---
title: “Dynamic Model”
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output:
pdf_document: default
html_document: default

Exploración de los paneles

Importemos los paneles donde un pánel corresponde a los bateadores y, el otro, a los fielderos.

Por otro lado, se mostrarán las dimensiones de cada pánel

```
print("Bateadores: ")
```

```
[1] "Bateadores: "
```

```
print(dim(hitters_panel))
```

```
[1] 570 205
```

```
print("")
```

```
[1] ""
```

```
print("Fildeadores: ")
```

```
[1] "Fildeadores: "
```

```
print(dim(fielders_panel))
```

```
[1] 542 221
```

Como la posición del jugador es un control, necesitaremos pasar de columna categórica a columna numérica.

```
# Convert categorical column to numerical
# Position;
hitters_panel$position_num_t <- as.numeric(factor(hitters_panel$Posicion_t))
fielders_panel$position_num_t <- as.numeric(factor(fielders_panel$Posicion_t))
# Team:
hitters_panel$team_num_t <- as.numeric(factor(hitters_panel$Acronimo_t))
fielders_panel$team_num_t <- as.numeric(factor(fielders_panel$Acronimo_t))
# Free Agent dummy
hitters_panel <- cbind(setNames(data.frame(rep(1, nrow(hitters_panel))), "Agente_t"), hitters_panel)
fielders_panel <- cbind(setNames(data.frame(rep(1, nrow(fielders_panel))), "Agente_t"), fielders_panel)
```

Como adelanto, se descartaron los controles por posición puesto que no son significativos para los modelos y afectan los resultados. Tal vez por el hehco de que los jugadores tienden a rotar de posición en un mismo partido e incluso a lo largo de la temporada. aAgreguemos una columna de 1’s que represente la dummy de ser agente libre

```
# add a column of 1s to the panel data
hitters_panel <- cbind(hitters_panel,
                       fa = rep(1, nrow(hitters_panel)))
fielders_panel <- cbind(fielders_panel,
                        fa = rep(1, nrow(fielders_panel)))
```

Debido a que en las estadísticas descriptivas se observó un shock en el año de la pandemia COVID-19, se obtendrán las estimaciones quitando el año 2020.

Segmentación por grupo

Lo que haremos es dividir los paneles en ciertas categorías. Primero, veamos todas las posiciones en los páneles

```
print("Bateadores:")
```

```
[1] "Bateadores:"
```

```
print(unique(hitters_panel$Posicion_t))
```

```
 [1] SP C  CF RF DH 1B 2B SS 3B LF RP OF
Levels: 1B 2B 3B C CF DH LF OF RF RP SP SS
```

```
print("")
```

```
[1] ""
```

```
print("Fildeadores:")
```

```
[1] "Fildeadores:"
```

```
print(unique(fielders_panel$Posicion_t))
```

```
[1] SP    RP    RP/CL RF    SS
Levels: RF RP RP/CL SP SS
```

Arriba se muestran las posiciones de los jugadores en nuestras bases de datos. A pesar de que en los bateadores aparezcan posiciones defensivas se debe a que estos juegan tanto como ofensivos como defensivos. Estando en la ofensiva se juega en las misma posición que todos por lo que no es necesario especificar que ocupala posición de bateador (**H**). Sin embargo, cuando se dice que es un bateador designado (**DH**) ya que este solo juega en la ofensiva para sustituir a un lanzador/pitcher.

Por otro lado, veamos cuantas observaciones hay por posición.

```
hitters_panel %>% count(Posicion_t, sort = TRUE)
```

```
   Posicion_t   n
1          SP 112
2           C  76
3          LF  60
4          RF  59
5          2B  53
6          RP  47
7          1B  45
8          3B  31
9          DH  31
10         CF  28
11         SS  27
12         OF   1
```

```
fielders_panel %>% count(Posicion_t, sort = TRUE)
```

```
  Posicion_t   n
1         RP 299
2         SP 206
3      RP/CL  22
4         SS  12
5         RF   3
```

Continuemos con la segmentación de acuerdo a categorías. Primero, obtendremos el split de todas las posiciones y luego concatenaremos de acuerdo a los grupos de interés:

Ofensivos:

- **Bateador designado (DH).**
- **No bateador designado (H).**

Debido a la falta de observaciones para los *outfielders* es que se omitirá su estimación. Por otro lado, debido a que la mayoría de los datos para los fildeadores son de los lanzadores, podemos agruparlos de la siguiente manera

Defensivos:

- **Starting pitcher:** Lanzador inicial (SP).
- **Relief pitcher:** Lanzador de relevo (RP) y lanzador de cierre (RP/CL)
- **Campo corto (SS).**

Segundo, crearemos las categorías de acuerdo a la especificación mencionada arriba

Tercero, concatenaremos estas bases de datos de acuerdo a los grupos señalados anteriormente

Veamos las dimensiones de cada una de los paneles sin el shock de la COVID-19:

```
print("Regular hitter: ")
```

```
[1] "Regular hitter: "
```

```
print(dim(hitter_cov_data))
```

```
[1] 501 209
```

```
print("")
```

```
[1] ""
```

```
print("Designated hitter: ")
```

```
[1] "Designated hitter: "
```

```
print(dim(d_hitter_cov_data))
```

```
[1]  30 209
```

```
print("")
```

```
[1] ""
```

```
print("Relief pitchers: ")
```

```
[1] "Relief pitchers: "
```

```
print(dim(relief_pitcher_cov_data))
```

```
[1] 296 225
```

```
print("")
```

```
[1] ""
```

```
print("Starting pitchers: ")
```

```
[1] "Starting pitchers: "
```

```
print(dim(starting_cov_data))
```

```
[1] 185 225
```

```
print("")
```

```
[1] ""
```

```
print("Short stops: ")
```

```
[1] "Short stops: "
```

```
print(dim(shorts_cov_data))
```

```
[1]  12 225
```

Estimaciones y regresiones

Lo que resta hacer es implementar un algoritmo donde se pueda hacer el siguiente modelo para todas las estadísticas deportiva de acuerdo a si el jugador es defensivo u ofensivo:

$$Y_t(\cdot) = \beta_0 X_t + \beta_1 \text{Controles}_t + u_t$$

donde

- $Controles_t$:
  - Equipo.
  - Edad.
  - Año.
- α: Heterogeneidad del jugador.

