

Untitled

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```
df_combo <- read_excel("BDB_Combo.xlsx")
df_player <- read_excel("BDB_Player.xlsx")
```

Player OLS

```
# Omit - Bubble
df_player <- df_player %>% filter( DATASET != '2019-2020 Regular Season') %>% mutate(
  PER_diff = PER - I_PER,
  M1_sq = M1^2,
  M1_cu = M1^3,
  M2_sq = M2^2,
  M2_cu = M2^3
)
```

OLD:

$$PER_{diff} = H + T + OEFF + DEFF + M1 + M2 + M3 + days_1 + days_2 + days_3 + days_4 + \epsilon$$

NEW:

$$PER_{diff} = H + T + OEFF + DEFF + M + M^2 + M^3 + \epsilon$$

OLS - compare lockout

```
base.lm = lm(
  data = df_player,
  PER_diff ~ H+TRAVEL+I_OEFF+I_DEFF+M1 + M1_sq + M1_cu
)

without_lockout_lm <- df_player %>% filter( DATASET != '2011-2012 Regular Season') %>% lm(
  PER_diff ~ H+TRAVEL+I_OEFF+I_DEFF+M1+ M1_sq + M1_cu, data = .
)

M1.M2 <- lm(
  data = df_player,
  PER_diff ~ H+TRAVEL+I_OEFF+I_DEFF+M1 + M1_sq + M1_cu + M2
)
```

```
stargazer(base.lm, without_lockout_lm, type = 'latex',
          title = "Consider the 11-12 NBA Season",
          notes = "(1) Includes 11-12 NBA Season. (2) Omits 11-12 NBA Season")
```

```
##
## % Table created by stargazer v.5.2.3 by Marek Hlavac, Social Policy Institute. E-
## mail: marek.hlavac at gmail.com
## % Date and time: Mon, May 23, 2022 - 10:43:09 PM
## \begin{table}[!htbp] \centering
##   \caption{Consider the 11-12 NBA Season}
##   \label{}
##   \begin{tabular}{@{\extracolsep{5pt}}lcc}
##     \hline
##     \hline \hline
##     & \multicolumn{2}{c}{\textit{Dependent variable:}} \\
##     \cline{2-3}
##     \hline & \multicolumn{2}{c}{PER\_diff} \\
##     \hline & (1) & (2) \\
##     \hline
##     H & 0.679*** & 0.681*** \\
##     & (0.046) & (0.047) \\
##     & & \\
##     TRAVEL & 0.010 & 0.026 \\
##     & (0.053) & (0.055) \\
##     & & \\
##     I\_OEFF & $-0.042***$ & $-0.038***$ \\
##     & (0.005) & (0.006) \\
##     & & \\
##     I\_DEFF & 0.150*** & 0.156*** \\
##     & (0.006) & (0.006) \\
##     & & \\
##     M1 & 0.019 & 0.020 \\
##     & (0.025) & (0.026) \\
##     & & \\
##     M1\_sq & $-0.001$ & $-0.001$ \\
##     & (0.001) & (0.002) \\
##     & & \\
##     M1\_cu & 0.00000 & 0.00000 \\
##     & (0.00002) & (0.00002) \\
##     & & \\
##     Constant & $-11.917***$ & $-13.043***$ \\
##     & (0.848) & (0.905) \\
##     & & \\
##     \hline \hline
##     Observations & 132,159 & 124,986 \\
##     R2 & 0.008 & 0.009 \\
##     Adjusted R2 & 0.008 & 0.008 \\
##     Residual Std. Error & 6.821 (df = 132151) & 6.821 (df = 124978) \\
##     F Statistic & 160.718*** (df = 7; 132151) & 153.405*** (df = 7; 124978) \\
##     \hline
##     \hline \hline
##     \textit{Note:} & \multicolumn{2}{r}{***$p$<$0.1$; **$p$<$0.05$; *$p$<$0.01$} \\
##     & \multicolumn{2}{r}{(1) Includes 11-12 NBA Season. (2) Omits 11-12 NBA Season}
```

```
## \end{tabular}  
## \end{table}
```

```
print(" Wald Tests: Lockout Check ") wald.test( Sigma = vcov(lockout_lm), b = lockout_lmcoefficients, Terms =
5 : 7)wald.test(Sigma = vcov(without_lockout_lm), b = without_lockout_lmcoefficients, Terms = 5:7)
```

IV

