER1_ID)202498 0.0362487
## factor(PLOYER1_ID)202681 0.1608151
## factor(PLOYER1_ID)202683 0.0709766
## factor(PLOYER1_ID)202684 -0.0741185
## factor(PLOYER1_ID)202685 0.0820234

```

```

## factor(PLOYER1_ID)202687 -0.0774529
## factor(PLOYER1_ID)202688 0.0781994
## factor(PLOYER1_ID)202689 0.1313214
## factor(PLOYER1_ID)202690 0.2900253
## factor(PLOYER1_ID)202691 0.1015675
## factor(PLOYER1_ID)202692 0.1094516
## factor(PLOYER1_ID)202693 0.0578910
## factor(PLOYER1_ID)202694 0.1316425
## factor(PLOYER1_ID)202695 0.1413255
## factor(PLOYER1_ID)202696 0.0753810
## factor(PLOYER1_ID)202697 0.0847871
## factor(PLOYER1_ID)202699 0.1546413
## factor(PLOYER1_ID)202700 -0.7037241
## factor(PLOYER1_ID)202702 -0.0677728
## factor(PLOYER1_ID)202703 0.1331431
## factor(PLOYER1_ID)202704 0.1525143
## factor(PLOYER1_ID)202705 -0.0168706
## factor(PLOYER1_ID)202709 -0.0156629
## factor(PLOYER1_ID)202710 0.1426078
## factor(PLOYER1_ID)202711 0.0919003
## factor(PLOYER1_ID)202714 -0.0199817
## factor(PLOYER1_ID)202718 0.1657616
## factor(PLOYER1_ID)202720 0.0320987
## factor(PLOYER1_ID)202722 0.1701949
## factor(PLOYER1_ID)202734 0.0500188
## factor(PLOYER1_ID)202738 -0.0828400
## factor(PLOYER1_ID)202954 0.1485633
## factor(PLOYER1_ID)203076 0.0800317
## factor(PLOYER1_ID)203077 0.0576836
## factor(PLOYER1_ID)203078 0.0945870
## factor(PLOYER1_ID)203079 -0.2151693
## factor(PLOYER1_ID)203081 0.1995392
## factor(PLOYER1_ID)203082 0.1639055
## factor(PLOYER1_ID)203083 -0.1224008
## factor(PLOYER1_ID)203084 0.1092982
## factor(PLOYER1_ID)203085 -0.1856718
## factor(PLOYER1_ID)203086 0.1297049
## factor(PLOYER1_ID)203087 0.1742302
## factor(PLOYER1_ID)203089 -0.1161432
## factor(PLOYER1_ID)203090 -0.0435291
## factor(PLOYER1_ID)203092 0.0630053
## factor(PLOYER1_ID)203093 -0.7037241
## factor(PLOYER1_ID)203095 0.0948560
## factor(PLOYER1_ID)203098 0.1227646
## factor(PLOYER1_ID)203101 -0.1840956
## factor(PLOYER1_ID)203107 0.1057710
## factor(PLOYER1_ID)203109 0.0056918
## factor(PLOYER1_ID)203110 -0.0234939
## factor(PLOYER1_ID)203112 -0.0129686
## factor(PLOYER1_ID)203114 0.1222807
## factor(PLOYER1_ID)203115 0.0557575
## factor(PLOYER1_ID)203118 -0.0453568
## factor(PLOYER1_ID)203121 0.0752880
## factor(PLOYER1_ID)203124 0.0985699

```

```

## factor(PLOYER1_ID)203145    0.0117894
## factor(PLOYER1_ID)203159    0.2962759
## factor(PLOYER1_ID)203200    0.1842363
## factor(PLOYER1_ID)203210    0.0762153
## factor(PLOYER1_ID)203263    0.2962759
## factor(PLOYER1_ID)203382    0.1390324
## factor(PLOYER1_ID)203457   -0.0311611
## factor(PLOYER1_ID)203458   -0.0651158
## factor(PLOYER1_ID)203459    0.0172231
## factor(PLOYER1_ID)203463   -0.0370574
## factor(PLOYER1_ID)203468    0.1155377
## factor(PLOYER1_ID)203469    0.0718760
## factor(PLOYER1_ID)203471    0.1063600
## factor(PLOYER1_ID)203473    0.1014344
## factor(PLOYER1_ID)203476    0.1152412
## factor(PLOYER1_ID)203477    0.0775145
## factor(PLOYER1_ID)203482    0.1071334
## factor(PLOYER1_ID)203484    0.1546790
## factor(PLOYER1_ID)203485    0.2871191
## factor(PLOYER1_ID)203486   -0.1530033
## factor(PLOYER1_ID)203487   -0.1049775
## factor(PLOYER1_ID)203488    0.1087312
## factor(PLOYER1_ID)203490    0.0982295
##                               Std. Error
## (Intercept)                  0.0512051
## clutch                       0.0212524
## factor(PLOYER1_ID)1717       0.0777771
## factor(PLOYER1_ID)2037       0.0645860
## factor(PLOYER1_ID)2199       0.0677230
## factor(PLOYER1_ID)2200       0.0831263
## factor(PLOYER1_ID)2225       0.0632079
## factor(PLOYER1_ID)2403       0.0791697
## factor(PLOYER1_ID)2544       0.0549447
## factor(PLOYER1_ID)2546       0.1021215
## factor(PLOYER1_ID)2548       0.0578441
## factor(PLOYER1_ID)2585       0.0632085
## factor(PLOYER1_ID)2594       0.0704636
## factor(PLOYER1_ID)2617       0.2136096
## factor(PLOYER1_ID)2730       0.0786894
## factor(PLOYER1_ID)2733       0.0773481
## factor(PLOYER1_ID)2734       0.0623825
## factor(PLOYER1_ID)2736       0.0867373
## factor(PLOYER1_ID)2738       0.0719412
## factor(PLOYER1_ID)2747       0.1407636
## factor(PLOYER1_ID)2772       0.0604747
## factor(PLOYER1_ID)101106     0.2448741
## factor(PLOYER1_ID)101107     0.0678873
## factor(PLOYER1_ID)101108     0.0587795
## factor(PLOYER1_ID)101109     0.1258714
## factor(PLOYER1_ID)101112     0.1220668
## factor(PLOYER1_ID)101123     0.0716799
## factor(PLOYER1_ID)101133     0.0736767
## factor(PLOYER1_ID)101139     0.0746590
## factor(PLOYER1_ID)101141     0.0702398

```

```

## factor(PLOYER1_ID)101150 0.0544230
## factor(PLOYER1_ID)101161 0.0824855
## factor(PLOYER1_ID)101162 0.0787001
## factor(PLOYER1_ID)101181 0.1350898
## factor(PLOYER1_ID)200746 0.0550010
## factor(PLOYER1_ID)200752 0.0614653
## factor(PLOYER1_ID)200755 0.0572900
## factor(PLOYER1_ID)200757 0.1021347
## factor(PLOYER1_ID)200765 0.0859495
## factor(PLOYER1_ID)200768 0.0591174
## factor(PLOYER1_ID)200782 0.0743213
## factor(PLOYER1_ID)200794 0.0574324
## factor(PLOYER1_ID)200826 0.0693850
## factor(PLOYER1_ID)201142 0.0542917
## factor(PLOYER1_ID)201143 0.0664743
## factor(PLOYER1_ID)201144 0.0550621
## factor(PLOYER1_ID)201145 0.0586840
## factor(PLOYER1_ID)201147 0.0813017
## factor(PLOYER1_ID)201149 0.0646993
## factor(PLOYER1_ID)201152 0.0623089
## factor(PLOYER1_ID)201158 0.0632065
## factor(PLOYER1_ID)201160 0.1155903
## factor(PLOYER1_ID)201162 0.0796773
## factor(PLOYER1_ID)201163 0.0974168
## factor(PLOYER1_ID)201188 0.0573403
## factor(PLOYER1_ID)201229 0.0739924
## factor(PLOYER1_ID)201563 0.0837800
## factor(PLOYER1_ID)201565 0.0606872
## factor(PLOYER1_ID)201566 0.0546682
## factor(PLOYER1_ID)201567 0.0641624
## factor(PLOYER1_ID)201568 0.0550591
## factor(PLOYER1_ID)201569 0.0611548
## factor(PLOYER1_ID)201571 0.0585719
## factor(PLOYER1_ID)201572 0.0624549
## factor(PLOYER1_ID)201573 0.0935685
## factor(PLOYER1_ID)201577 0.0632938
## factor(PLOYER1_ID)201580 0.0611504
## factor(PLOYER1_ID)201583 0.1155954
## factor(PLOYER1_ID)201584 0.1039265
## factor(PLOYER1_ID)201585 0.0988851
## factor(PLOYER1_ID)201586 0.0598297
## factor(PLOYER1_ID)201587 0.0673875
## factor(PLOYER1_ID)201588 0.0680559
## factor(PLOYER1_ID)201599 0.0570890
## factor(PLOYER1_ID)201601 0.1924156
## factor(PLOYER1_ID)201609 0.0656613
## factor(PLOYER1_ID)201933 0.0540390
## factor(PLOYER1_ID)201935 0.0529894
## factor(PLOYER1_ID)201936 0.0606868
## factor(PLOYER1_ID)201937 0.0579831
## factor(PLOYER1_ID)201939 0.0566312
## factor(PLOYER1_ID)201942 0.0547492
## factor(PLOYER1_ID)201949 0.0711741
## factor(PLOYER1_ID)201950 0.0569415

```

```

## factor(PLOYER1_ID)201952 0.0610877
## factor(PLOYER1_ID)201954 0.0592768
## factor(PLOYER1_ID)201956 0.0746590
## factor(PLOYER1_ID)201959 0.0598309
## factor(PLOYER1_ID)201960 0.0576274
## factor(PLOYER1_ID)201961 0.0782246
## factor(PLOYER1_ID)201967 0.1103049
## factor(PLOYER1_ID)201973 0.0689790
## factor(PLOYER1_ID)201975 0.4179371
## factor(PLOYER1_ID)201976 0.0632951
## factor(PLOYER1_ID)201980 0.0807720
## factor(PLOYER1_ID)201988 0.0654114
## factor(PLOYER1_ID)202066 0.0649282
## factor(PLOYER1_ID)202083 0.0605247
## factor(PLOYER1_ID)202322 0.0599196
## factor(PLOYER1_ID)202323 0.0650451
## factor(PLOYER1_ID)202324 0.0579840
## factor(PLOYER1_ID)202325 0.1080112
## factor(PLOYER1_ID)202326 0.0616623
## factor(PLOYER1_ID)202327 0.0913414
## factor(PLOYER1_ID)202328 0.0706916
## factor(PLOYER1_ID)202329 0.0600196
## factor(PLOYER1_ID)202330 0.0593904
## factor(PLOYER1_ID)202331 0.0540933
## factor(PLOYER1_ID)202334 0.0605835
## factor(PLOYER1_ID)202335 0.0913438
## factor(PLOYER1_ID)202339 0.0577624
## factor(PLOYER1_ID)202340 0.0777957
## factor(PLOYER1_ID)202347 0.0819011
## factor(PLOYER1_ID)202355 0.0575806
## factor(PLOYER1_ID)202357 0.0669236
## factor(PLOYER1_ID)202362 0.0704573
## factor(PLOYER1_ID)202391 0.0585412
## factor(PLOYER1_ID)202397 0.0733661
## factor(PLOYER1_ID)202498 0.0859552
## factor(PLOYER1_ID)202681 0.0575267
## factor(PLOYER1_ID)202683 0.0590011
## factor(PLOYER1_ID)202684 0.0650457
## factor(PLOYER1_ID)202685 0.0594738
## factor(PLOYER1_ID)202687 0.0670688
## factor(PLOYER1_ID)202688 0.0875745
## factor(PLOYER1_ID)202689 0.0546775
## factor(PLOYER1_ID)202690 0.1768796
## factor(PLOYER1_ID)202691 0.0607993
## factor(PLOYER1_ID)202692 0.0618695
## factor(PLOYER1_ID)202693 0.0669175
## factor(PLOYER1_ID)202694 0.0600179
## factor(PLOYER1_ID)202695 0.0548736
## factor(PLOYER1_ID)202696 0.0580121
## factor(PLOYER1_ID)202697 0.0801964
## factor(PLOYER1_ID)202699 0.0562850
## factor(PLOYER1_ID)202700 0.2977301
## factor(PLOYER1_ID)202702 0.0659199
## factor(PLOYER1_ID)202703 0.0632046

```