Creemos la lista de variables sobre las cuáles se va a iterar el clico

Variables para los fildeadores

Las variables base para ambos tipos de jugadores son los controles

```
# Constroles:
vars_ms  <- 'Y_Sueldo_regular_norm_t ~ Edad_t + Anios_de_contrato_t + team_num_t'
# Constroles:
vars_fe  <- 'Y_Sueldo_regular_norm_t ~ Edad_t + Anios_de_contrato_t + team_num_t -1'
```

```
hitter_stats_1 = c("$Edad_{t}$" , "Años contrato$_{t}$", "Eqipo$_{t}$",
                   "$X_{AB_{t}}$","$X_{AB_{t-1}}$","$X_{AB^{2}_{t}}$","$X_{AB^{2}_{t-1}}$",
                   "$X_{H_{t}}$","$X_{H_{t-1}}$","$X_{H^{2}_{t}}$","$X_{H^{2}_{t-1}}$",
                   "$X_{BA_{t}}$","$X_{BA_{t-1}}$", "$X_{BA^{2}_{t}}$","$X_{BA^{2}_{t-1}}$",
                   "Agente$_{t}$")
hitter_stats_2 = c("$Edad_{t}$" , "Años contrato$_{t}$", "Eqipo$_{t}$",
                   "$X_{D_{t}}$","$X_{D_{t-1}}$","$X_{D^{2}_{t}}$","$X_{D^{2}_{t-1}}$",
                   "$X_{HR_{t}}$","$X_{HR_{t-1}}$","$X_{HR^{2}_{t}}$","$X_{HR^{2}_{t-1}}$",
                   "$X_{GS_{t}}$","$X_{GS_{t-1}}$", "$X_{GS^{2}_{t}}$","$X_{GS^{2}_{t-1}}$",
                   "Agente$_{t}$")
hitter_stats_3 = c("$Edad_{t}$" , "Años contrato$_{t}$", "Eqipo$_{t}$",
                   "$X_{OPS_{t}}$","$X_{OPS_{t-1}}$","$X_{OPS^{2}_{t}}$","$X_{OPS^{2}_{t-1}}$",
                   "$X_{OBP_{t}}$","$X_{OBP_{t-1}}$","$X_{OBP^{2}_{t}}$","$X_{OBP^{2}_{t-1}}$",
                   "$X_{SLG_{t}}$","$X_{SLG_{t-1}}$", "$X_{SLG^{2}_{t}}$","$X_{SLG^{2}_{t-1}}$",
                   "Agente$_{t}$")
hitter_stats_4 = c("$Edad_{t}$" , "Años contrato$_{t}$", "Eqipo$_{t}$",
```

```
                  "$X_{RBI_{t}}$","$X_{RBI_{t-1}}$","$X_{RBI^{2}_{t}}$","$X_{RBI^{2}_{t-1}}$",
                  "$X_{T_{t}}$","$X_{T_{t-1}}$","$X_{T^{2}_{t}}$","$X_{T^{2}_{t-1}}$",
                  "$X_{WAR_{t}}$","$X_{WAR_{t-1}}$", "$X_{WAR^{2}_{t}}$","$X_{WAR^{2}_{t-1}}$",
                  "Agente$_{t}$")
hitter_stats <- list(hitter_stats_1,
                     hitter_stats_2,
                     hitter_stats_3,
                     hitter_stats_4)
# Cycles for loop
hitter_rep <- 4
# Stats to show
hitter_stat_num <- 6
```

```
fielder_stats_1 = c("$Edad_{t}$" , "Años contrato$_{t}$", "Eqipo$_{t}$",
                    "$X_{H^{2}_{t}}$","$X_{H^{2}_{t-1}}$","$X_{H_{t}}$","$X_{H_{t-1}}$",
                    "$X_{R^{2}_{t}}$","$X_{R^{2}_{t-1}}$","$X_{ER^{2}_{t}}$","$X_{ER^{2}_{t-1}}$",
                    "$X_{ER_{t}}$","$X_{ER_{t-1}}$", "$X_{R_{t}}$","$X_{R_{t-1}}$",
                    "Agente$_{t}$")
fielder_stats_2 = c("$Edad_{t}$" , "Años contrato$_{t}$", "Eqipo$_{t}$",
                    "$X_{Comando^{2}_{t}}$","$X_{Comando^{2}_{t-1}}$","$X_{Comando_{t}}$","$X_{Comando_
                    "$X_{Control^{2}_{t}}$","$X_{Control^{2}_{t-1}}$","$Control_{H_{t}}$","$X_{Control_
                    "$X_{Dominio^{2}_{t}}$","$X_{Dominio^{2}_{t-1}}$","$X_{Dominio_{t}}$","$X_{Dominio_
                    "Agente$_{t}$")
fielder_stats_3 = c("$Edad_{t}$" , "Años contrato$_{t}$", "Eqipo$_{t}$",
                    "$X_{ERA^{2}_{t}}$","$X_{ERA^{2}_{t-1}}$","$X_{ERA_{t}}$","$X_{ERA_{t-1}}$",
                    "$X_{IP^{2}_{t}}$","$X_{IP^{2}_{t-1}}$","$X_{IP_{t}}$","$X_{IP_{t-1}}$",
                    "$X_{L^{2}_{t}}$","$X_{L^{2}_{t-1}}$", "$X_{L_{t}}$","$X_{L_{t-1}}$",
                    "Agente$_{t}$")
fielder_stats_4 = c("$Edad_{t}$" , "Años contrato$_{t}$", "Eqipo$_{t}$",
                    "$X_{S^{2}_{t}}$","$X_{S^{2}_{t-1}}$","$X_{S_{t}}$","$X_{S_{t-1}}$",
                    "$X_{SO^{2}_{t}}$","$X_{SO^{2}_{t-1}}$","$X_{SO_{t}}$","$X_{SO_{t-1}}$",
                    "$X_{WAR^{2}_{t}}$","$X_{WAR^{2}_{t-1}}$","$X_{WAR_{t}}$","$X_{WAR_{t-1}}$",
                    "Agente$_{t}$")
fielder_stats_5 = c("$Edad_{t}$" , "Años contrato$_{t}$", "Eqipo$_{t}$",
                    "$X_{WHIP^{2}_{t}}$","$X_{WHIP^{2}_{t-1}}$","$X_{WHIP_{t}}$","$X_{WHIP_{t-1}}$",
                    "$X_{BB^{2}_{t}}$","$X_{BB^{2}_{t-1}}$","$X_{BB_{t}}$","$X_{BB_{t-1}}$",
                    "$X_{W^{2}_{t}}$","$X_{W^{2}_{t-1}}$","$X_{W_{t}}$","$X_{W_{t-1}}$",
                    "Agente$_{t}$")
fielder_stats <- list(fielder_stats_1,
                      fielder_stats_2,
                      fielder_stats_3,
                      fielder_stats_4,
                      fielder_stats_5)
# Cycles for loop
fielder_rep <- 5
# Stats to show
fielder_stat_num <- 6
```