```
df_combo <- df_combo %>% rename(
  'OWN TEAM' = 'TEAMS',
  'TEAM_OEFF' = 'OEFF',
  'TEAM_DEFF' = 'DEFF',
  'TEAM_REST_DAYS' = 'REST_DAYS',
  'TDF' = 'DATE-DIFF'
)

df_combo <- df_combo %>% select(
  c('DATASET', 'DATE', 'OWN TEAM', 'VENUE', 'TEAM_OEFF', 'TEAM_DEFF', 'TEAM_REST_DAYS', 'TDF')
)

df_player <- df_player[, -which(
  names(df_player) %in% c("FG", "FGA", "FT", "3P", "3PA", "FTA", "OR", "DR", "TOT", "A", "PF", "ST", "TO", "BL", "PTS")
)]

df_final <- merge(df_combo, df_player, by = c("DATASET", "DATE", "OWN TEAM", "VENUE"))

df_final <- dummy_cols(df_final, select_columns = "TDF")

df_final <- df_final %>% rename(
  'TDF_1' = 'TDF_1.0 days',
  'TDF_2' = 'TDF_2.0 days',
  'TDF_3' = 'TDF_3.0 days',
  'TDF_4' = 'TDF_4.0 days'
)
```

Model

```
IV_model <- ivreg::ivreg(
  data = df_final,
  PER_diff ~ H + TRAVEL + I_OEFF + I_DEFF + `1_days` + `2_days` + `3_days` + `4_days` + (M1 | ( `TDF_1` +
  `TDF_2` + `TDF_3` + `TDF_4` )) + (M2 | ( `TDF_1` + `TDF_2` + `TDF_3` + `TDF_4` )) + (M3 | ( `TDF_1` + `TDF_2` + `TDF_3` + `TDF_4` )), data = df_final)

IV_model.2 <- ivreg::ivreg(
  data = df_final,
  PER_diff ~ H + TRAVEL + I_OEFF + I_DEFF + `1_days` + `2_days` + `3_days` + `4_days` + (M1_sq | ( `TDF_1` +
  `TDF_2` + `TDF_3` + `TDF_4` )) + (M2 | ( `TDF_1` + `TDF_2` + `TDF_3` + `TDF_4` )) + (M3 | ( `TDF_1` + `TDF_2` + `TDF_3` + `TDF_4` )), data = df_final)

IV_model.3 <- ivreg::ivreg(
  data = df_final,
  PER_diff ~ H + TRAVEL + I_OEFF + I_DEFF + `1_days` + `2_days` + `3_days` + `4_days` + (M1_cu | ( `TDF_1` +
  `TDF_2` + `TDF_3` + `TDF_4` )) + (M2 | ( `TDF_1` + `TDF_2` + `TDF_3` + `TDF_4` )) + (M3 | ( `TDF_1` + `TDF_2` + `TDF_3` + `TDF_4` )), data = df_final)
```

```
summary(IV_model)
```

```
##
## Call:
## ivreg::ivreg(formula = PER_diff ~ H + TRAVEL + I_OEFF + I_DEFF +
## `1_days` + `2_days` + `3_days` + `4_days` + (M1 | (TDF_1 +
## TDF_2 + TDF_3 + TDF_4)) + (M2 | (TDF_1 + TDF_2 + TDF_3 +
## TDF_4)) + (M3 | (TDF_1 + TDF_2 + TDF_3 + TDF_4)), data = df_final)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -30.6204  -4.6561  -0.3136   4.3331  44.2854
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)    -12.090108   0.854236  -14.153 < 2e-16
## H               0.681175   0.045876   14.848 < 2e-16
## TRAVEL          0.025500   0.053486    0.477  0.6335
## I_OEFF         -0.042221   0.005301  -7.965 1.67e-15
## I_DEFF          0.149843   0.005652  26.512 < 2e-16
## `1_days`       -0.007071   0.078246  -0.090  0.9280
## `2_days`        0.162190   0.070223   2.310  0.0209
## `3_days`        0.060597   0.080312   0.755  0.4505
## `4_days`        0.157940   0.097416   1.621  0.1050
## M1 | (TDF_1 + TDF_2 + TDF_3 + TDF_4)TRUE  0.059102   0.123692   0.478  0.6328
## M2 | (TDF_1 + TDF_2 + TDF_3 + TDF_4)TRUE      NA         NA      NA      NA
## M3 | (TDF_1 + TDF_2 + TDF_3 + TDF_4)TRUE      NA         NA      NA      NA
##
## (Intercept)          ***
## H                    ***
## TRAVEL
## I_OEFF              ***
## I_DEFF              ***
## `1_days`
## `2_days`           *
## `3_days`
## `4_days`
## M1 | (TDF_1 + TDF_2 + TDF_3 + TDF_4)TRUE
```

```
## M2 | (TDF_1 + TDF_2 + TDF_3 + TDF_4)TRUE
## M3 | (TDF_1 + TDF_2 + TDF_3 + TDF_4)TRUE
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 6.82 on 131802 degrees of freedom
## Multiple R-Squared:  0.008425,    Adjusted R-squared:  0.008358
## Wald test: 124.4 on 9 and 131802 DF,  p-value: < 2.2e-16
```