```

## factor(PLOYER1_ID)202704 0.0577602
## factor(PLOYER1_ID)202705 0.0884392
## factor(PLOYER1_ID)202709 0.0812979
## factor(PLOYER1_ID)202710 0.0554879
## factor(PLOYER1_ID)202711 0.0563180
## factor(PLOYER1_ID)202714 0.0682355
## factor(PLOYER1_ID)202718 0.0974177
## factor(PLOYER1_ID)202720 0.0903287
## factor(PLOYER1_ID)202722 0.0739950
## factor(PLOYER1_ID)202734 0.0743210
## factor(PLOYER1_ID)202738 0.0947716
## factor(PLOYER1_ID)202954 0.0935657
## factor(PLOYER1_ID)203076 0.0548180
## factor(PLOYER1_ID)203077 0.0632959
## factor(PLOYER1_ID)203078 0.0546924
## factor(PLOYER1_ID)203079 0.0807341
## factor(PLOYER1_ID)203081 0.0542454
## factor(PLOYER1_ID)203082 0.0616619
## factor(PLOYER1_ID)203083 0.0549979
## factor(PLOYER1_ID)203084 0.0568041
## factor(PLOYER1_ID)203085 0.0664727
## factor(PLOYER1_ID)203086 0.0773420
## factor(PLOYER1_ID)203087 0.0571766
## factor(PLOYER1_ID)203089 0.1407668
## factor(PLOYER1_ID)203090 0.0704600
## factor(PLOYER1_ID)203092 0.1103067
## factor(PLOYER1_ID)203093 0.4179371
## factor(PLOYER1_ID)203095 0.0601607
## factor(PLOYER1_ID)203098 0.1103023
## factor(PLOYER1_ID)203101 0.0913435
## factor(PLOYER1_ID)203107 0.0607010
## factor(PLOYER1_ID)203109 0.0590040
## factor(PLOYER1_ID)203110 0.0670704
## factor(PLOYER1_ID)203112 0.1407665
## factor(PLOYER1_ID)203114 0.0572222
## factor(PLOYER1_ID)203115 0.0702318
## factor(PLOYER1_ID)203118 0.0884385
## factor(PLOYER1_ID)203121 0.0709292
## factor(PLOYER1_ID)203124 0.1039276
## factor(PLOYER1_ID)203145 0.0599334
## factor(PLOYER1_ID)203159 0.4179371
## factor(PLOYER1_ID)203200 0.0650488
## factor(PLOYER1_ID)203210 0.0656602
## factor(PLOYER1_ID)203263 0.2136096
## factor(PLOYER1_ID)203382 0.0733740
## factor(PLOYER1_ID)203457 0.0691771
## factor(PLOYER1_ID)203458 0.0583641
## factor(PLOYER1_ID)203459 0.0754455
## factor(PLOYER1_ID)203463 0.1302036
## factor(PLOYER1_ID)203468 0.0591894
## factor(PLOYER1_ID)203469 0.0618696
## factor(PLOYER1_ID)203471 0.0580125
## factor(PLOYER1_ID)203473 0.0642625
## factor(PLOYER1_ID)203476 0.0650450

```

```

## factor(PLOYER1_ID)203477    0.0988760
## factor(PLOYER1_ID)203482    0.0594773
## factor(PLOYER1_ID)203484    0.0607999
## factor(PLOYER1_ID)203485    0.2448789
## factor(PLOYER1_ID)203486    0.0589620
## factor(PLOYER1_ID)203487    0.0765175
## factor(PLOYER1_ID)203488    0.0680648
## factor(PLOYER1_ID)203490    0.0663344
##                               t value
## (Intercept)                 14.011
## clutch                      -1.731
## factor(PLOYER1_ID)1717       0.831
## factor(PLOYER1_ID)2037       2.037
## factor(PLOYER1_ID)2199      -1.901
## factor(PLOYER1_ID)2200      -0.133
## factor(PLOYER1_ID)2225       0.301
## factor(PLOYER1_ID)2403      -0.671
## factor(PLOYER1_ID)2544      -0.879
## factor(PLOYER1_ID)2546      -0.328
## factor(PLOYER1_ID)2548      -0.098
## factor(PLOYER1_ID)2585       1.051
## factor(PLOYER1_ID)2594       1.536
## factor(PLOYER1_ID)2617       0.217
## factor(PLOYER1_ID)2730      -1.389
## factor(PLOYER1_ID)2733       0.899
## factor(PLOYER1_ID)2734       0.754
## factor(PLOYER1_ID)2736       0.002
## factor(PLOYER1_ID)2738      -1.843
## factor(PLOYER1_ID)2747       0.584
## factor(PLOYER1_ID)2772       1.292
## factor(PLOYER1_ID)101106     1.191
## factor(PLOYER1_ID)101107     0.774
## factor(PLOYER1_ID)101108     2.511
## factor(PLOYER1_ID)101109     1.640
## factor(PLOYER1_ID)101112     0.614
## factor(PLOYER1_ID)101123     1.767
## factor(PLOYER1_ID)101133    -0.352
## factor(PLOYER1_ID)101139     1.523
## factor(PLOYER1_ID)101141     1.553
## factor(PLOYER1_ID)101150     3.006
## factor(PLOYER1_ID)101161     0.523
## factor(PLOYER1_ID)101162     0.148
## factor(PLOYER1_ID)101181     0.780
## factor(PLOYER1_ID)200746     2.426
## factor(PLOYER1_ID)200752     1.676
## factor(PLOYER1_ID)200755     3.160
## factor(PLOYER1_ID)200757    -0.710
## factor(PLOYER1_ID)200765    -0.862
## factor(PLOYER1_ID)200768     1.924
## factor(PLOYER1_ID)200782    -0.235
## factor(PLOYER1_ID)200794     0.219
## factor(PLOYER1_ID)200826    -0.153
## factor(PLOYER1_ID)201142     3.150
## factor(PLOYER1_ID)201143     1.658

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## factor(PLOYER1_ID)201144      2.382
## factor(PLOYER1_ID)201145      2.957
## factor(PLOYER1_ID)201147       0.140
## factor(PLOYER1_ID)201149       0.016
## factor(PLOYER1_ID)201152     -1.144
## factor(PLOYER1_ID)201158       3.000
## factor(PLOYER1_ID)201160       1.390
## factor(PLOYER1_ID)201162     -0.263
## factor(PLOYER1_ID)201163       0.047
## factor(PLOYER1_ID)201188       0.792
## factor(PLOYER1_ID)201229       0.962
## factor(PLOYER1_ID)201563       0.057
## factor(PLOYER1_ID)201565       2.354
## factor(PLOYER1_ID)201566     -1.031
## factor(PLOYER1_ID)201567       2.965
## factor(PLOYER1_ID)201568       3.455
## factor(PLOYER1_ID)201569       1.136
## factor(PLOYER1_ID)201571       2.612
## factor(PLOYER1_ID)201572       2.069
## factor(PLOYER1_ID)201573     -1.504
## factor(PLOYER1_ID)201577       0.161
## factor(PLOYER1_ID)201580     -1.367
## factor(PLOYER1_ID)201583       0.289
## factor(PLOYER1_ID)201584     -0.437
## factor(PLOYER1_ID)201585     -3.048
## factor(PLOYER1_ID)201586       0.817
## factor(PLOYER1_ID)201587       2.241
## factor(PLOYER1_ID)201588       1.611
## factor(PLOYER1_ID)201599     -0.170
## factor(PLOYER1_ID)201601     -1.667
## factor(PLOYER1_ID)201609       1.010
## factor(PLOYER1_ID)201933       0.729
## factor(PLOYER1_ID)201935       3.129
## factor(PLOYER1_ID)201936       0.071
## factor(PLOYER1_ID)201937       2.447
## factor(PLOYER1_ID)201939       3.572
## factor(PLOYER1_ID)201942       2.115
## factor(PLOYER1_ID)201949     -0.005
## factor(PLOYER1_ID)201950       0.968
## factor(PLOYER1_ID)201952       1.472
## factor(PLOYER1_ID)201954       2.013
## factor(PLOYER1_ID)201956     -0.564
## factor(PLOYER1_ID)201959       0.710
## factor(PLOYER1_ID)201960       0.799
## factor(PLOYER1_ID)201961       1.065
## factor(PLOYER1_ID)201967       0.610
## factor(PLOYER1_ID)201973       1.268
## factor(PLOYER1_ID)201975       0.709
## factor(PLOYER1_ID)201976       1.070
## factor(PLOYER1_ID)201980       1.580
## factor(PLOYER1_ID)201988       2.135
## factor(PLOYER1_ID)202066       0.495
## factor(PLOYER1_ID)202083       1.594
## factor(PLOYER1_ID)202322     -0.256

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## factor(PLOYER1_ID)202323 -0.062
## factor(PLOYER1_ID)202324 -0.661
## factor(PLOYER1_ID)202325 -0.333
## factor(PLOYER1_ID)202326 0.371
## factor(PLOYER1_ID)202327 -0.840
## factor(PLOYER1_ID)202328 -1.243
## factor(PLOYER1_ID)202329 2.555
## factor(PLOYER1_ID)202330 2.033
## factor(PLOYER1_ID)202331 2.328
## factor(PLOYER1_ID)202334 -1.634
## factor(PLOYER1_ID)202335 -0.899
## factor(PLOYER1_ID)202339 0.636
## factor(PLOYER1_ID)202340 1.923
## factor(PLOYER1_ID)202347 1.245
## factor(PLOYER1_ID)202355 -4.612
## factor(PLOYER1_ID)202357 0.691
## factor(PLOYER1_ID)202362 -0.368
## factor(PLOYER1_ID)202391 2.107
## factor(PLOYER1_ID)202397 0.590
## factor(PLOYER1_ID)202498 0.422
## factor(PLOYER1_ID)202681 2.795
## factor(PLOYER1_ID)202683 1.203
## factor(PLOYER1_ID)202684 -1.139
## factor(PLOYER1_ID)202685 1.379
## factor(PLOYER1_ID)202687 -1.155
## factor(PLOYER1_ID)202688 0.893
## factor(PLOYER1_ID)202689 2.402
## factor(PLOYER1_ID)202690 1.640
## factor(PLOYER1_ID)202691 1.671
## factor(PLOYER1_ID)202692 1.769
## factor(PLOYER1_ID)202693 0.865
## factor(PLOYER1_ID)202694 2.193
## factor(PLOYER1_ID)202695 2.575
## factor(PLOYER1_ID)202696 1.299
## factor(PLOYER1_ID)202697 1.057
## factor(PLOYER1_ID)202699 2.747
## factor(PLOYER1_ID)202700 -2.364
## factor(PLOYER1_ID)202702 -1.028
## factor(PLOYER1_ID)202703 2.107
## factor(PLOYER1_ID)202704 2.640
## factor(PLOYER1_ID)202705 -0.191
## factor(PLOYER1_ID)202709 -0.193
## factor(PLOYER1_ID)202710 2.570
## factor(PLOYER1_ID)202711 1.632
## factor(PLOYER1_ID)202714 -0.293
## factor(PLOYER1_ID)202718 1.702
## factor(PLOYER1_ID)202720 0.355
## factor(PLOYER1_ID)202722 2.300
## factor(PLOYER1_ID)202734 0.673
## factor(PLOYER1_ID)202738 -0.874
## factor(PLOYER1_ID)202954 1.588
## factor(PLOYER1_ID)203076 1.460
## factor(PLOYER1_ID)203077 0.911
## factor(PLOYER1_ID)203078 1.729

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## factor(PLOYER1_ID)203079 -2.665
## factor(PLOYER1_ID)203081 3.678
## factor(PLOYER1_ID)203082 2.658
## factor(PLOYER1_ID)203083 -2.226
## factor(PLOYER1_ID)203084 1.924
## factor(PLOYER1_ID)203085 -2.793
## factor(PLOYER1_ID)203086 1.677
## factor(PLOYER1_ID)203087 3.047
## factor(PLOYER1_ID)203089 -0.825
## factor(PLOYER1_ID)203090 -0.618
## factor(PLOYER1_ID)203092 0.571
## factor(PLOYER1_ID)203093 -1.684
## factor(PLOYER1_ID)203095 1.577
## factor(PLOYER1_ID)203098 1.113
## factor(PLOYER1_ID)203101 -2.015
## factor(PLOYER1_ID)203107 1.742
## factor(PLOYER1_ID)203109 0.096
## factor(PLOYER1_ID)203110 -0.350
## factor(PLOYER1_ID)203112 -0.092
## factor(PLOYER1_ID)203114 2.137
## factor(PLOYER1_ID)203115 0.794
## factor(PLOYER1_ID)203118 -0.513
## factor(PLOYER1_ID)203121 1.061
## factor(PLOYER1_ID)203124 0.948
## factor(PLOYER1_ID)203145 0.197
## factor(PLOYER1_ID)203159 0.709
## factor(PLOYER1_ID)203200 2.832
## factor(PLOYER1_ID)203210 1.161
## factor(PLOYER1_ID)203263 1.387
## factor(PLOYER1_ID)203382 1.895
## factor(PLOYER1_ID)203457 -0.450
## factor(PLOYER1_ID)203458 -1.116
## factor(PLOYER1_ID)203459 0.228
## factor(PLOYER1_ID)203463 -0.285
## factor(PLOYER1_ID)203468 1.952
## factor(PLOYER1_ID)203469 1.162
## factor(PLOYER1_ID)203471 1.833
## factor(PLOYER1_ID)203473 1.578
## factor(PLOYER1_ID)203476 1.772
## factor(PLOYER1_ID)203477 0.784
## factor(PLOYER1_ID)203482 1.801
## factor(PLOYER1_ID)203484 2.544
## factor(PLOYER1_ID)203485 1.172
## factor(PLOYER1_ID)203486 -2.595
## factor(PLOYER1_ID)203487 -1.372
## factor(PLOYER1_ID)203488 1.597
## factor(PLOYER1_ID)203490 1.481
## Pr(>|t|)
## (Intercept) < 2e-16
## clutch 0.083474
## factor(PLOYER1_ID)1717 0.405902
## factor(PLOYER1_ID)2037 0.041645
## factor(PLOYER1_ID)2199 0.057355
## factor(PLOYER1_ID)2200 0.893847