Estimaciones directas

Pooling

Bateadores

Se obtendrán las estimaciones de las variables referentes a estadísticas deportivas sin controles

```
# Create a model to store the results
hitter_simple_pooling <- list()

# To store the results
hitter_results_simple_pooling_1 <- list()
hitter_results_simple_pooling_2 <- list()
hitter_results_simple_pooling_3 <- list()
hitter_results_simple_pooling_4 <- list()
hitter_results_simple_pooling <- list(result_1 = hitter_results_simple_pooling_1,
                                      result_2 = hitter_results_simple_pooling_2,
                                      result_3 = hitter_results_simple_pooling_3,
                                      result_4 = hitter_results_simple_pooling_4)

# Loop over the variables in var_hitter_list
for (j in 1:hitter_rep){

  for (i in 1:hitter_stat_num){
    # Run linear regression with grouped errors by country and robust errors
    base_vars_h  <- paste(vars_ms, stat_hitter_t[[i + hitter_stat_num*(j - 1)]],
                          sep = '+')
    formula <- paste(base_vars_h,
                     stat_hitter_t_1[[i + hitter_stat_num*(j - 1)]],
                     sep = " + ")

    hitter_simple_pooling[[i + hitter_stat_num*(j - 1)]] <- plm(formula, data = hitter_data,
                                                               model = "pooling",
                                                               index = c("id", "Anio_ref"))

    hitter_results_simple_pooling[[j]][[i]] <- coeftest(hitter_simple_pooling[[i + hitter_stat_num*(j -
                                                                vcov = vcovHC(hitter_simple_pooling[[i + hitter
                                                                              type = "HC1",
                                                                              cluster = "group"))
  }

  # Print the third block of results
  stargazer(hitter_results_simple_pooling[[j]],
          no.space = TRUE,
          type = "text",
          title = "Bateadores: Modelo Pooling",
          covariate.labels = hitter_stats[[j]])
}
```

```
Bateadores: Modelo Pooling
================================================================
                                Dependent variable:
```

```
                ------------------------------------------------
                  (1)       (2)      (3)      (4)      (5)      (6)
-------------------------------------------------------------------
Edadt          -0.006** -0.006**  -0.006** -0.006** -0.006** -0.006**
               (0.003)   (0.003)  (0.002)  (0.003)  (0.003)  (0.003)
Años contratot  0.001    -0.001    0.001    -0.001  -0.0003   -0.001
               (0.004)   (0.004)  (0.004)  (0.004)  (0.003)  (0.003)
Eqipot          0.001     0.001    0.001    0.001    0.001    0.001
               (0.001)   (0.001)  (0.001)  (0.001)  (0.001)  (0.001)
XABt           -0.001
               (0.001)
XABt-1         -0.001
               (0.001)
XAB2t                   -0.00002
                        (0.00004)
XAB2t-1                 -0.00000
                        (0.00003)
XHt                              -0.002*
                                 (0.001)
XHt-1                             0.0003
                                 (0.001)
XH2t                                      -0.0001
                                          (0.0001)
XH2t-1                                     0.0001
                                          (0.0001)
XBAt                                                -0.031
                                                   (0.020)
XBAt-1                                              0.020
                                                   (0.017)
XBA2t                                                       -0.046
                                                           (0.029)
XBA2t-1                                                     0.005
                                                           (0.017)
Agentet         0.162*   0.157*    0.149*   0.153*   0.152*   0.149*
               (0.085)   (0.081)  (0.081)  (0.086)  (0.085)  (0.085)
===================================================================
===================================================================
Note:                                    *p<0.1; **p<0.05; ***p<0.01

Bateadores: Modelo Pooling
===================================================================
                                Dependent variable:
                ------------------------------------------------
                  (1)      (2)      (3)      (4)      (5)      (6)
-------------------------------------------------------------------
Edadt          -0.006** -0.006** -0.006** -0.006** -0.006** -0.006**
               (0.002)  (0.003)  (0.003)  (0.003)  (0.003)  (0.003)
Años contratot  0.001    -0.001   -0.002   -0.001   0.001    -0.001
               (0.004)  (0.004)  (0.003)  (0.003)  (0.004)  (0.004)
Eqipot          0.001    0.001    0.001    0.001    0.001    0.001
               (0.001)  (0.001)  (0.001)  (0.001)  (0.001)  (0.001)
XDt            -0.004
```

```
               (0.003)
XDt-1           -0.001
               (0.003)
XD2t                     -0.0004
                         (0.001)
XD2t-1                    0.001
                         (0.001)
XHRt                              -0.001
                                  (0.004)
XHRt-1                             0.003
                                  (0.002)
XHR2t                                      -0.001
                                           (0.001)
XHR2t-1                                    -0.0001
                                           (0.0004)
XGSt                                                -0.002
                                                    (0.001)
XGSt-1                                               -0.001
                                                    (0.001)
XGS2t                                                        -0.0001
                                                             (0.0002)
XGS2t-1                                                      0.00005
                                                             (0.0001)
Agentet          0.150*   0.155*   0.158*   0.160*   0.161*   0.158*
                (0.080)  (0.083)  (0.083)  (0.083)  (0.084)  (0.081)
=================================================================
=================================================================
Note:                                      *p<0.1; **p<0.05; ***p<0.01

Bateadores: Modelo Pooling
=================================================================
                              Dependent variable:
                ---------------------------------------------------

                   (1)      (2)      (3)      (4)      (5)      (6)
-----------------------------------------------------------------
Edadt           -0.006** -0.005** -0.006** -0.005** -0.006** -0.006**
                (0.003)  (0.003)  (0.003)  (0.003)  (0.003)  (0.003)
Años contratot -0.0004   0.0001   -0.001  -0.0002   0.0002   0.0002
                (0.003)  (0.004)  (0.003)  (0.003)  (0.003)  (0.004)
Eqipot           0.001    0.001    0.001    0.001    0.001    0.001
                (0.001)  (0.001)  (0.001)  (0.001)  (0.001)  (0.001)
XOPSt            -0.021
                (0.014)
XOPSt-1          -0.001
                (0.013)
XOPS2t                   -0.026**
                         (0.013)
XOPS2t-1                  0.008
                         (0.011)
XOBPt                             -0.043**
                                  (0.022)
XOBPt-1                            0.020
                                  (0.019)
```

```
XOBP2t                                      -0.049*
                                            (0.028)
XOBP2t-1                                     0.006
                                            (0.020)
XSLGt                                                  -0.018
                                                      (0.019)
XSLGt-1                                                -0.023
                                                      (0.017)
XSLG2t                                                         -0.040*
                                                               (0.022)
XSLG2t-1                                                        0.014
                                                               (0.018)
Agentet          0.160*   0.142*   0.156*   0.144*  0.167**   0.148*
                (0.085)  (0.086)  (0.083)  (0.083)  (0.082)  (0.085)
=============================================================================
=============================================================================
Note:                                        *p<0.1; **p<0.05; ***p<0.01

Bateadores: Modelo Pooling
=============================================================================
                                Dependent variable:
                ---------------------------------------------------------

                   (1)      (2)      (3)      (4)       (5)      (6)
-----------------------------------------------------------------------------
Edadt           -0.006** -0.006** -0.006** -0.006** -0.007*** -0.006**
                (0.003)  (0.003)  (0.003)  (0.003)   (0.002)  (0.002)
Años contratot  0.0004   -0.002   -0.001   -0.001    -0.005    -0.002
                (0.004)  (0.004)  (0.003)  (0.003)   (0.004)  (0.003)
Eqipot           0.001    0.001    0.001    0.001     0.001    0.001
                (0.001)  (0.001)  (0.001)  (0.001)   (0.001)  (0.001)
XRBIt           -0.003**
                (0.001)
XRBIt-1          0.001
                (0.002)
XRBI2t                    0.0001
                         (0.0002)
XRBI2t-1                  0.0001
                         (0.0002)
XTt                               -0.010
                                 (0.008)
XTt-1                            0.011**
                                 (0.005)
XT2t                                      -0.003
                                          (0.004)
XT2t-1                                     0.001
                                          (0.001)
XWARt                                                 0.016**
                                                      (0.007)
XWARt-1                                               0.013**
                                                      (0.006)
XWAR2t                                                          0.005
                                                               (0.004)
XWAR2t-1                                                       0.005**
```

```
                                                                    (0.002)
Agentet          0.149*   0.165*   0.156*   0.156*   0.205**  0.180**
                (0.082)  (0.084)  (0.084)  (0.084)   (0.081)  (0.079)
=========================================================================
=========================================================================
Note:                                        *p<0.1; **p<0.05; ***p<0.01
```