```
summary(IV_model.2)
```

```
##
## Call:
## ivreg::ivreg(formula = PER_diff ~ H + TRAVEL + I_OEFF + I_DEFF +
##   `1_days` + `2_days` + `3_days` + `4_days` + (M1_sq | (TDF_1 +
##   TDF_2 + TDF_3 + TDF_4)) + (M2_sq | (TDF_1 + TDF_2 + TDF_3 +
##   TDF_4)) + (M3 | (TDF_1 + TDF_2 + TDF_3 + TDF_4)), data = df_final)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -30.6204  -4.6561  -0.3136   4.3331  44.2854
##
## Coefficients:
##                  Estimate Std. Error t value
## (Intercept)      -12.090108   0.854236 -14.153
## H                  0.681175   0.045876  14.848
## TRAVEL             0.025500   0.053486   0.477
## I_OEFF            -0.042221   0.005301  -7.965
## I_DEFF             0.149843   0.005652  26.512
## `1_days`         -0.007071   0.078246  -0.090
## `2_days`          0.162190   0.070223   2.310
## `3_days`          0.060597   0.080312   0.755
## `4_days`          0.157940   0.097416   1.621
## M1_sq | (TDF_1 + TDF_2 + TDF_3 + TDF_4)TRUE  0.059102   0.123692   0.478
## M2_sq | (TDF_1 + TDF_2 + TDF_3 + TDF_4)TRUE      NA         NA      NA
## M3 | (TDF_1 + TDF_2 + TDF_3 + TDF_4)TRUE      NA         NA      NA
##
##                  Pr(>|t|)
## (Intercept)      < 2e-16 ***
## H                  < 2e-16 ***
## TRAVEL             0.6335
## I_OEFF            1.67e-15 ***
## I_DEFF             < 2e-16 ***
## `1_days`          0.9280
## `2_days`          0.0209 *
## `3_days`          0.4505
## `4_days`          0.1050
## M1_sq | (TDF_1 + TDF_2 + TDF_3 + TDF_4)TRUE  0.6328
## M2_sq | (TDF_1 + TDF_2 + TDF_3 + TDF_4)TRUE      NA
## M3 | (TDF_1 + TDF_2 + TDF_3 + TDF_4)TRUE      NA
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 6.82 on 131802 degrees of freedom
## Multiple R-Squared:  0.008425,    Adjusted R-squared:  0.008358
```

```
## Wald test: 124.4 on 9 and 131802 DF, p-value: < 2.2e-16
```

```
summary(IV_model.3)
```

```
##
## Call:
## ivreg::ivreg(formula = PER_diff ~ H + TRAVEL + I_OEFF + I_DEFF +
##   `1_days` + `2_days` + `3_days` + `4_days` + (M1_cu | (TDF_1 +
##   TDF_2 + TDF_3 + TDF_4)) + (M2 | (TDF_1 + TDF_2 + TDF_3 +
##   TDF_4)) + (M3 | (TDF_1 + TDF_2 + TDF_3 + TDF_4)), data = df_final)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -30.6204  -4.6561  -0.3136   4.3331  44.2854
##
## Coefficients:
##                                Estimate Std. Error t value
## (Intercept)                   -12.090108   0.854236  -14.153
## H                               0.681175   0.045876   14.848
## TRAVEL                         0.025500   0.053486    0.477
## I_OEFF                       -0.042221   0.005301   -7.965
## I_DEFF                        0.149843   0.005652   26.512
## `1_days`                     -0.007071   0.078246   -0.090
## `2_days`                      0.162190   0.070223    2.310
## `3_days`                      0.060597   0.080312    0.755
## `4_days`                      0.157940   0.097416    1.621
## M1_cu | (TDF_1 + TDF_2 + TDF_3 + TDF_4)TRUE  0.059102   0.123692    0.478
## M2 | (TDF_1 + TDF_2 + TDF_3 + TDF_4)TRUE      NA         NA      NA
## M3 | (TDF_1 + TDF_2 + TDF_3 + TDF_4)TRUE      NA         NA      NA
##                                Pr(>|t|)
## (Intercept)                   < 2e-16 ***
## H                             < 2e-16 ***
## TRAVEL                        0.6335
## I_OEFF                       1.67e-15 ***
## I_DEFF                        < 2e-16 ***
## `1_days`                      0.9280
## `2_days`                      0.0209 *
## `3_days`                      0.4505
## `4_days`                      0.1050
## M1_cu | (TDF_1 + TDF_2 + TDF_3 + TDF_4)TRUE  0.6328
## M2 | (TDF_1 + TDF_2 + TDF_3 + TDF_4)TRUE      NA
## M3 | (TDF_1 + TDF_2 + TDF_3 + TDF_4)TRUE      NA
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 6.82 on 131802 degrees of freedom
## Multiple R-Squared:  0.008425,    Adjusted R-squared:  0.008358
## Wald test: 124.4 on 9 and 131802 DF, p-value: < 2.2e-16
```