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## factor(PLOYER1_ID)2225      0.763276
## factor(PLOYER1_ID)2403      0.502496
## factor(PLOYER1_ID)2544      0.379480
## factor(PLOYER1_ID)2546      0.743085
## factor(PLOYER1_ID)2548      0.921822
## factor(PLOYER1_ID)2585      0.293052
## factor(PLOYER1_ID)2594      0.124493
## factor(PLOYER1_ID)2617      0.828491
## factor(PLOYER1_ID)2730      0.164816
## factor(PLOYER1_ID)2733      0.368453
## factor(PLOYER1_ID)2734      0.450961
## factor(PLOYER1_ID)2736      0.998151
## factor(PLOYER1_ID)2738      0.065403
## factor(PLOYER1_ID)2747      0.559351
## factor(PLOYER1_ID)2772      0.196414
## factor(PLOYER1_ID)101106    0.233575
## factor(PLOYER1_ID)101107    0.438909
## factor(PLOYER1_ID)101108    0.012029
## factor(PLOYER1_ID)101109    0.101066
## factor(PLOYER1_ID)101112    0.539263
## factor(PLOYER1_ID)101123    0.077161
## factor(PLOYER1_ID)101133    0.725110
## factor(PLOYER1_ID)101139    0.127720
## factor(PLOYER1_ID)101141    0.120391
## factor(PLOYER1_ID)101150    0.002650
## factor(PLOYER1_ID)101161    0.600959
## factor(PLOYER1_ID)101162    0.882688
## factor(PLOYER1_ID)101181    0.435640
## factor(PLOYER1_ID)200746    0.015286
## factor(PLOYER1_ID)200752    0.093798
## factor(PLOYER1_ID)200755    0.001576
## factor(PLOYER1_ID)200757    0.477956
## factor(PLOYER1_ID)200765    0.388768
## factor(PLOYER1_ID)200768    0.054332
## factor(PLOYER1_ID)200782    0.814238
## factor(PLOYER1_ID)200794    0.826976
## factor(PLOYER1_ID)200826    0.878141
## factor(PLOYER1_ID)201142    0.001634
## factor(PLOYER1_ID)201143    0.097297
## factor(PLOYER1_ID)201144    0.017242
## factor(PLOYER1_ID)201145    0.003113
## factor(PLOYER1_ID)201147    0.888690
## factor(PLOYER1_ID)201149    0.986943
## factor(PLOYER1_ID)201152    0.252624
## factor(PLOYER1_ID)201158    0.002702
## factor(PLOYER1_ID)201160    0.164492
## factor(PLOYER1_ID)201162    0.792735
## factor(PLOYER1_ID)201163    0.962309
## factor(PLOYER1_ID)201188    0.428346
## factor(PLOYER1_ID)201229    0.336125
## factor(PLOYER1_ID)201563    0.954852
## factor(PLOYER1_ID)201565    0.018575
## factor(PLOYER1_ID)201566    0.302680
## factor(PLOYER1_ID)201567    0.003023

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## factor(PLOYER1_ID)201568 0.000551
## factor(PLOYER1_ID)201569 0.256115
## factor(PLOYER1_ID)201571 0.009011
## factor(PLOYER1_ID)201572 0.038519
## factor(PLOYER1_ID)201573 0.132694
## factor(PLOYER1_ID)201577 0.872248
## factor(PLOYER1_ID)201580 0.171777
## factor(PLOYER1_ID)201583 0.772532
## factor(PLOYER1_ID)201584 0.661763
## factor(PLOYER1_ID)201585 0.002308
## factor(PLOYER1_ID)201586 0.414039
## factor(PLOYER1_ID)201587 0.025012
## factor(PLOYER1_ID)201588 0.107220
## factor(PLOYER1_ID)201599 0.865116
## factor(PLOYER1_ID)201601 0.095579
## factor(PLOYER1_ID)201609 0.312686
## factor(PLOYER1_ID)201933 0.466231
## factor(PLOYER1_ID)201935 0.001757
## factor(PLOYER1_ID)201936 0.943202
## factor(PLOYER1_ID)201937 0.014405
## factor(PLOYER1_ID)201939 0.000354
## factor(PLOYER1_ID)201942 0.034437
## factor(PLOYER1_ID)201949 0.996168
## factor(PLOYER1_ID)201950 0.333033
## factor(PLOYER1_ID)201952 0.140905
## factor(PLOYER1_ID)201954 0.044161
## factor(PLOYER1_ID)201956 0.572670
## factor(PLOYER1_ID)201959 0.477973
## factor(PLOYER1_ID)201960 0.424299
## factor(PLOYER1_ID)201961 0.286934
## factor(PLOYER1_ID)201967 0.541997
## factor(PLOYER1_ID)201973 0.204788
## factor(PLOYER1_ID)201975 0.478389
## factor(PLOYER1_ID)201976 0.284697
## factor(PLOYER1_ID)201980 0.114176
## factor(PLOYER1_ID)201988 0.032800
## factor(PLOYER1_ID)202066 0.620447
## factor(PLOYER1_ID)202083 0.110879
## factor(PLOYER1_ID)202322 0.798040
## factor(PLOYER1_ID)202323 0.950595
## factor(PLOYER1_ID)202324 0.508428
## factor(PLOYER1_ID)202325 0.738838
## factor(PLOYER1_ID)202326 0.711007
## factor(PLOYER1_ID)202327 0.400897
## factor(PLOYER1_ID)202328 0.213886
## factor(PLOYER1_ID)202329 0.010614
## factor(PLOYER1_ID)202330 0.042059
## factor(PLOYER1_ID)202331 0.019937
## factor(PLOYER1_ID)202334 0.102232
## factor(PLOYER1_ID)202335 0.368923
## factor(PLOYER1_ID)202339 0.524827
## factor(PLOYER1_ID)202340 0.054441
## factor(PLOYER1_ID)202347 0.213020
## factor(PLOYER1_ID)202355 3.99e-06

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## factor(PLOYER1_ID)202357 0.489739
## factor(PLOYER1_ID)202362 0.712801
## factor(PLOYER1_ID)202391 0.035139
## factor(PLOYER1_ID)202397 0.555287
## factor(PLOYER1_ID)202498 0.673234
## factor(PLOYER1_ID)202681 0.005184
## factor(PLOYER1_ID)202683 0.228993
## factor(PLOYER1_ID)202684 0.254506
## factor(PLOYER1_ID)202685 0.167853
## factor(PLOYER1_ID)202687 0.248166
## factor(PLOYER1_ID)202688 0.371889
## factor(PLOYER1_ID)202689 0.016320
## factor(PLOYER1_ID)202690 0.101078
## factor(PLOYER1_ID)202691 0.094819
## factor(PLOYER1_ID)202692 0.076887
## factor(PLOYER1_ID)202693 0.386982
## factor(PLOYER1_ID)202694 0.028283
## factor(PLOYER1_ID)202695 0.010013
## factor(PLOYER1_ID)202696 0.193812
## factor(PLOYER1_ID)202697 0.290405
## factor(PLOYER1_ID)202699 0.006008
## factor(PLOYER1_ID)202700 0.018100
## factor(PLOYER1_ID)202702 0.303904
## factor(PLOYER1_ID)202703 0.035162
## factor(PLOYER1_ID)202704 0.008281
## factor(PLOYER1_ID)202705 0.848715
## factor(PLOYER1_ID)202709 0.847226
## factor(PLOYER1_ID)202710 0.010170
## factor(PLOYER1_ID)202711 0.102725
## factor(PLOYER1_ID)202714 0.769650
## factor(PLOYER1_ID)202718 0.088844
## factor(PLOYER1_ID)202720 0.722325
## factor(PLOYER1_ID)202722 0.021447
## factor(PLOYER1_ID)202734 0.500943
## factor(PLOYER1_ID)202738 0.382067
## factor(PLOYER1_ID)202954 0.112338
## factor(PLOYER1_ID)203076 0.144309
## factor(PLOYER1_ID)203077 0.362124
## factor(PLOYER1_ID)203078 0.083736
## factor(PLOYER1_ID)203079 0.007697
## factor(PLOYER1_ID)203081 0.000235
## factor(PLOYER1_ID)203082 0.007860
## factor(PLOYER1_ID)203083 0.026048
## factor(PLOYER1_ID)203084 0.054344
## factor(PLOYER1_ID)203085 0.005221
## factor(PLOYER1_ID)203086 0.093542
## factor(PLOYER1_ID)203087 0.002311
## factor(PLOYER1_ID)203089 0.409332
## factor(PLOYER1_ID)203090 0.536720
## factor(PLOYER1_ID)203092 0.567878
## factor(PLOYER1_ID)203093 0.092225
## factor(PLOYER1_ID)203095 0.114868
## factor(PLOYER1_ID)203098 0.265721
## factor(PLOYER1_ID)203101 0.043865

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```

## factor(PLOYER1_ID)203107 0.081428
## factor(PLOYER1_ID)203109 0.923152
## factor(PLOYER1_ID)203110 0.726125
## factor(PLOYER1_ID)203112 0.926597
## factor(PLOYER1_ID)203114 0.032607
## factor(PLOYER1_ID)203115 0.427253
## factor(PLOYER1_ID)203118 0.608049
## factor(PLOYER1_ID)203121 0.288489
## factor(PLOYER1_ID)203124 0.342905
## factor(PLOYER1_ID)203145 0.844056
## factor(PLOYER1_ID)203159 0.478389
## factor(PLOYER1_ID)203200 0.004623
## factor(PLOYER1_ID)203210 0.245747
## factor(PLOYER1_ID)203263 0.165448
## factor(PLOYER1_ID)203382 0.058118
## factor(PLOYER1_ID)203457 0.652384
## factor(PLOYER1_ID)203458 0.264563
## factor(PLOYER1_ID)203459 0.819425
## factor(PLOYER1_ID)203463 0.775943
## factor(PLOYER1_ID)203468 0.050943
## factor(PLOYER1_ID)203469 0.245348
## factor(PLOYER1_ID)203471 0.066749
## factor(PLOYER1_ID)203473 0.114470
## factor(PLOYER1_ID)203476 0.076447
## factor(PLOYER1_ID)203477 0.433069
## factor(PLOYER1_ID)203482 0.071669
## factor(PLOYER1_ID)203484 0.010960
## factor(PLOYER1_ID)203485 0.241004
## factor(PLOYER1_ID)203486 0.009463
## factor(PLOYER1_ID)203487 0.170087
## factor(PLOYER1_ID)203488 0.110167
## factor(PLOYER1_ID)203490 0.138659
##
## (Intercept) ***
## clutch .
## factor(PLOYER1_ID)1717
## factor(PLOYER1_ID)2037 *
## factor(PLOYER1_ID)2199 .
## factor(PLOYER1_ID)2200
## factor(PLOYER1_ID)2225
## factor(PLOYER1_ID)2403
## factor(PLOYER1_ID)2544
## factor(PLOYER1_ID)2546
## factor(PLOYER1_ID)2548
## factor(PLOYER1_ID)2585
## factor(PLOYER1_ID)2594
## factor(PLOYER1_ID)2617
## factor(PLOYER1_ID)2730
## factor(PLOYER1_ID)2733
## factor(PLOYER1_ID)2734
## factor(PLOYER1_ID)2736
## factor(PLOYER1_ID)2738 .
## factor(PLOYER1_ID)2747
## factor(PLOYER1_ID)2772

```

```

## factor(PLOYER1_ID)101106
## factor(PLOYER1_ID)101107
## factor(PLOYER1_ID)101108 *
## factor(PLOYER1_ID)101109
## factor(PLOYER1_ID)101112
## factor(PLOYER1_ID)101123 .
## factor(PLOYER1_ID)101133
## factor(PLOYER1_ID)101139
## factor(PLOYER1_ID)101141
## factor(PLOYER1_ID)101150 **
## factor(PLOYER1_ID)101161
## factor(PLOYER1_ID)101162
## factor(PLOYER1_ID)101181
## factor(PLOYER1_ID)200746 *
## factor(PLOYER1_ID)200752 .
## factor(PLOYER1_ID)200755 **
## factor(PLOYER1_ID)200757
## factor(PLOYER1_ID)200765
## factor(PLOYER1_ID)200768 .
## factor(PLOYER1_ID)200782
## factor(PLOYER1_ID)200794
## factor(PLOYER1_ID)200826
## factor(PLOYER1_ID)201142 **
## factor(PLOYER1_ID)201143 .
## factor(PLOYER1_ID)201144 *
## factor(PLOYER1_ID)201145 **
## factor(PLOYER1_ID)201147
## factor(PLOYER1_ID)201149
## factor(PLOYER1_ID)201152
## factor(PLOYER1_ID)201158 **
## factor(PLOYER1_ID)201160
## factor(PLOYER1_ID)201162
## factor(PLOYER1_ID)201163
## factor(PLOYER1_ID)201188
## factor(PLOYER1_ID)201229
## factor(PLOYER1_ID)201563
## factor(PLOYER1_ID)201565 *
## factor(PLOYER1_ID)201566
## factor(PLOYER1_ID)201567 **
## factor(PLOYER1_ID)201568 ***
## factor(PLOYER1_ID)201569
## factor(PLOYER1_ID)201571 **
## factor(PLOYER1_ID)201572 *
## factor(PLOYER1_ID)201573
## factor(PLOYER1_ID)201577
## factor(PLOYER1_ID)201580
## factor(PLOYER1_ID)201583
## factor(PLOYER1_ID)201584
## factor(PLOYER1_ID)201585 **
## factor(PLOYER1_ID)201586
## factor(PLOYER1_ID)201587 *
## factor(PLOYER1_ID)201588
## factor(PLOYER1_ID)201599
## factor(PLOYER1_ID)201601 .

```