Starting pitcher

```
# Create a model to store the results
fielder_simple_pooling <- list()

# To store the results
fielder_results_simple_pooling_1 <- list()
fielder_results_simple_pooling_2 <- list()
fielder_results_simple_pooling_3 <- list()
fielder_results_simple_pooling_4 <- list()
fielder_results_simple_pooling_5 <- list()
fielder_results_simple_pooling <- list(result_1 = fielder_results_simple_pooling_1,
                                       result_2 = fielder_results_simple_pooling_2,
                                       result_3 = fielder_results_simple_pooling_3,
                                       result_4 = fielder_results_simple_pooling_4,
                                       result_5 = fielder_results_simple_pooling_5)

# Loop over the variables in var_hitter_list
for (j in 1:fielder_rep){

  for (i in 1:fielder_stat_num){
    # Run linear regression with grouped errors by country and robust errors
    base_vars_h  <- paste(vars_ms, stat_fielder_t[[i + fielder_stat_num*(j - 1)]],
                          sep = '+')
    formula <- paste(base_vars_h,
                     stat_fielder_t_1[[i + fielder_stat_num*(j - 1)]],
                     sep = " + ")

    fielder_simple_pooling[[i + hitter_stat_num*(j - 1)]] <- plm(formula, data = starting_data,
                                                 model = "pooling",
                                                 index = c("id", "Anio_ref"))

    fielder_results_simple_pooling[[j]][[i]] <- coeftest(fielder_simple_pooling[[i + fielder_stat_num*(
                                                         vcov = vcovHC(fielder_simple_pooling[[i + fiel
                                                                       type = "HC1",
                                                                       cluster = "group"))
  }

  # Print the third block of results
  stargazer(fielder_results_simple_pooling[[j]],
          no.space = TRUE,
          type = "text",
          title = "Lanzadores Iniciales: Modelo Pooling",
          covariate.labels = fielder_stats[[j]])
}
```

Lanzadores Iniciales: Modelo Pooling

	Dependent variable:					
	(1)	(2)	(3)	(4)	(5)	(6)
Edadt	-0.008*	-0.009**	-0.009**	-0.009**	-0.008**	-0.008**
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Años contratot	-0.007	-0.010	-0.011	-0.011	-0.009	-0.010
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.008)
Eqipot	0.003*	0.003*	0.003*	0.003*	0.003*	0.003*
	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)	(0.002)
XH2t	-0.0001					
	(0.0001)					
XH2t-1	-0.00005					
	(0.0001)					
XHt		-0.0005				
		(0.002)				
XHt-1		0.00002				
		(0.001)				
XR2t			0.00002			
			(0.0002)			
XR2t-1			-0.0001			
			(0.0001)			
XER2t				0.0001		
				(0.0002)		
XER2t-1				-0.0002		
				(0.0001)		
XERt					-0.002	
					(0.002)	
XERt-1					-0.001	
					(0.001)	
XRt						-0.001
						(0.002)
XRt-1						-0.001
						(0.001)
Agentet	0.227*	0.252**	0.257**	0.261**	0.243*	0.247**
	(0.121)	(0.123)	(0.124)	(0.129)	(0.125)	(0.124)
Note:				*p<0.1; **p<0.05; ***p<0.01		

Lanzadores Iniciales: Modelo Pooling

	Dependent variable:					
	(1)	(2)	(3)	(4)	(5)	(6)
Edadt	-0.008**	-0.009**	-0.009**	-0.008**	-0.007*	-0.006
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Años contratot	-0.010	-0.010	-0.010	-0.011	-0.011	-0.011
	(0.007)	(0.008)	(0.007)	(0.007)	(0.007)	(0.007)

```
Eqipot          0.003*    0.003*   0.003**   0.003*  0.003**  0.003*
                (0.002)  (0.002)   (0.001)  (0.001)  (0.001) (0.001)
XComando2t      -0.001
                (0.006)
XComando2t-1   -0.00001
               (0.00001)
XComandot                -0.002
                        (0.012)
XComandot-1              -0.001
                        (0.001)
XControl2t                        -0.061
                                  (0.043)
XControl2t-1                     -0.122***
                                  (0.033)
ControlHt                                   0.042
                                           (0.030)
XControlt-1                                -0.076**
                                           (0.031)
XDominio2t                                          -0.009
                                                    (0.023)
XDominio2t-1                                        0.048**
                                                    (0.020)
XDominiot                                                    -0.015
                                                            (0.019)
XDominiot-1                                                 0.052***
                                                            (0.018)
Agentet         0.244**  0.245**   0.241**   0.218*   0.191   0.195
                (0.119)  (0.120)   (0.119)  (0.118)  (0.122) (0.126)
=============================================================================
=============================================================================
Note:                                       *p<0.1; **p<0.05; ***p<0.01

Lanzadores Iniciales: Modelo Pooling
=============================================================================
                                Dependent variable:
                ---------------------------------------------------

                  (1)       (2)       (3)       (4)       (5)      (6)
-----------------------------------------------------------------------------
Edadt          -0.008** -0.008**  -0.008** -0.008** -0.008* -0.008**
               (0.004)   (0.004)  (0.004)  (0.004)  (0.004) (0.004)
Años contratot  -0.010   -0.012    -0.007   -0.010  -0.011   -0.010
               (0.008)   (0.008)  (0.007)  (0.008)  (0.007) (0.007)
Eqipot          0.003*   0.003*    0.003*   0.003*  0.003*   0.003*
               (0.002)   (0.001)  (0.001)  (0.001)  (0.001) (0.001)
XERA2t          -0.001
               (0.003)
XERA2t-1       -0.006**
               (0.003)
XERAt                    -0.012*
                         (0.006)
XERAt-1                 -0.020***
                         (0.006)
XIP2t                             -0.0001
```

			(0.0001)			
XIP2t-1			-0.00001			
			(0.0001)			
XIPt				-0.0005		
				(0.001)		
XIPt-1				-0.0002		
				(0.001)		
XL2t					-0.002	
					(0.002)	
XL2t-1					-0.001	
					(0.001)	
XLt						-0.004
						(0.006)
XLt-1						-0.004
						(0.004)
Agentet	0.236*	0.234**	0.234*	0.247*	0.241*	0.248**
	(0.125)	(0.113)	(0.120)	(0.130)	(0.127)	(0.125)
Note:				*p<0.1; **p<0.05; ***p<0.01		

Lanzadores Iniciales: Modelo Pooling

	Dependent variable:					
	(1)	(2)	(3)	(4)	(5)	(6)
Edadt	-0.010**	-0.010**	-0.009**	-0.009**	-0.009**	-0.010**
	(0.005)	(0.005)	(0.004)	(0.004)	(0.004)	(0.004)
Años contratot	-0.012	-0.012	-0.009	-0.012	-0.011	-0.015**
	(0.008)	(0.008)	(0.008)	(0.008)	(0.007)	(0.007)
Eqipot	0.003*	0.003*	0.003*	0.003*	0.003*	0.003*
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
XS2t	0.087					
	(0.080)					
XS2t-1	0.023**					
	(0.009)					
XSt		0.051				
		(0.051)				
XSt-1		0.064**				
		(0.030)				
XSO2t			-0.0001			
			(0.0001)			
XSO2t-1			0.0001			
			(0.0001)			
XSOt				0.0004		
				(0.001)		
XSOt-1				-0.00002		
				(0.001)		
XWAR2t					0.003	
					(0.004)	
XWAR2t-1					-0.001	
					(0.005)	

XWARt						0.013
						(0.009)
XWARt-1						0.008
						(0.011)
Agentet	0.288**	0.303**	0.257**	0.263**	0.262**	0.290**
	(0.144)	(0.146)	(0.119)	(0.126)	(0.119)	(0.124)

Note: *p<0.1; **p<0.05; ***p<0.01

Lanzadores Iniciales: Modelo Pooling

	Dependent variable:					
	(1)	(2)	(3)	(4)	(5)	(6)
Edadt	-0.007*	-0.009**	-0.009**	-0.009**	-0.009**	-0.008*
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Años contratot	-0.013	-0.014*	-0.011	-0.012	-0.012	-0.008
	(0.008)	(0.008)	(0.007)	(0.007)	(0.007)	(0.007)
Eqipot	0.003**	0.003**	0.003*	0.003*	0.003*	0.003*
	(0.001)	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)
XWHIP2t	-0.008					
	(0.011)					
XWHIP2t-1	-0.043***					
	(0.011)					
XWHIPt		-0.007				
		(0.010)				
XWHIPt-1		-0.036***				
		(0.011)				
XBB2t			-0.0002			
			(0.0004)			
XBB2t-1			0.0001			
			(0.0003)			
XBBt				0.001		
				(0.003)		
XBBt-1				-0.002		
				(0.002)		
XW2t					0.001	
					(0.001)	
XW2t-1					0.0001	
					(0.001)	
XWt						-0.005
						(0.006)
XWt-1						0.0002
						(0.005)
Agentet	0.174	0.266**	0.256**	0.265**	0.262**	0.233*
	(0.112)	(0.115)	(0.122)	(0.130)	(0.122)	(0.130)

Note: *p<0.1; **p<0.05; ***p<0.01

Efectos fijos

Bateadores

Se obtendrán las estimaciones de las variables referentes a estadísticas deportivas sin controles

```
# Create a model to store the results
hitter_simple_within <- list()

# To store the results
hitter_results_simple_within_1 <- list()
hitter_results_simple_within_2 <- list()
hitter_results_simple_within_3 <- list()
hitter_results_simple_within_4 <- list()
hitter_results_simple_within <- list(result_1 = hitter_results_simple_within_1,
                                     result_2 = hitter_results_simple_within_2,
                                     result_3 = hitter_results_simple_within_3,
                                     result_4 = hitter_results_simple_within_4)

# Loop over the variables in var_hitter_list
for (j in 1:hitter_rep){

  for (i in 1:hitter_stat_num){
    # Run linear regression with grouped errors by country and robust errors
    base_vars_h  <- paste(vars_fe, stat_hitter_t[[i + hitter_stat_num*(j - 1)]],
                          sep = '+')
    formula <- paste(base_vars_h,
                     stat_hitter_t_1[[i + hitter_stat_num*(j - 1)]],
                     sep = " + ")

    hitter_simple_within[[i + hitter_stat_num*(j - 1)]] <- plm(formula, data = hitter_data,
                                                 model = "within",
                                                 index = c("id", "Anio_ref"))

    hitter_results_simple_within[[j]][[i]] <- coeftest(hitter_simple_within[[i + hitter_stat_num*(j - 1
                                                       vcov = vcovHC(hitter_simple_within[[i + hitter_
                                                                     type = "HC1",
                                                                     cluster = "group"))
  }

  # Print the third block of results
  stargazer(hitter_results_simple_within[[j]],
          no.space = TRUE,
          type = "text",
          title = "Bateadores: Estimador Within",
          covariate.labels = hitter_stats[[j]])
}
```

```
Bateadores: Estimador Within
================================================================================
                                  Dependent variable:
                ---------------------------------------------------------

                    (1)        (2)        (3)        (4)        (5)        (6)
```

```
------------------------------------------------------------------------
Edadt           -0.003    -0.004    -0.004   -0.004   -0.004   -0.004
                (0.006)   (0.006)  (0.006)  (0.005)  (0.005)   (0.005)
Años contratot -0.032*** -0.032**  -0.032** -0.031** -0.031** -0.032***
                (0.012)   (0.013)  (0.012)  (0.012)  (0.012)   (0.012)
Eqipot           0.001     0.001    0.001    0.001    0.001     0.001
                (0.001)   (0.001)  (0.001)  (0.001)  (0.001)   (0.001)
XABt             0.001
                (0.001)
XABt-1          0.0003
                (0.001)
XAB2t                     0.00000
                         (0.00004)
XAB2t-1                   0.00000
                         (0.00004)
XHt                               -0.0005
                                  (0.002)
XHt-1                             -0.0001
                                  (0.002)
XH2t                                       -0.0002
                                           (0.0002)
XH2t-1                                     -0.0001
                                           (0.0002)
XBAt                                                 -0.004
                                                    (0.030)
XBAt-1                                               0.034
                                                    (0.028)
XBA2t                                                          0.010
                                                              (0.046)
XBA2t-1                                                        0.011
                                                              (0.024)
========================================================================
========================================================================
Note:                                        *p<0.1; **p<0.05; ***p<0.01

Bateadores: Estimador Within
========================================================================
                                Dependent variable:
                ---------------------------------------------------------

                   (1)       (2)       (3)       (4)       (5)       (6)
------------------------------------------------------------------------
Edadt           -0.004    -0.004    -0.003    -0.004    -0.003    -0.003
                (0.005)   (0.005)   (0.005)   (0.005)   (0.006)   (0.006)
Años contratot -0.032*** -0.032** -0.034*** -0.034*** -0.032*** -0.032**
                (0.012)   (0.012)   (0.012)   (0.013)   (0.012)   (0.012)
Eqipot           0.001     0.001     0.001     0.001     0.001     0.001
                (0.001)   (0.001)   (0.001)   (0.001)   (0.001)   (0.001)
XDt              0.001
                (0.005)
XDt-1           -0.001
                (0.003)
XD2t                      0.00000
                          (0.001)
```

```
XD2t-1                    -0.0004
                          (0.001)
XHRt                                0.005
                                   (0.005)
XHRt-1                              0.001
                                   (0.004)
XHR2t                                          0.001
                                              (0.001)
XHR2t-1                                       -0.0002
                                              (0.001)
XGSt                                                      0.001
                                                         (0.002)
XGSt-1                                                   0.0004
                                                         (0.002)
XGS2t                                                               0.0001
                                                                   (0.0002)
XGS2t-1                                                            0.00002
                                                                   (0.0002)
=========================================================================
=========================================================================
Note:                                          *p<0.1; **p<0.05; ***p<0.01

Bateadores: Estimador Within
=========================================================================
                                Dependent variable:
               ---------------------------------------------------------

                  (1)       (2)       (3)       (4)       (5)       (6)
-------------------------------------------------------------------------
Edadt           -0.004    -0.004    -0.004    -0.004    -0.004    -0.004
               (0.005)   (0.005)   (0.005)   (0.005)   (0.005)   (0.005)
Años contratot -0.031** -0.032** -0.031** -0.033*** -0.030** -0.033***
               (0.012)   (0.012)   (0.012)   (0.012)   (0.013)   (0.012)
Eqipot          0.001     0.001     0.001     0.002     0.001     0.001
               (0.001)   (0.001)   (0.001)   (0.001)   (0.001)   (0.001)
XOPSt           -0.013
               (0.020)
XOPSt-1         -0.002
               (0.018)
XOPS2t                    0.002
                         (0.021)
XOPS2t-1                 -0.003
                         (0.016)
XOBPt                              -0.002
                                   (0.040)
XOBPt-1                             0.029
                                   (0.032)
XOBP2t                                         0.054
                                              (0.045)
XOBP2t-1                                       0.025
                                              (0.027)
XSLGt                                                    -0.015
                                                         (0.026)
XSLGt-1                                                  -0.026
```