```

## factor(PLOYER1_ID)201609
## factor(PLOYER1_ID)201933
## factor(PLOYER1_ID)201935  **
## factor(PLOYER1_ID)201936
## factor(PLOYER1_ID)201937  *
## factor(PLOYER1_ID)201939  ***
## factor(PLOYER1_ID)201942  *
## factor(PLOYER1_ID)201949
## factor(PLOYER1_ID)201950
## factor(PLOYER1_ID)201952
## factor(PLOYER1_ID)201954  *
## factor(PLOYER1_ID)201956
## factor(PLOYER1_ID)201959
## factor(PLOYER1_ID)201960
## factor(PLOYER1_ID)201961
## factor(PLOYER1_ID)201967
## factor(PLOYER1_ID)201973
## factor(PLOYER1_ID)201975
## factor(PLOYER1_ID)201976
## factor(PLOYER1_ID)201980
## factor(PLOYER1_ID)201988  *
## factor(PLOYER1_ID)202066
## factor(PLOYER1_ID)202083
## factor(PLOYER1_ID)202322
## factor(PLOYER1_ID)202323
## factor(PLOYER1_ID)202324
## factor(PLOYER1_ID)202325
## factor(PLOYER1_ID)202326
## factor(PLOYER1_ID)202327
## factor(PLOYER1_ID)202328
## factor(PLOYER1_ID)202329  *
## factor(PLOYER1_ID)202330  *
## factor(PLOYER1_ID)202331  *
## factor(PLOYER1_ID)202334
## factor(PLOYER1_ID)202335
## factor(PLOYER1_ID)202339
## factor(PLOYER1_ID)202340  .
## factor(PLOYER1_ID)202347
## factor(PLOYER1_ID)202355  ***
## factor(PLOYER1_ID)202357
## factor(PLOYER1_ID)202362
## factor(PLOYER1_ID)202391  *
## factor(PLOYER1_ID)202397
## factor(PLOYER1_ID)202498
## factor(PLOYER1_ID)202681  **
## factor(PLOYER1_ID)202683
## factor(PLOYER1_ID)202684
## factor(PLOYER1_ID)202685
## factor(PLOYER1_ID)202687
## factor(PLOYER1_ID)202688
## factor(PLOYER1_ID)202689  *
## factor(PLOYER1_ID)202690
## factor(PLOYER1_ID)202691  .
## factor(PLOYER1_ID)202692  .

```

```

## factor(PLOYER1_ID)202693
## factor(PLOYER1_ID)202694 *
## factor(PLOYER1_ID)202695 *
## factor(PLOYER1_ID)202696
## factor(PLOYER1_ID)202697
## factor(PLOYER1_ID)202699 **
## factor(PLOYER1_ID)202700 *
## factor(PLOYER1_ID)202702
## factor(PLOYER1_ID)202703 *
## factor(PLOYER1_ID)202704 **
## factor(PLOYER1_ID)202705
## factor(PLOYER1_ID)202709
## factor(PLOYER1_ID)202710 *
## factor(PLOYER1_ID)202711
## factor(PLOYER1_ID)202714
## factor(PLOYER1_ID)202718 .
## factor(PLOYER1_ID)202720
## factor(PLOYER1_ID)202722 *
## factor(PLOYER1_ID)202734
## factor(PLOYER1_ID)202738
## factor(PLOYER1_ID)202954
## factor(PLOYER1_ID)203076
## factor(PLOYER1_ID)203077
## factor(PLOYER1_ID)203078 .
## factor(PLOYER1_ID)203079 **
## factor(PLOYER1_ID)203081 ***
## factor(PLOYER1_ID)203082 **
## factor(PLOYER1_ID)203083 *
## factor(PLOYER1_ID)203084 .
## factor(PLOYER1_ID)203085 **
## factor(PLOYER1_ID)203086 .
## factor(PLOYER1_ID)203087 **
## factor(PLOYER1_ID)203089
## factor(PLOYER1_ID)203090
## factor(PLOYER1_ID)203092
## factor(PLOYER1_ID)203093 .
## factor(PLOYER1_ID)203095
## factor(PLOYER1_ID)203098
## factor(PLOYER1_ID)203101 *
## factor(PLOYER1_ID)203107 .
## factor(PLOYER1_ID)203109
## factor(PLOYER1_ID)203110
## factor(PLOYER1_ID)203112
## factor(PLOYER1_ID)203114 *
## factor(PLOYER1_ID)203115
## factor(PLOYER1_ID)203118
## factor(PLOYER1_ID)203121
## factor(PLOYER1_ID)203124
## factor(PLOYER1_ID)203145
## factor(PLOYER1_ID)203159
## factor(PLOYER1_ID)203200 **
## factor(PLOYER1_ID)203210
## factor(PLOYER1_ID)203263
## factor(PLOYER1_ID)203382 .

```

```
## factor(PAYER1_ID)203457
## factor(PAYER1_ID)203458
## factor(PAYER1_ID)203459
## factor(PAYER1_ID)203463
## factor(PAYER1_ID)203468 .
## factor(PAYER1_ID)203469
## factor(PAYER1_ID)203471 .
## factor(PAYER1_ID)203473
## factor(PAYER1_ID)203476 .
## factor(PAYER1_ID)203477
## factor(PAYER1_ID)203482 .
## factor(PAYER1_ID)203484 *
## factor(PAYER1_ID)203485
## factor(PAYER1_ID)203486 **
## factor(PAYER1_ID)203487
## factor(PAYER1_ID)203488
## factor(PAYER1_ID)203490
## [ reached getOption("max.print") -- omitted 311 rows ]
## ---
## Signif. codes:
## 0 '***' 0.001 '**' 0.01 '*' 0.05
## '.' 0.1 ' ' 1
##
## Residual standard error: 0.4148 on 56247 degrees of freedom
## Multiple R-squared: 0.04788, Adjusted R-squared: 0.03924
## F-statistic: 5.546 on 510 and 56247 DF, p-value: < 2.2e-16
```

model has FE for player and period, which accounts for fatigue.

Now we want to add:

home vs away dummy

Adding home vs away dummy column:

```
ft_all <- ft_all %>%
  mutate(
    home = case_when(
      !is.na(HOMEDESCRIPTION) ~ 1,
      !is.na(VISITORDESCRIPTION) ~ 0,
      TRUE ~ NA_real_
    )
  )
```

```
ft_all %>%
  filter(EVENTMSGTYPE == 3) %>%
  count(home)
```

```
## # A tibble: 2 x 2
##   home      n
##   <dbl> <int>
## 1     0 27979
## 2     1 28779
```

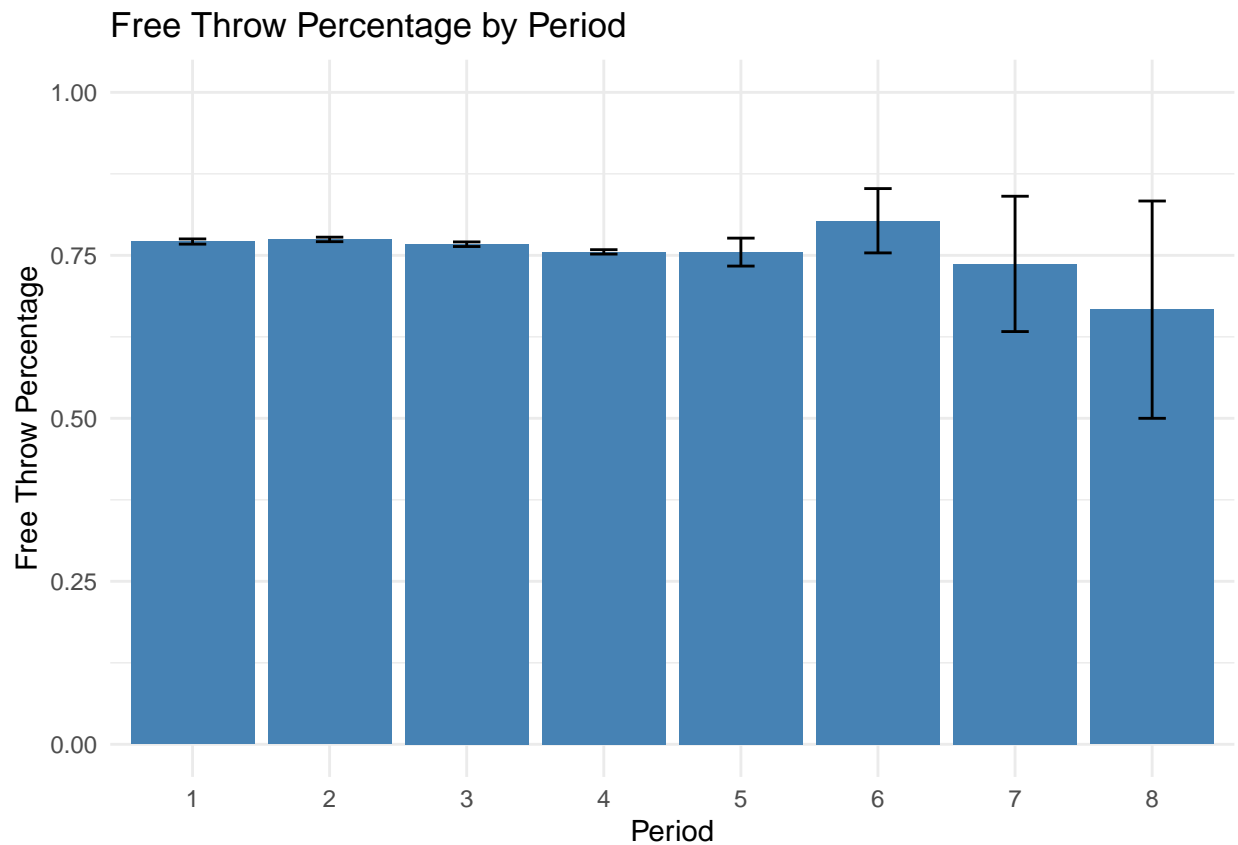
verify:

```
view(ft_all)
```

graph periods:

```
library(dplyr)
library(ggplot2)

ft_all %>%
  filter(!is.na(made)) %>%
  group_by(PERIOD) %>%
  summarise(
    FT_Percentage = mean(made),
    SE = sd(made) / sqrt(n()),
    .groups = "drop"
  ) %>%
  ggplot(aes(x = factor(PERIOD), y = FT_Percentage)) +
  geom_bar(stat = "identity", fill = "steelblue") +
  geom_errorbar(aes(ymin = FT_Percentage - SE, ymax = FT_Percentage + SE), width = 0.2) +
  labs(
    title = "Free Throw Percentage by Period",
    x = "Period",
    y = "Free Throw Percentage"
  ) +
  ylim(0, 1) +
  theme_minimal()
```



FT% by player

```
library(dplyr)
library(ggplot2)

ft_by_player <- ft_all %>%
  filter(!is.na(made)) %>%
  group_by(PPLAYER1_NAME) %>%
  summarise(
    Attempts = n(),
    FT_Percentage = mean(made),
    .groups = "drop"
  ) %>%
  filter(Attempts >= 30)

# Best FT shooter
best <- ft_by_player %>% arrange(desc(FT_Percentage)) %>% slice(1)

# Worst FT shooter
worst <- ft_by_player %>% arrange(FT_Percentage) %>% slice(1)

best
```

```
## # A tibble: 1 x 3
##   PPLAYER1_NAME Attempts FT_Percentage
##   <chr>          <int>          <dbl>
## 1 Malcolm Bro~    152            0.928
```

worst

```
## # A tibble: 1 x 3
##   PPLAYER1_NAME Attempts FT_Percentage
##   <chr>          <int>          <dbl>
## 1 Lonzo Ball      48            0.417
```

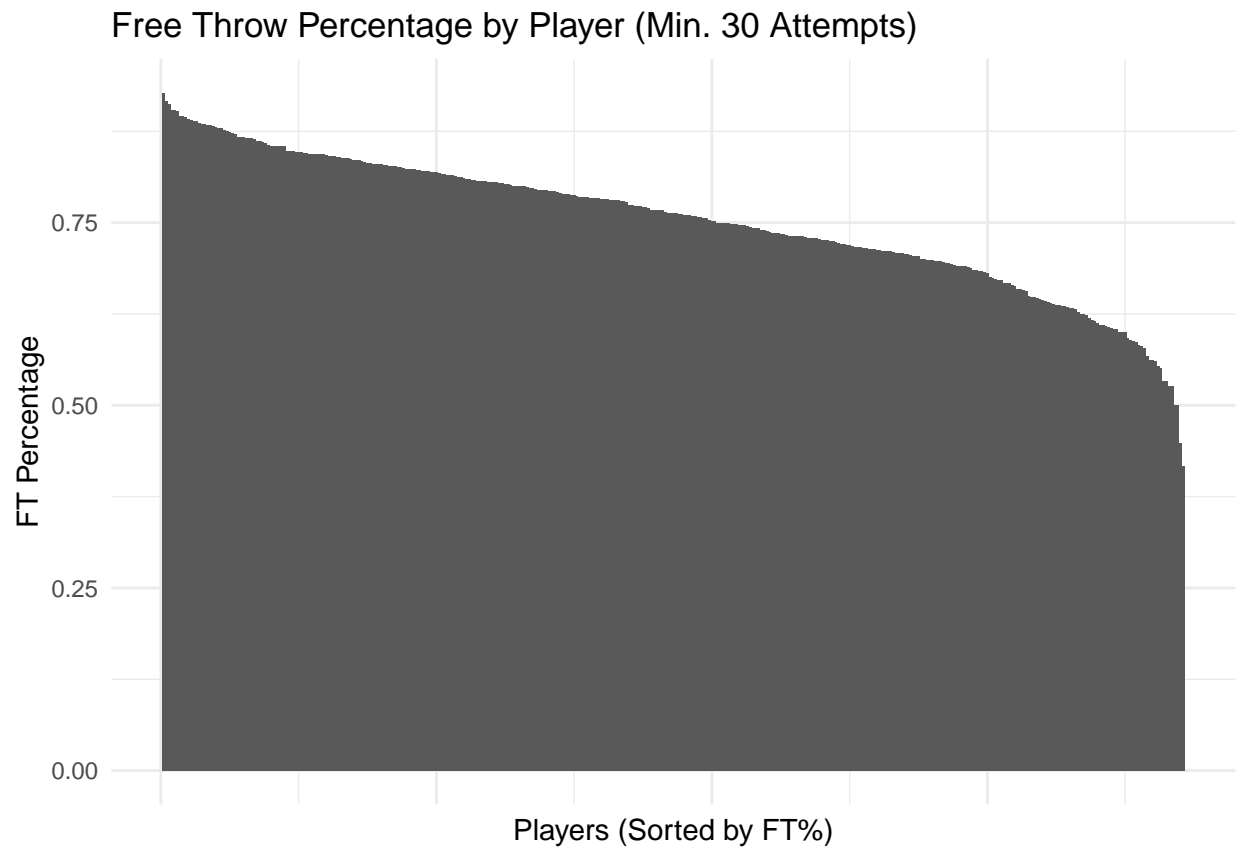
```
library(ggplot2)

ft_all %>%
  filter(!is.na(made)) %>%
  group_by(PPLAYER1_NAME) %>%
  summarise(
    Attempts = n(),
    FT_Percentage = mean(made),
    .groups = "drop"
  ) %>%
  filter(Attempts >= 30) %>%
  arrange(desc(FT_Percentage)) %>%
  mutate(Player_ID = row_number()) %>%
  ggplot(aes(x = Player_ID, y = FT_Percentage)) +
  geom_col() +
  labs(
    title = "Free Throw Percentage by Player (Min. 30 Attempts)",
    x = "Players (Sorted by FT%)",
```

```

  y = "FT Percentage"
) +
theme_minimal() +
theme(axis.text.x = element_blank())

```

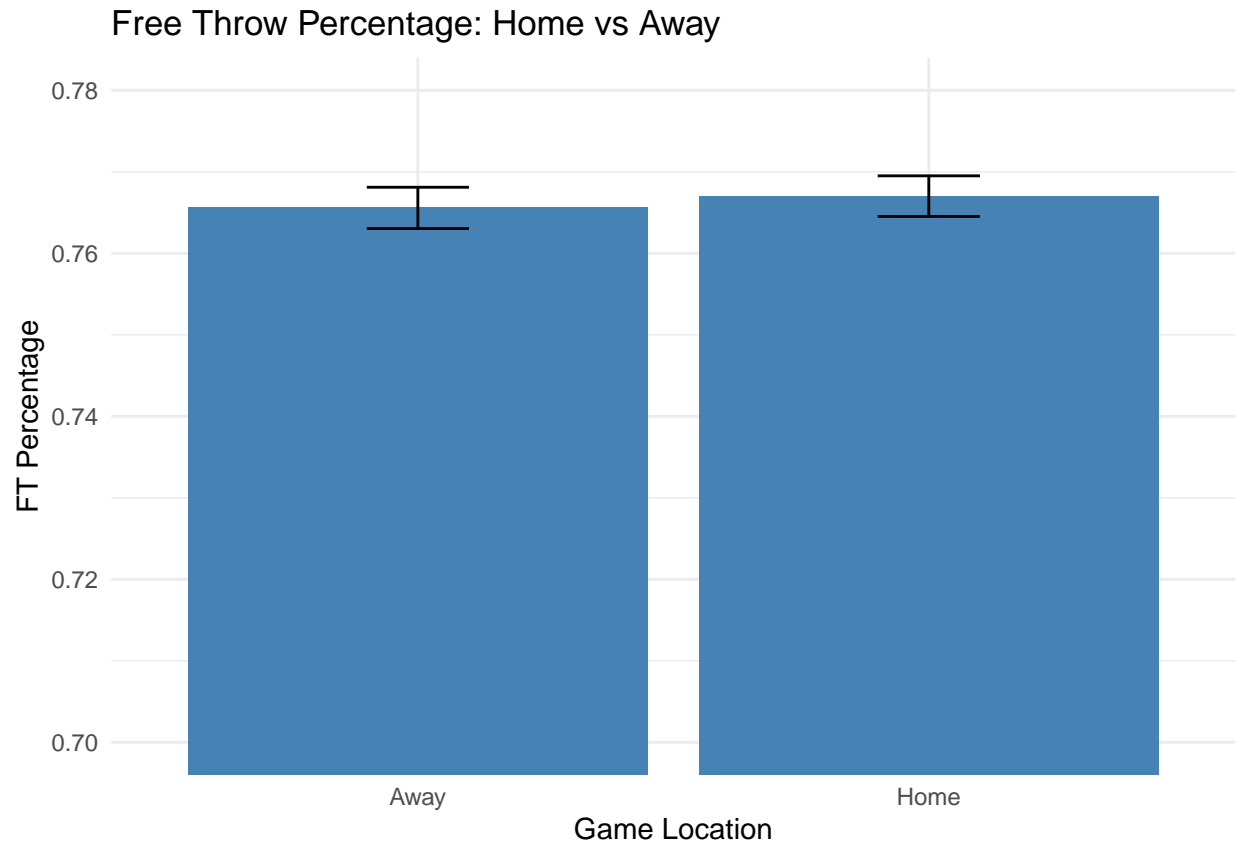


home vs away

```

ft_all %>%
  filter(!is.na(made)) %>%
  group_by(home) %>%
  summarise(
    ft_pct = mean(made),
    se = sd(made) / sqrt(n()),
    .groups = "drop"
  ) %>%
  ggplot(aes(x = factor(home, labels = c("Away", "Home")), y = ft_pct)) +
  geom_bar(stat = "identity", fill = "steelblue") +
  geom_errorbar(aes(ymin = ft_pct - se, ymax = ft_pct + se), width = 0.2) +
  coord_cartesian(ylim = c(0.70, 0.78)) +
  labs(
    title = "Free Throw Percentage: Home vs Away",
    x = "Game Location",
    y = "FT Percentage"
  ) +
  theme_minimal()

```

model comparison:

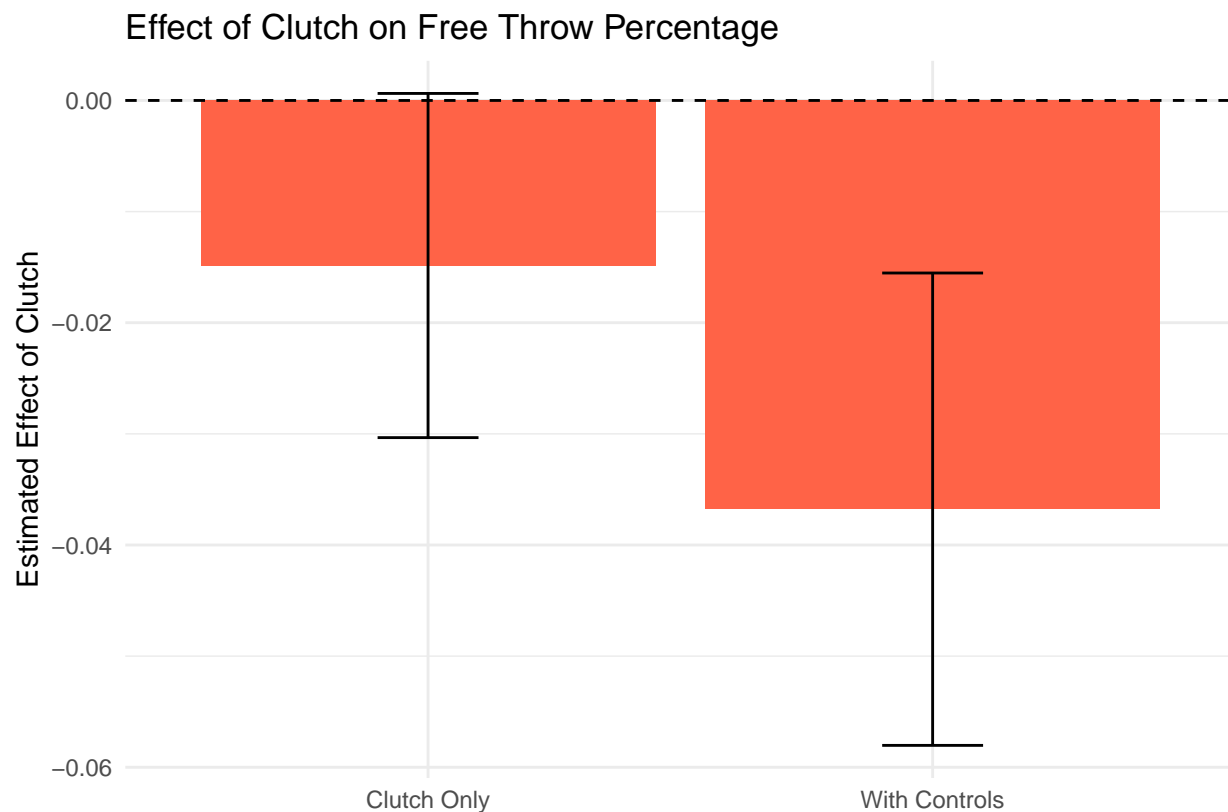
```
# Base model: FT% ~ clutch
m_base <- lm(made ~ clutch, data = ft_all)

# Full model with controls
m_full <- lm(made ~ clutch + factor(home) + factor(PERIOD) + factor(PPLAYER1_ID), data = ft_all)

# Extract coefficients and SEs for 'clutch'
reg_results <- tibble(
  Model = c("Clutch Only", "With Controls"),
  Estimate = c(coef(m_base)["clutch"], coef(m_full)["clutch"]),
  SE = c(summary(m_base)$coefficients["clutch", "Std. Error"],
        summary(m_full)$coefficients["clutch", "Std. Error"])
)

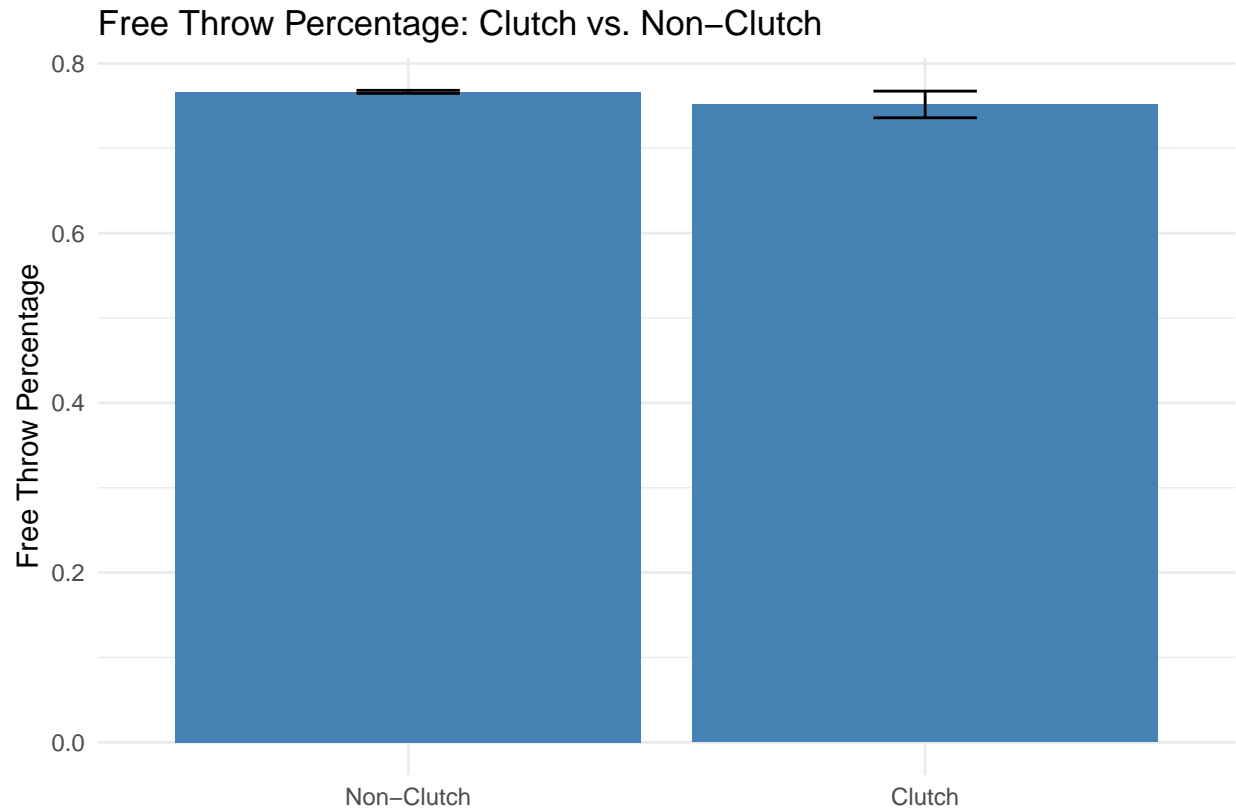
# Plot
ggplot(reg_results, aes(x = Model, y = Estimate)) +
  geom_col(fill = "tomato") +
  geom_errorbar(aes(ymin = Estimate - SE, ymax = Estimate + SE), width = 0.2) +
  geom_hline(yintercept = 0, linetype = "dashed") +
  labs(
    title = "Effect of Clutch on Free Throw Percentage",
    y = "Estimated Effect of Clutch",
    x = ""
  ) +
```