					(0.030)	
XSLG2t						0.019
						(0.030)
XSLG2t-1						-0.016
						(0.029)
Note:						*p<0.1; **p<0.05; ***p<0.01

Bateadores: Estimador Within

	Dependent variable:					
	(1)	(2)	(3)	(4)	(5)	(6)
Edadt	-0.003	-0.004	-0.002	-0.003	-0.006	-0.004
	(0.006)	(0.005)	(0.005)	(0.006)	(0.005)	(0.005)
Años contratot	-0.033***	-0.032***	-0.034***	-0.032**	-0.039***	-0.035***
	(0.013)	(0.012)	(0.013)	(0.013)	(0.012)	(0.013)
Eqipot	0.001	0.001	0.001	0.001	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
XRBIt	0.001					
	(0.002)					
XRBIt-1	0.001					
	(0.002)					
XRBI2t		0.0001				
		(0.0004)				
XRBI2t-1		-0.0002				
		(0.0003)				
XTt			-0.021			
			(0.014)			
XTt-1			0.001			
			(0.014)			
XT2t				-0.002		
				(0.005)		
XT2t-1				0.001		
				(0.004)		
XWARt					0.035***	
					(0.009)	
XWARt-1					0.003	
					(0.008)	
XWAR2t						0.011
						(0.008)
XWAR2t-1						-0.0001
						(0.003)
Note:						*p<0.1; **p<0.05; ***p<0.01