```
theme_minimal()
```



```
# Calculate FT% by clutch status
ft_by_clutch <- ft_all %>%
  filter(!is.na(made)) %>%
  group_by(clutch) %>%
  summarise(
    ft_pct = mean(made),
    se = sd(made) / sqrt(n())
  )

# Plot
ggplot(ft_by_clutch, aes(x = factor(clutch, labels = c("Non-Clutch", "Clutch")), y = ft_pct)) +
  geom_col(fill = "steelblue") +
  geom_errorbar(aes(ymin = ft_pct - se, ymax = ft_pct + se), width = 0.2) +
  labs(
    title = "Free Throw Percentage: Clutch vs. Non-Clutch",
    x = "",
    y = "Free Throw Percentage"
  ) +
  theme_minimal()
```



reg tables

```
library(modelsummary)
```

```
## Warning: package 'modelsummary' was
## built under R version 4.4.3
```

```
m_basic <- lm(made ~ clutch, data = ft_all)
m_full <- lm(made ~ clutch + factor(PLOYER1_ID) + factor(PERIOD) + home, data = ft_all)
```

```
modelsummary(
  list(
    "Basic: Clutch Only" = m_basic,
    "Full: + Controls" = m_full
  ),
  stars = TRUE,
  coef_omit = "factor",
  gof_omit = "IC|Log.Lik",
  statistic = "std.error",
  output = "markdown"
)
```

```
model_basic <- lm(made ~ clutch, data = ft_all)
model_full <- lm(made ~ clutch + home + factor(PLOYER1_ID) + factor(PERIOD), data = ft_all)
```

| | Basic: Clutch Only | Full: + Controls |
|-------------|---------------------|---------------------|
| (Intercept) | 0.767*** (0.002) | 0.716*** (0.051) |
| clutch | -0.015 (0.015) | -0.037+ (0.021) |
| home | | 0.002 (0.004) |
| Num.Obs. | 56758 | 56758 |
| R2 | 0.000 | 0.048 |
| R2 Adj. | -0.000 | 0.039 |
| RMSE | 0.42 | 0.41 |

+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001

```
summary(model_basic)$coefficients[, 4]
```

```
## (Intercept)      clutch
##  0.0000000    0.3374556
```

```
summary(model_full)$coefficients[, 4]
```

```
## (Intercept)
## 2.455298e-44
## clutch
## 8.354068e-02
## home
## 6.612914e-01
## factor(PLAYER1_ID)1717
## 4.054517e-01
## factor(PLAYER1_ID)2037
## 4.127951e-02
## factor(PLAYER1_ID)2199
## 5.773777e-02
## factor(PLAYER1_ID)2200
## 8.956156e-01
## factor(PLAYER1_ID)2225
## 7.655536e-01
## factor(PLAYER1_ID)2403
## 5.025543e-01
## factor(PLAYER1_ID)2544
## 3.811199e-01
## factor(PLAYER1_ID)2546
## 7.434221e-01
## factor(PLAYER1_ID)2548
## 9.241488e-01
## factor(PLAYER1_ID)2585
## 2.911056e-01
## factor(PLAYER1_ID)2594
## 1.236092e-01
```

```

## factor(PLOYER1_ID)2617
##      8.306135e-01
## factor(PLOYER1_ID)2730
##      1.645429e-01
## factor(PLOYER1_ID)2733
##      3.670740e-01
## factor(PLOYER1_ID)2734
##      4.506264e-01
## factor(PLOYER1_ID)2736
##      9.958310e-01
## factor(PLOYER1_ID)2738
##      6.571577e-02
## factor(PLOYER1_ID)2747
##      5.577405e-01
## factor(PLOYER1_ID)2772
##      1.959559e-01
## factor(PLOYER1_ID)101106
##      2.336854e-01
## factor(PLOYER1_ID)101107
##      4.399557e-01
## factor(PLOYER1_ID)101108
##      1.192679e-02
## factor(PLOYER1_ID)101109
##      1.002859e-01
## factor(PLOYER1_ID)101112
##      5.406683e-01
## factor(PLOYER1_ID)101123
##      7.627567e-02
## factor(PLOYER1_ID)101133
##      7.286878e-01
## factor(PLOYER1_ID)101139
##      1.271934e-01
## factor(PLOYER1_ID)101141
##      1.198420e-01
## factor(PLOYER1_ID)101150
##      2.621859e-03
## factor(PLOYER1_ID)101161
##      6.001878e-01
## factor(PLOYER1_ID)101162
##      8.814936e-01
## factor(PLOYER1_ID)101181
##      4.339328e-01
## factor(PLOYER1_ID)200746
##      1.516805e-02
## factor(PLOYER1_ID)200752
##      9.320052e-02
## factor(PLOYER1_ID)200755
##      1.561926e-03
## factor(PLOYER1_ID)200757
##      4.786885e-01
## factor(PLOYER1_ID)200765
##      3.925065e-01
## factor(PLOYER1_ID)200768
##      5.382097e-02

```

```

## factor(PLOYER1_ID)200782
##      8.152327e-01
## factor(PLOYER1_ID)200794
##      8.271044e-01
## factor(PLOYER1_ID)200826
##      8.811612e-01
## factor(PLOYER1_ID)201142
##      1.615567e-03
## factor(PLOYER1_ID)201143
##      9.705570e-02
## factor(PLOYER1_ID)201144
##      1.712190e-02
## factor(PLOYER1_ID)201145
##      3.102045e-03
## factor(PLOYER1_ID)201147
##      8.849554e-01
## factor(PLOYER1_ID)201149
##      9.868477e-01
## factor(PLOYER1_ID)201152
##      2.543055e-01
## factor(PLOYER1_ID)201158
##      2.662112e-03
## factor(PLOYER1_ID)201160
##      1.640100e-01
## factor(PLOYER1_ID)201162
##      7.954994e-01
## factor(PLOYER1_ID)201163
##      9.610435e-01
## factor(PLOYER1_ID)201188
##      4.261519e-01
## factor(PLOYER1_ID)201229
##      3.367787e-01
## factor(PLOYER1_ID)201563
##      9.525213e-01
## factor(PLOYER1_ID)201565
##      1.866225e-02
## factor(PLOYER1_ID)201566
##      3.037220e-01
## factor(PLOYER1_ID)201567
##      2.985931e-03
## factor(PLOYER1_ID)201568
##      5.423151e-04
## factor(PLOYER1_ID)201569
##      2.549120e-01
## factor(PLOYER1_ID)201571
##      8.941405e-03
## factor(PLOYER1_ID)201572
##      3.838927e-02
## factor(PLOYER1_ID)201573
##      1.320138e-01
## factor(PLOYER1_ID)201577
##      8.706474e-01
## factor(PLOYER1_ID)201580
##      1.729585e-01

```

```

## factor(PLOYER1_ID)201583
##          7.700354e-01
## factor(PLOYER1_ID)201584
##          6.622930e-01
## factor(PLOYER1_ID)201585
##          2.312712e-03
## factor(PLOYER1_ID)201586
##          4.111824e-01
## factor(PLOYER1_ID)201587
##          2.482966e-02
## factor(PLOYER1_ID)201588
##          1.066083e-01
## factor(PLOYER1_ID)201599
##          8.664600e-01
## factor(PLOYER1_ID)201601
##          9.561112e-02
## factor(PLOYER1_ID)201609
##          3.114034e-01
## factor(PLOYER1_ID)201933
##          4.648620e-01
## factor(PLOYER1_ID)201935
##          1.746692e-03
## factor(PLOYER1_ID)201936
##          9.424113e-01
## factor(PLOYER1_ID)201937
##          1.431238e-02
## factor(PLOYER1_ID)201939
##          3.476250e-04
## factor(PLOYER1_ID)201942
##          3.423701e-02
## factor(PLOYER1_ID)201949
##          9.982913e-01
## factor(PLOYER1_ID)201950
##          3.319857e-01
## factor(PLOYER1_ID)201952
##          1.405132e-01
## factor(PLOYER1_ID)201954
##          4.382504e-02
## factor(PLOYER1_ID)201956
##          5.753550e-01
## factor(PLOYER1_ID)201959
##          4.750565e-01
## factor(PLOYER1_ID)201960
##          4.238735e-01
## factor(PLOYER1_ID)201961
##          2.870538e-01
## factor(PLOYER1_ID)201967
##          5.424153e-01
## factor(PLOYER1_ID)201973
##          2.043281e-01
## factor(PLOYER1_ID)201975
##          4.769669e-01
## factor(PLOYER1_ID)201976
##          2.835135e-01

```

```

## factor(PLOYER1_ID)201980
##      1.137682e-01
## factor(PLOYER1_ID)201988
##      3.271045e-02
## factor(PLOYER1_ID)202066
##      6.213438e-01
## factor(PLOYER1_ID)202083
##      1.107076e-01
## factor(PLOYER1_ID)202322
##      7.990319e-01
## factor(PLOYER1_ID)202323
##      9.510993e-01
## factor(PLOYER1_ID)202324
##      5.107221e-01
## factor(PLOYER1_ID)202325
##      7.404150e-01
## factor(PLOYER1_ID)202326
##      7.077512e-01
## factor(PLOYER1_ID)202327
##      4.043164e-01
## factor(PLOYER1_ID)202328
##      2.151033e-01
## factor(PLOYER1_ID)202329
##      1.060500e-02
## factor(PLOYER1_ID)202330
##      4.187793e-02
## factor(PLOYER1_ID)202331
##      1.970152e-02
## factor(PLOYER1_ID)202334
##      1.029213e-01
## factor(PLOYER1_ID)202335
##      3.700176e-01
## factor(PLOYER1_ID)202339
##      5.225222e-01
## factor(PLOYER1_ID)202340
##      5.428539e-02
## factor(PLOYER1_ID)202347
##      2.115334e-01
## factor(PLOYER1_ID)202355
##      3.993120e-06
## factor(PLOYER1_ID)202357
##      4.889421e-01
## factor(PLOYER1_ID)202362
##      7.167141e-01
## factor(PLOYER1_ID)202391
##      3.469580e-02
## factor(PLOYER1_ID)202397
##      5.533822e-01
## factor(PLOYER1_ID)202498
##      6.712989e-01
## factor(PLOYER1_ID)202681
##      5.136068e-03
## factor(PLOYER1_ID)202683
##      2.259493e-01

```



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## factor(PLOYER1_ID)202684
##      2.555190e-01
## factor(PLOYER1_ID)202685
##      1.677267e-01
## factor(PLOYER1_ID)202687
##      2.503264e-01
## factor(PLOYER1_ID)202688
##      3.732618e-01
## factor(PLOYER1_ID)202689
##      1.618914e-02
## factor(PLOYER1_ID)202690
##      1.005615e-01
## factor(PLOYER1_ID)202691
##      9.456856e-02
## factor(PLOYER1_ID)202692
##      7.584779e-02
## factor(PLOYER1_ID)202693
##      3.860038e-01
## factor(PLOYER1_ID)202694
##      2.806125e-02
## factor(PLOYER1_ID)202695
##      9.951329e-03
## factor(PLOYER1_ID)202696
##      1.934631e-01
## factor(PLOYER1_ID)202697
##      2.886927e-01
## factor(PLOYER1_ID)202699
##      5.931494e-03
## factor(PLOYER1_ID)202700
##      1.826309e-02
## factor(PLOYER1_ID)202702
##      3.056444e-01
## factor(PLOYER1_ID)202703
##      3.463841e-02
## factor(PLOYER1_ID)202704
##      8.241212e-03
## factor(PLOYER1_ID)202705
##      8.505740e-01
## factor(PLOYER1_ID)202709
##      8.498915e-01
## factor(PLOYER1_ID)202710
##      1.005688e-02
## factor(PLOYER1_ID)202711
##      1.020179e-01
## factor(PLOYER1_ID)202714
##      7.752782e-01
## factor(PLOYER1_ID)202718
##      8.763973e-02
## factor(PLOYER1_ID)202720
##      7.205620e-01
## factor(PLOYER1_ID)202722
##      2.130745e-02
## factor(PLOYER1_ID)202734
##      4.966128e-01