Starting pitcher

```
# Create a model to store the results
fielder_simple_within <- list()

# To store the results
fielder_results_simple_within_1 <- list()
fielder_results_simple_within_2 <- list()
fielder_results_simple_within_3 <- list()
fielder_results_simple_within_4 <- list()
fielder_results_simple_within_5 <- list()
fielder_results_simple_within <- list(result_1 = fielder_results_simple_within_1,
                                      result_2 = fielder_results_simple_within_2,
                                      result_3 = fielder_results_simple_within_3,
                                      result_4 = fielder_results_simple_within_4,
                                      result_5 = fielder_results_simple_within_5)

# Loop over the variables in var_hitter_list
for (j in 1:fielder_rep){

  for (i in 1:fielder_stat_num){
    # Run linear regression with grouped errors by country and robust errors
    base_vars_h  <- paste(vars_fe, stat_fielder_t[[i + fielder_stat_num*(j - 1)]],
                          sep = '+')
    formula <- paste(base_vars_h,
                     stat_fielder_t_1[[i + fielder_stat_num*(j - 1)]],
                     sep = " + ")

    fielder_simple_within[[i + hitter_stat_num*(j - 1)]] <- plm(formula, data = starting_data,
                                                    model = "within",
                                                    index = c("id", "Anio_ref"))

    fielder_results_simple_within[[j]][[i]] <- coeftest(fielder_simple_within[[i + fielder_stat_num*(j
                                                        vcov = vcovHC(fielder_simple_within[[i + fielde
                                                                      type = "HC1",
                                                                      cluster = "group"))
  }

  # Print the third block of results
  stargazer(fielder_results_simple_within[[j]],
          no.space = TRUE,
          type = "text",
          title = "Lanzadores Iniciales: Estimador Within",
          covariate.labels = fielder_stats[[j]])
}
```

```
Lanzadores Iniciales: Estimador Within
=================================================================
                              Dependent variable:
                ---------------------------------------------

                  (1)      (2)      (3)      (4)      (5)     (6)
-----------------------------------------------------------------
```

```
Edadt          -0.031** -0.030** -0.031*  -0.031** -0.028* -0.028*
               (0.015)  (0.014)  (0.015)  (0.015)  (0.015) (0.014)
Años contratot  -0.021  -0.037*   -0.028   -0.025  -0.032  -0.034*
               (0.019)  (0.020)  (0.019)  (0.017)  (0.020) (0.020)
Eqipot          0.003    0.004*   0.004*   0.004   0.004*  0.004*
               (0.002)  (0.002)  (0.002)  (0.002)  (0.002) (0.002)
XH2t           -0.0001
               (0.0002)
XH2t-1         -0.0001
               (0.0001)
XHt                      0.004
                        (0.002)
XHt-1                   -0.001
                        (0.002)
XR2t                             0.0002
                                (0.0003)
XR2t-1                          -0.0003
                                (0.0002)
XER2t                                    -0.0002
                                         (0.0004)
XER2t-1                                  -0.0004
                                         (0.0002)
XERt                                              0.003
                                                 (0.002)
XERt-1                                           -0.0003
                                                 (0.002)
XRt                                                      0.004*
                                                         (0.002)
XRt-1                                                    0.001
                                                         (0.002)
=========================================================================
=========================================================================
Note:                                      *p<0.1; **p<0.05; ***p<0.01

Lanzadores Iniciales: Estimador Within
=========================================================================
                                Dependent variable:
                    ---------------------------------------------------

                      (1)      (2)      (3)      (4)      (5)      (6)
-------------------------------------------------------------------------
Edadt          -0.029**  -0.029** -0.027* -0.025* -0.029* -0.028*
                (0.014)  (0.014)  (0.016) (0.015) (0.015) (0.014)
Años contratot  -0.026    -0.027  -0.025  -0.027  -0.024  -0.028
                (0.020)  (0.022)  (0.020) (0.020) (0.020) (0.019)
Eqipot          0.004*    0.004    0.004  0.004** 0.004*   0.003
                (0.002)  (0.003)  (0.002) (0.002) (0.003) (0.002)
XComando2t      -0.013*
                (0.008)
XComando2t-1   0.00001**
               (0.00000)
XComandot                -0.004
                        (0.022)
XComandot-1              0.001
```

```
                          (0.001)
XControl2t                            0.004
                                     (0.088)
XControl2t-1                         -0.027
                                     (0.050)
ControlHt                                     0.025
                                             (0.063)
XControlt-1                                  -0.061
                                             (0.053)
XDominio2t                                            -0.025
                                                      (0.029)
XDominio2t-1                                           0.010
                                                      (0.030)
XDominiot                                                      0.011
                                                              (0.025)
XDominiot-1                                                    0.009
                                                              (0.030)
=====================================================================
=====================================================================
Note:                                    *p<0.1; **p<0.05; ***p<0.01

Lanzadores Iniciales: Estimador Within
=====================================================================
                                Dependent variable:
               ---------------------------------------------------

                  (1)      (2)      (3)      (4)      (5)      (6)
---------------------------------------------------------------------
Edadt          -0.023   -0.022   -0.029*  -0.030* -0.030** -0.029**
               (0.015)  (0.013)  (0.015)  (0.015)  (0.015)  (0.014)
Años contratot -0.018   -0.023   -0.024   -0.030   -0.027   -0.028
               (0.019)  (0.019)  (0.018)  (0.022)  (0.018)  (0.019)
Eqipot          0.003    0.003    0.004    0.004    0.004*   0.004*
               (0.002)  (0.002)  (0.002)  (0.002)  (0.002)  (0.002)
XERA2t          0.006
               (0.005)
XERA2t-1       -0.003
               (0.005)
XERAt                    0.003
                        (0.013)
XERAt-1                 -0.023**
                        (0.011)
XIP2t                            -0.00003
                                 (0.0002)
XIP2t-1                          -0.0001
                                 (0.0001)
XIPt                                       0.001
                                          (0.002)
XIPt-1                                    -0.001
                                          (0.002)
XL2t                                                -0.001
                                                   (0.003)
XL2t-1                                              -0.001
                                                   (0.001)
```

```
XLt                                                                0.004
                                                                  (0.009)
XLt-1                                                             -0.008
                                                                  (0.006)
=====================================================================
=====================================================================
Note:                                    *p<0.1; **p<0.05; ***p<0.01

Lanzadores Iniciales: Estimador Within
=====================================================================
                                Dependent variable:
                ------------------------------------------------

                   (1)       (2)       (3)       (4)      (5)       (6)
---------------------------------------------------------------------
Edadt           -0.029** -0.029** -0.028** -0.028* -0.027** -0.029*
                (0.015)  (0.015)  (0.014)  (0.015) (0.014)  (0.015)
Años contratot  -0.027   -0.027   -0.030   -0.035*  -0.022  -0.026
                (0.019)  (0.020)  (0.019)  (0.021) (0.022)  (0.023)
Eqipot           0.004    0.004*   0.004*   0.004   0.004*   0.004
                (0.002)  (0.002)  (0.002)  (0.003) (0.002)  (0.002)
XS2t            0.098***
                (0.004)
XS2t-1          0.040**
                (0.018)
XSt                      0.069***
                         (0.010)
XSt-1                     0.057
                         (0.035)
XSO2t                             -0.00003
                                  (0.0001)
XSO2t-1                           0.0003*
                                  (0.0002)
XSOt                                        0.002
                                           (0.002)
XSOt-1                                      0.001
                                           (0.002)
XWAR2t                                                -0.001
                                                     (0.003)
XWAR2t-1                                             -0.007**
                                                     (0.003)
XWARt                                                          0.001
                                                              (0.012)
XWARt-1                                                       -0.004
                                                              (0.018)
=====================================================================
=====================================================================
Note:                                    *p<0.1; **p<0.05; ***p<0.01

Lanzadores Iniciales: Estimador Within
=============================================================
                           Dependent variable:
                ---------------------------------------------
```

```
                  (1)     (2)     (3)      (4)     (5)     (6)
-------------------------------------------------------------------
Edadt          -0.022  -0.026* -0.028** -0.027* -0.030* -0.029*
               (0.014) (0.015) (0.014)  (0.014) (0.016) (0.015)
Años contratot -0.018  -0.021   -0.028  -0.027  -0.029  -0.024
               (0.018) (0.018) (0.018)  (0.018) (0.020) (0.018)
Eqipot          0.004   0.004   0.004   0.004*   0.004   0.004
               (0.002) (0.002) (0.002)  (0.002) (0.002) (0.002)
XWHIP2t         0.024
               (0.019)
XWHIP2t-1      -0.017
               (0.015)
XWHIPt                  0.020
                       (0.021)
XWHIPt-1               -0.015
                       (0.020)
XBB2t                           0.0002
                               (0.001)
XBB2t-1                         0.0002
                               (0.0004)
XBBt                                    0.0002
                                        (0.003)
XBBt-1                                   0.002
                                        (0.003)
XW2t                                             0.001
                                                (0.002)
XW2t-1                                          -0.001
                                                (0.001)
XWt                                                     -0.002
                                                        (0.006)
XWt-1                                                   -0.003
                                                        (0.006)
===================================================================
===================================================================
Note:                                  *p<0.1; **p<0.05; ***p<0.01
```