```

```

## factor(PLOYER1_ID)202738
##      3.836597e-01
## factor(PLOYER1_ID)202954
##      1.107411e-01
## factor(PLOYER1_ID)203076
##      1.435975e-01
## factor(PLOYER1_ID)203077
##      3.608538e-01
## factor(PLOYER1_ID)203078
##      8.303437e-02
## factor(PLOYER1_ID)203079
##      7.720709e-03
## factor(PLOYER1_ID)203081
##      2.311487e-04
## factor(PLOYER1_ID)203082
##      7.737983e-03
## factor(PLOYER1_ID)203083
##      2.623448e-02
## factor(PLOYER1_ID)203084
##      5.398079e-02
## factor(PLOYER1_ID)203085
##      5.286147e-03
## factor(PLOYER1_ID)203086
##      9.356896e-02
## factor(PLOYER1_ID)203087
##      2.282940e-03
## factor(PLOYER1_ID)203089
##      4.094473e-01
## factor(PLOYER1_ID)203090
##      5.389662e-01
## factor(PLOYER1_ID)203092
##      5.662291e-01
## factor(PLOYER1_ID)203093
##      9.196103e-02
## factor(PLOYER1_ID)203095
##      1.142649e-01
## factor(PLOYER1_ID)203098
##      2.653294e-01
## factor(PLOYER1_ID)203101
##      4.426336e-02
## factor(PLOYER1_ID)203107
##      8.137581e-02
## factor(PLOYER1_ID)203109
##      9.219816e-01
## factor(PLOYER1_ID)203110
##      7.275333e-01
## factor(PLOYER1_ID)203112
##      9.267888e-01
## factor(PLOYER1_ID)203114
##      3.234244e-02
## factor(PLOYER1_ID)203115
##      4.265868e-01
## factor(PLOYER1_ID)203118
##      6.093483e-01

```

```

## factor(PLOYER1_ID)203121
##      2.877864e-01
## factor(PLOYER1_ID)203124
##      3.421752e-01
## factor(PLOYER1_ID)203145
##      8.386248e-01
## factor(PLOYER1_ID)203159
##      4.792564e-01
## factor(PLOYER1_ID)203200
##      4.589256e-03
## factor(PLOYER1_ID)203210
##      2.442009e-01
## factor(PLOYER1_ID)203263
##      1.657291e-01
## factor(PLOYER1_ID)203382
##      5.778999e-02
## factor(PLOYER1_ID)203457
##      6.542263e-01
## factor(PLOYER1_ID)203458
##      2.662791e-01
## factor(PLOYER1_ID)203459
##      8.138916e-01
## factor(PLOYER1_ID)203463
##      7.816582e-01
## factor(PLOYER1_ID)203468
##      5.050083e-02
## factor(PLOYER1_ID)203469
##      2.444691e-01
## factor(PLOYER1_ID)203471
##      6.613979e-02
## factor(PLOYER1_ID)203473
##      1.139350e-01
## factor(PLOYER1_ID)203476
##      7.583873e-02
## factor(PLOYER1_ID)203477
##      4.312216e-01
## factor(PLOYER1_ID)203482
##      7.124303e-02
## factor(PLOYER1_ID)203484
##      1.093965e-02
## factor(PLOYER1_ID)203485
##      2.394545e-01
## factor(PLOYER1_ID)203486
##      9.594911e-03
## factor(PLOYER1_ID)203487
##      1.702026e-01
## factor(PLOYER1_ID)203488
##      1.101355e-01
## factor(PLOYER1_ID)203490
##      1.392180e-01
## factor(PLOYER1_ID)203493
##      3.119891e-02
## factor(PLOYER1_ID)203496
##      4.560545e-01

```

```

## factor(PLOYER1_ID)203497
##      1.504255e-01
## factor(PLOYER1_ID)203500
##      1.430053e-04
## factor(PLOYER1_ID)203501
##      2.531799e-02
## factor(PLOYER1_ID)203503
##      3.869057e-02
## factor(PLOYER1_ID)203504
##      5.927182e-02
## factor(PLOYER1_ID)203506
##      7.604925e-01
## factor(PLOYER1_ID)203507
##      7.695188e-01
## factor(PLOYER1_ID)203516
##      9.503558e-01
## factor(PLOYER1_ID)203518
##      9.711338e-02
## factor(PLOYER1_ID)203521
##      1.986750e-01
## factor(PLOYER1_ID)203524
##      9.355001e-01
## factor(PLOYER1_ID)203526
##      1.207479e-01
## factor(PLOYER1_ID)203546
##      3.502811e-02
## factor(PLOYER1_ID)203552
##      8.739897e-02
## factor(PLOYER1_ID)203564
##      3.496353e-01
## factor(PLOYER1_ID)203584
##      4.597355e-01
## factor(PLOYER1_ID)203585
##      9.066128e-01
## factor(PLOYER1_ID)203613
##      6.441322e-01
## factor(PLOYER1_ID)203710
##      9.196103e-02
## factor(PLOYER1_ID)203894
##      4.874617e-02
## factor(PLOYER1_ID)203895
##      2.931739e-01
## factor(PLOYER1_ID)203897
##      3.205368e-02
## factor(PLOYER1_ID)203901
##      6.527123e-01
## factor(PLOYER1_ID)203903
##      2.682950e-02
## factor(PLOYER1_ID)203914
##      1.648055e-01
## factor(PLOYER1_ID)203915
##      9.126909e-02
## factor(PLOYER1_ID)203917
##      1.371707e-02

```

```

## factor(PLOYER1_ID)203918
##      5.438756e-03
## factor(PLOYER1_ID)203920
##      8.542832e-01
## factor(PLOYER1_ID)203922
##      3.053487e-01
## factor(PLOYER1_ID)203924
##      9.412475e-01
## factor(PLOYER1_ID)203925
##      6.742003e-02
## factor(PLOYER1_ID)203926
##      7.595588e-02
## factor(PLOYER1_ID)203932
##      7.723785e-01
## factor(PLOYER1_ID)203933
##      1.075290e-01
## factor(PLOYER1_ID)203935
##      1.267608e-01
## factor(PLOYER1_ID)203937
##      6.539131e-02
## factor(PLOYER1_ID)203939
##      3.093409e-01
## factor(PLOYER1_ID)203943
##      9.744107e-01
## factor(PLOYER1_ID)203944
##      7.425144e-01
## factor(PLOYER1_ID)203952
##      7.939323e-01
## factor(PLOYER1_ID)203953
##      9.916055e-01
## factor(PLOYER1_ID)203954
##      9.054953e-02
## factor(PLOYER1_ID)203957
##      2.473569e-01
## factor(PLOYER1_ID)203960
##      3.554879e-01
## factor(PLOYER1_ID)203967
##      6.775463e-03
## factor(PLOYER1_ID)203991
##      1.666331e-01
## factor(PLOYER1_ID)203992
##      6.038741e-02
## factor(PLOYER1_ID)203994
##      2.937606e-01
## factor(PLOYER1_ID)203998
##      1.067393e-01
## factor(PLOYER1_ID)203999
##      5.474109e-02
## factor(PLOYER1_ID)204020
##      5.800844e-01
## factor(PLOYER1_ID)204025
##      5.415575e-01
## factor(PLOYER1_ID)204038
##      4.867778e-02

```

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## factor(P1AYER1_ID)204060
##          9.135132e-01
## factor(P1AYER1_ID)204456
##          4.009107e-01
## factor(P1AYER1_ID)1626143
##          4.534680e-01
## factor(P1AYER1_ID)1626144
##          2.955860e-01
## factor(P1AYER1_ID)1626145
##          7.671324e-02
## factor(P1AYER1_ID)1626147
##          7.315584e-01
## factor(P1AYER1_ID)1626149
##          1.993872e-01
## factor(P1AYER1_ID)1626150
##          3.296091e-02
## factor(P1AYER1_ID)1626153
##          1.992192e-01
## factor(P1AYER1_ID)1626154
##          4.958782e-01
## factor(P1AYER1_ID)1626155
##          1.925667e-01
## factor(P1AYER1_ID)1626156
##          2.517190e-01
## factor(P1AYER1_ID)1626157
##          2.614106e-02
## factor(P1AYER1_ID)1626158
##          7.716022e-01
## factor(P1AYER1_ID)1626159
##          1.626535e-01
## factor(P1AYER1_ID)1626161
##          4.648422e-03
## factor(P1AYER1_ID)1626162
##          2.777032e-01
## factor(P1AYER1_ID)1626163
##          6.884118e-01
## factor(P1AYER1_ID)1626164
##          5.409053e-03
## factor(P1AYER1_ID)1626166
##          2.583967e-01
## factor(P1AYER1_ID)1626167
##          7.116990e-01
## factor(P1AYER1_ID)1626168
##          8.180006e-01
## factor(P1AYER1_ID)1626169
##          3.410319e-01
## factor(P1AYER1_ID)1626170
##          4.492720e-01
## factor(P1AYER1_ID)1626171
##          2.294745e-01
## factor(P1AYER1_ID)1626172
##          1.414070e-01
## factor(P1AYER1_ID)1626174
##          7.858295e-01

```

```

## factor(P1AYER1_ID)1626178
##          2.465254e-01
## factor(P1AYER1_ID)1626179
##          2.876324e-01
## factor(P1AYER1_ID)1626181
##          1.025537e-01
## factor(P1AYER1_ID)1626184
##          7.924176e-01
## factor(P1AYER1_ID)1626185
##          4.222028e-01
## factor(P1AYER1_ID)1626188
##          5.365516e-01
## factor(P1AYER1_ID)1626192
##          8.792704e-01
## factor(P1AYER1_ID)1626195
##          7.636276e-01
## factor(P1AYER1_ID)1626196
##          9.938170e-03
## factor(P1AYER1_ID)1626203
##          3.018204e-01
## factor(P1AYER1_ID)1626204
##          9.609543e-01
## factor(P1AYER1_ID)1626209
##          4.417661e-01
## factor(P1AYER1_ID)1626210
##          3.425495e-01
## factor(P1AYER1_ID)1626220
##          5.478178e-01
## factor(P1AYER1_ID)1626224
##          2.760089e-01
## factor(P1AYER1_ID)1626245
##          7.046572e-01
## factor(P1AYER1_ID)1626246
##          5.641670e-01
## factor(P1AYER1_ID)1626257
##          3.408856e-01
## factor(P1AYER1_ID)1626259
##          8.249835e-01
## factor(P1AYER1_ID)1627215
##          8.910143e-01
## factor(P1AYER1_ID)1627395
##          8.430268e-01
## factor(P1AYER1_ID)1627732
##          3.940479e-02
## factor(P1AYER1_ID)1627733
##          1.075004e-01
## factor(P1AYER1_ID)1627734
##          9.896796e-01
## factor(P1AYER1_ID)1627735
##          8.633868e-01
## factor(P1AYER1_ID)1627736
##          5.784261e-02
## factor(P1AYER1_ID)1627737
##          9.902583e-01

```

```

## factor(PLAYER1_ID)1627738
##      4.178878e-01
## factor(PLAYER1_ID)1627739
##      2.325698e-01
## factor(PLAYER1_ID)1627740
##      5.963232e-01
## factor(PLAYER1_ID)1627741
##      3.233036e-03
## factor(PLAYER1_ID)1627742
##      4.872085e-01
## factor(PLAYER1_ID)1627743
##      1.641006e-01
## factor(PLAYER1_ID)1627745
##      4.351562e-01
## factor(PLAYER1_ID)1627746
##      1.198409e-01
## factor(PLAYER1_ID)1627747
##      7.289240e-01
## factor(PLAYER1_ID)1627748
##      4.921314e-01
## factor(PLAYER1_ID)1627750
##      1.973276e-02
## factor(PLAYER1_ID)1627751
##      6.807072e-03
## factor(PLAYER1_ID)1627752
##      1.009167e-01
## factor(PLAYER1_ID)1627758
##      4.915304e-01
## factor(PLAYER1_ID)1627759
##      3.481663e-01
## factor(PLAYER1_ID)1627761
##      2.447475e-01
## factor(PLAYER1_ID)1627763
##      4.556451e-04
## factor(PLAYER1_ID)1627767
##      6.207045e-01
## factor(PLAYER1_ID)1627772
##      2.337527e-01
## factor(PLAYER1_ID)1627774
##      8.975628e-01
## factor(PLAYER1_ID)1627775
##      2.037487e-01
## factor(PLAYER1_ID)1627777
##      2.123571e-01
## factor(PLAYER1_ID)1627781
##      6.439862e-01
## factor(PLAYER1_ID)1627782
##      7.801704e-01
## factor(PLAYER1_ID)1627783
##      2.067864e-01
## factor(PLAYER1_ID)1627786
##      3.298628e-01
## factor(PLAYER1_ID)1627788
##      1.882919e-01

```



```

## factor(PLAYER1_ID)1627789
##          5.808519e-01
## factor(PLAYER1_ID)1627790
##          8.931672e-01
## factor(PLAYER1_ID)1627812
##          1.176346e-02
## factor(PLAYER1_ID)1627814
##          1.331394e-01
## factor(PLAYER1_ID)1627816
##          3.222346e-01
## factor(PLAYER1_ID)1627820
##          1.264545e-02
## factor(PLAYER1_ID)1627823
##          4.258909e-01
## factor(PLAYER1_ID)1627824
##          8.136853e-01
## factor(PLAYER1_ID)1627826
##          1.578677e-01
## factor(PLAYER1_ID)1627827
##          9.406238e-01
## factor(PLAYER1_ID)1627832
##          4.191261e-02
## factor(PLAYER1_ID)1627846
##          6.634616e-01
## factor(PLAYER1_ID)1627853
##          1.550584e-02
## factor(PLAYER1_ID)1627854
##          1.345611e-02
## factor(PLAYER1_ID)1627863
##          2.802470e-01
## factor(PLAYER1_ID)1627883
##          9.213909e-01
## factor(PLAYER1_ID)1627884
##          8.515479e-02
## factor(PLAYER1_ID)1627885
##          4.791033e-01
## factor(PLAYER1_ID)1627936
##          2.466490e-01
## factor(PLAYER1_ID)1628021
##          6.619400e-01
## factor(PLAYER1_ID)1628035
##          5.454386e-02
## factor(PLAYER1_ID)1628070
##          3.947260e-01
## factor(PLAYER1_ID)1628249
##          9.632413e-01
## factor(PLAYER1_ID)1628365
##          8.367771e-02
## factor(PLAYER1_ID)1628366
##          1.509159e-04
## factor(PLAYER1_ID)1628367
##          4.634040e-01
## factor(PLAYER1_ID)1628368
##          8.012973e-01

```

```

## factor(PLOYER1_ID)1628369
##      1.313458e-02
## factor(PLOYER1_ID)1628370
##      8.549938e-03
## factor(PLOYER1_ID)1628371
##      1.057895e-01
## factor(PLOYER1_ID)1628372
##      2.038214e-01
## factor(PLOYER1_ID)1628373
##      5.595579e-01
## factor(PLOYER1_ID)1628374
##      5.932918e-03
## factor(PLOYER1_ID)1628378
##      8.753133e-02
## factor(PLOYER1_ID)1628379
##      8.892100e-02
## factor(PLOYER1_ID)1628380
##      6.079348e-01
## factor(PLOYER1_ID)1628381
##      3.901081e-01
## factor(PLOYER1_ID)1628382
##      3.038318e-01
## factor(PLOYER1_ID)1628383
##      4.719088e-01
## factor(PLOYER1_ID)1628384
##      7.468544e-02
## factor(PLOYER1_ID)1628385
##      2.600257e-01
## factor(PLOYER1_ID)1628386
##      9.440516e-01
## factor(PLOYER1_ID)1628388
##      2.648055e-01
## factor(PLOYER1_ID)1628389
##      6.977560e-01
## factor(PLOYER1_ID)1628390
##      8.871754e-01
## factor(PLOYER1_ID)1628391
##      4.184953e-02
## factor(PLOYER1_ID)1628392
##      5.699601e-01
## factor(PLOYER1_ID)1628395
##      2.030942e-01
## factor(PLOYER1_ID)1628396
##      4.568817e-01
## factor(PLOYER1_ID)1628397
##      9.586555e-01
## factor(PLOYER1_ID)1628398
##      5.110571e-01
## factor(PLOYER1_ID)1628399
##      1.308787e-01
## factor(PLOYER1_ID)1628400
##      2.515406e-01
## factor(PLOYER1_ID)1628401
##      3.396161e-01

```

```

## factor(P1AYER1_ID)1628402
##          6.974534e-01
## factor(P1AYER1_ID)1628403
##          7.732304e-01
## factor(P1AYER1_ID)1628404
##          7.384477e-01
## factor(P1AYER1_ID)1628405
##          1.896813e-01
## factor(P1AYER1_ID)1628407
##          7.495006e-01
## factor(P1AYER1_ID)1628408
##          4.958782e-01
## factor(P1AYER1_ID)1628410
##          3.936115e-01
## factor(P1AYER1_ID)1628411
##          1.233798e-01
## factor(P1AYER1_ID)1628412
##          7.423492e-01
## factor(P1AYER1_ID)1628413
##          1.656926e-02
## factor(P1AYER1_ID)1628414
##          7.633242e-01
## factor(P1AYER1_ID)1628415
##          8.118370e-01
## factor(P1AYER1_ID)1628416
##          2.417284e-01
## factor(P1AYER1_ID)1628417
##          6.196648e-01
## factor(P1AYER1_ID)1628418
##          2.747405e-01
## factor(P1AYER1_ID)1628420
##          1.831993e-01
## factor(P1AYER1_ID)1628421
##          5.900517e-01
## factor(P1AYER1_ID)1628422
##          6.161597e-01
## factor(P1AYER1_ID)1628425
##          8.011430e-01
## factor(P1AYER1_ID)1628436
##          1.552123e-01
## factor(P1AYER1_ID)1628439
##          6.443967e-01
## factor(P1AYER1_ID)1628443
##          3.962291e-01
## factor(P1AYER1_ID)1628449
##          1.691475e-01
## factor(P1AYER1_ID)1628462
##          3.701943e-01
## factor(P1AYER1_ID)1628463
##          3.181276e-01
## factor(P1AYER1_ID)1628464
##          7.389074e-01
## factor(P1AYER1_ID)1628467
##          3.244291e-01

```

```

## factor(PLOYER1_ID)1628469
##          4.591489e-01
## factor(PLOYER1_ID)1628470
##          8.269610e-01
## factor(PLOYER1_ID)1628513
##          3.344838e-01
## factor(PLOYER1_ID)1628515
##          1.630075e-01
## factor(PLOYER1_ID)1628518
##          2.674891e-01
## factor(PLOYER1_ID)1628537
##          4.671589e-01
## factor(PLOYER1_ID)1628605
##          3.181276e-01
## factor(PLOYER1_ID)1628656
##          1.651777e-01
## factor(PLOYER1_ID)1628769
##          9.196103e-02
## factor(PLOYER1_ID)1628959
##          7.212398e-01
## factor(PLOYER1_ID)1628960
##          5.764328e-01
## factor(PLOYER1_ID)1628961
##          3.425495e-01
## factor(PLOYER1_ID)1628963
##          6.977814e-01
## factor(PLOYER1_ID)1628964
##          8.553477e-02
## factor(PLOYER1_ID)1628966
##          4.908857e-01
## factor(PLOYER1_ID)1628969
##          1.475502e-01
## factor(PLOYER1_ID)1628970
##          5.902442e-01
## factor(PLOYER1_ID)1628971
##          6.159021e-01
## factor(PLOYER1_ID)1628972
##          6.931479e-01
## factor(PLOYER1_ID)1628973
##          8.220212e-01
## factor(PLOYER1_ID)1628975
##          2.717787e-01
## factor(PLOYER1_ID)1628976
##          1.994889e-01
## factor(PLOYER1_ID)1628977
##          1.657423e-01
## factor(PLOYER1_ID)1628978
##          7.847876e-01
## factor(PLOYER1_ID)1628980
##          9.196103e-02
## factor(PLOYER1_ID)1628982
##          3.344593e-02
## factor(PLOYER1_ID)1628983
##          1.460917e-01

```

```

## factor(PLOYER1_ID)1628984
##          5.409247e-01
## factor(PLOYER1_ID)1628988
##          1.629633e-01
## factor(PLOYER1_ID)1628989
##          7.516397e-01
## factor(PLOYER1_ID)1628990
##          2.078381e-01
## factor(PLOYER1_ID)1628991
##          3.656365e-01
## factor(PLOYER1_ID)1628993
##          1.791007e-01
## factor(PLOYER1_ID)1628995
##          9.567239e-01
## factor(PLOYER1_ID)1629001
##          6.656291e-01
## factor(PLOYER1_ID)1629002
##          5.864050e-01
## factor(PLOYER1_ID)1629003
##          9.564207e-01
## factor(PLOYER1_ID)1629004
##          3.102189e-01
## factor(PLOYER1_ID)1629006
##          8.206670e-01
## factor(PLOYER1_ID)1629010
##          7.920606e-01
## factor(PLOYER1_ID)1629011
##          7.169023e-02
## factor(PLOYER1_ID)1629012
##          2.762398e-02
## factor(PLOYER1_ID)1629013
##          1.638833e-01
## factor(PLOYER1_ID)1629014
##          2.039498e-01
## factor(PLOYER1_ID)1629015
##          8.302028e-01
## factor(PLOYER1_ID)1629016
##          9.687939e-01
## factor(PLOYER1_ID)1629017
##          6.217044e-01
## factor(PLOYER1_ID)1629018
##          8.828996e-02
## factor(PLOYER1_ID)1629019
##          1.201774e-01
## factor(PLOYER1_ID)1629020
##          4.621126e-01
## factor(PLOYER1_ID)1629021
##          2.077916e-01
## factor(PLOYER1_ID)1629022
##          5.066797e-01
## factor(PLOYER1_ID)1629026
##          7.926655e-01
## factor(PLOYER1_ID)1629027
##          3.509534e-02

```

```

## factor(PLAYER1_ID)1629028
##          5.892176e-01
## factor(PLAYER1_ID)1629029
##          9.991507e-01
## factor(PLAYER1_ID)1629033
##          1.303946e-01
## factor(PLAYER1_ID)1629034
##          3.249317e-03
## factor(PLAYER1_ID)1629045
##          2.438273e-01
## factor(PLAYER1_ID)1629057
##          3.485773e-01
## factor(PLAYER1_ID)1629058
##          1.826309e-02
## factor(PLAYER1_ID)1629059
##          3.397869e-01
## factor(PLAYER1_ID)1629061
##          1.734567e-01
## factor(PLAYER1_ID)1629066
##          2.910273e-01
## factor(PLAYER1_ID)1629067
##          3.734600e-01
## factor(PLAYER1_ID)1629094
##          6.155770e-01
## factor(PLAYER1_ID)1629102
##          8.215272e-01
## factor(PLAYER1_ID)1629109
##          8.675429e-02
## factor(PLAYER1_ID)1629116
##          4.958782e-01
## factor(PLAYER1_ID)1629118
##          4.925931e-01
## factor(PLAYER1_ID)1629121
##          6.479869e-01
## factor(PLAYER1_ID)1629123
##          2.261044e-01
## factor(PLAYER1_ID)1629126
##          7.370125e-01
## factor(PLAYER1_ID)1629130
##          7.801516e-01
## factor(PLAYER1_ID)1629133
##          4.410779e-01
## factor(PLAYER1_ID)1629139
##          9.635441e-01
## factor(PLAYER1_ID)1629140
##          5.295294e-02
## factor(PLAYER1_ID)1629150
##          3.290672e-01
## factor(PLAYER1_ID)1629151
##          4.401579e-01
## factor(PLAYER1_ID)1629152
##          4.925931e-01
## factor(PLAYER1_ID)1629164
##          3.964415e-01

```

| | Basic Model | Full Model |
|------------------|-------------|------------|
| (Intercept) | 0.767 | 0.716 |
| | (<0.001) | (<0.001) |
| clutch | -0.015 | -0.037 |
| | (0.337) | (0.084) |
| P-value (clutch) | 0.337 | 0.0835 |

```
## factor(PLAYER1_ID)1629168
##          3.206411e-01
## factor(PLAYER1_ID)1629203
##          4.568817e-01
## factor(PLAYER1_ID)1629234
##          2.727697e-01
## factor(PLAYER1_ID)1629244
##          2.302871e-01
## factor(PLAYER1_ID)1629312
##          1.800718e-02
##          factor(PERIOD)2
##          3.427446e-01
##          factor(PERIOD)3
##          4.663110e-01
##          factor(PERIOD)4
##          8.741326e-03
##          factor(PERIOD)5
##          8.445623e-01
##          factor(PERIOD)6
##          4.709584e-01
##          factor(PERIOD)7
##          9.005909e-01
##          factor(PERIOD)8
##          4.331356e-01
```

```
library(modelsummary)

model_basic <- lm(made ~ clutch, data = ft_all)
model_full <- lm(made ~ clutch + home + factor(PLAYER1_ID) + factor(PERIOD), data = ft_all)

modelsummary(
  list("Basic Model" = model_basic, "Full Model" = model_full),
  coef_omit = "factor\\(PLAYER1_ID\\)|factor\\(PERIOD\\)|home", # hide all controls
  statistic = "p.value",
  fmt = 3,
  gof_omit = ".*",
  add_rows = data.frame(
    Term = c("P-value (clutch)"),
    `Basic Model` = format(summary(model_basic)$coefficients["clutch", "Pr(>|t|)"], digits = 3),
    `Full Model` = format(summary(model_full)$coefficients["clutch", "Pr(>|t|)"], digits = 3)
  )
)
```

| | (1) |
|---------------------------|----------------------------------|
| (Intercept) | 0.716 (0.051) (<0.001) |
| clutch | -0.037 (0.021) (0.084) |
| home | 0.002 (0.004) (0.661) |
| factor(PPLAYER1_ID)2037 | 0.132 (0.065) (0.041) |
| factor(PPLAYER1_ID)201144 | 0.131 (0.055) (0.017) |
| factor(PPERIOD)2 | 0.005 (0.005) (0.343) |
| factor(PPERIOD)4 | -0.014 (0.005) (0.009) |

```
library(modelsummary)

model_full <- lm(made ~ clutch + home + factor(PPLAYER1_ID) + factor(PPERIOD), data = ft_all)

coef_subset <- c(
  "(Intercept)",
  "clutch",
  "home",
  "factor(PPLAYER1_ID)2037", # example player with a low p-value
  "factor(PPLAYER1_ID)201144", # example player with a high p-value
  "factor(PPERIOD)2",
  "factor(PPERIOD)4"
)

modelsummary(
  model_full,
  coef_map = setNames(coef_subset, coef_subset),
  statistic = c("std.error", "p.value"),
  fmt = 3,
  gof_omit = ".*"
)
```