Efectos aleatorios

Bateadores

Se obtendrán las estimaciones de las variables referentes a estadísticas deportivas sin controles

```
# Create a model to store the results
hitter_simple_random <- list()

# To store the results
hitter_results_simple_random_1 <- list()
hitter_results_simple_random_2 <- list()
hitter_results_simple_random_3 <- list()
hitter_results_simple_random_4 <- list()
hitter_results_simple_random <- list(result_1 = hitter_results_simple_random_1,
                                     result_2 = hitter_results_simple_random_2,
                                     result_3 = hitter_results_simple_random_3,
```

```
                                    result_4 = hitter_results_simple_random_4)

# Loop over the variables in var_hitter_list
for (j in 1:hitter_rep){

  for (i in 1:hitter_stat_num){
    # Run linear regression with grouped errors by country and robust errors
    base_vars_h  <- paste(vars_ms, stat_hitter_t[[i + hitter_stat_num*(j - 1)]],
                          sep = '+')
    formula <- paste(base_vars_h,
                     stat_hitter_t_1[[i + hitter_stat_num*(j - 1)]],
                     sep = " + ")

    hitter_simple_random[[i + hitter_stat_num*(j - 1)]] <- plm(formula, data = hitter_data,
                                                  model = "random",
                                                  index = c("id", "Anio_ref"))

    hitter_results_simple_random[[j]][[i]] <- coeftest(hitter_simple_random[[i + hitter_stat_num*(j - 1
                                                       vcov = vcovHC(hitter_simple_random[[i + hitter_s
                                                                     type = "HC1",
                                                                     cluster = "group"))
  }

  # Print the third block of results
  stargazer(hitter_results_simple_random[[j]],
          no.space = TRUE,
          type = "text",
          title = "Bateadores: Efectos Aleatorios",
          covariate.labels = hitter_stats[[j]])
}
```

```
Bateadores: Efectos Aleatorios
=================================================================
                              Dependent variable:
                ---------------------------------------------
                  (1)       (2)       (3)       (4)       (5)       (6)
-----------------------------------------------------------------------
Edadt          -0.006** -0.005**  -0.005** -0.005** -0.005** -0.005*
               (0.003)   (0.003)  (0.003)  (0.003)  (0.003)  (0.003)
Años contratot  -0.002   -0.003    -0.002   -0.003   -0.003  -0.003
               (0.004)   (0.004)  (0.004)  (0.004)  (0.004)  (0.004)
Eqipot          0.001     0.001    0.001    0.001    0.001    0.001
               (0.001)   (0.001)  (0.001)  (0.001)  (0.001)  (0.001)
XABt           -0.0002
               (0.001)
XABt-1         -0.0004
               (0.001)
XAB2t                    -0.00001
                         (0.00003)
XAB2t-1                  -0.00000
                         (0.00002)
XHt                                -0.001
```

			(0.001)			
XHt-1			0.0002			
			(0.001)			
XH2t				-0.0001		
				(0.0001)		
XH2t-1				0.00005		
				(0.0001)		
XBAt					-0.024	
					(0.018)	
XBAt-1					0.019	
					(0.016)	
XBA2t						-0.036
						(0.027)
XBA2t-1						0.005
						(0.016)
Agentet	0.155*	0.148*	0.145*	0.142*	0.142*	0.140*
	(0.087)	(0.083)	(0.083)	(0.085)	(0.086)	(0.084)

Note: *p<0.1; **p<0.05; ***p<0.01

Bateadores: Efectos Aleatorios

	Dependent variable:					
	(1)	(2)	(3)	(4)	(5)	(6)
Edadt	-0.005**	-0.005**	-0.005**	-0.005**	-0.006**	-0.005**
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Años contratot	-0.002	-0.003	-0.004	-0.003	-0.002	-0.004
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Eqipot	0.001	0.001	0.001	0.001	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
XDt	-0.003					
	(0.003)					
XDt-1	-0.001					
	(0.002)					
XD2t		-0.0003				
		(0.0005)				
XD2t-1		0.0003				
		(0.0004)				
XHRt			0.0003			
			(0.003)			
XHRt-1			0.002			
			(0.002)			
XHR2t				-0.0004		
				(0.001)		
XHR2t-1				-0.00001		
				(0.0003)		
XGSt					-0.001	
					(0.001)	
XGSt-1					-0.001	
					(0.001)	

```
XGS2t                                                          -0.00001
                                                               (0.0001)
XGS2t-1                                                        0.00004
                                                               (0.0001)
Agentet          0.143*   0.146*   0.145*   0.147*   0.155*   0.147*
                (0.081)  (0.084)  (0.084)  (0.084)  (0.086)  (0.083)
=================================================================
=================================================================
Note:                                    *p<0.1; **p<0.05; ***p<0.01

Bateadores: Efectos Aleatorios
=================================================================
                              Dependent variable:
                ---------------------------------------------------

                   (1)      (2)      (3)      (4)      (5)      (6)
-----------------------------------------------------------------
Edadt           -0.005** -0.005* -0.005** -0.005** -0.005** -0.005*
                (0.003)  (0.003) (0.003)  (0.003)  (0.003)  (0.003)
Años contratot  -0.003   -0.002   -0.003   -0.003   -0.002   -0.002
                (0.004)  (0.004) (0.004)  (0.004)  (0.004)  (0.004)
Eqipot           0.001    0.001   0.001    0.001    0.001    0.001
                (0.001)  (0.001) (0.001)  (0.001)  (0.001)  (0.001)
XOPSt           -0.019
                (0.013)
XOPSt-1         -0.002
                (0.012)
XOPS2t                   -0.019*
                         (0.011)
XOPS2t-1                  0.006
                         (0.010)
XOBPt                             -0.034
                                 (0.021)
XOBPt-1                           0.018
                                 (0.018)
XOBP2t                                     -0.030
                                          (0.026)
XOBP2t-1                                   0.006
                                          (0.018)
XSLGt                                                 -0.015
                                                     (0.016)
XSLGt-1                                               -0.024
                                                     (0.015)
XSLG2t                                                        -0.026
                                                              (0.019)
XSLG2t-1                                                       0.008
                                                              (0.017)
Agentet          0.152*   0.135   0.148*   0.140*   0.159*   0.143*
                (0.086)  (0.086) (0.084)  (0.083)  (0.083)  (0.086)
=================================================================
=================================================================
Note:                                  *p<0.1; **p<0.05; ***p<0.01

Bateadores: Efectos Aleatorios
```

	Dependent variable:					
	(1)	(2)	(3)	(4)	(5)	(6)
Edadt	-0.005**	-0.005**	-0.005**	-0.005**	-0.006**	-0.006**
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.002)
Años contratot	-0.002	-0.004	-0.004	-0.003	-0.008**	-0.004
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Eqipot	0.001	0.001	0.001	0.001	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
XRBIt	-0.002					
	(0.001)					
XRBIt-1	0.001					
	(0.002)					
XRBI2t		0.0001				
		(0.0002)				
XRBI2t-1		0.00005				
		(0.0002)				
XTt			-0.010			
			(0.008)			
XTt-1			0.010*			
			(0.005)			
XT2t				-0.002		
				(0.003)		
XT2t-1				0.001		
				(0.001)		
XWARt					0.019***	
					(0.006)	
XWARt-1					0.010*	
					(0.005)	
XWAR2t						0.005
						(0.003)
XWAR2t-1						0.003*
						(0.002)
Agentet	0.145*	0.152*	0.144*	0.145*	0.197**	0.165**
	(0.084)	(0.083)	(0.084)	(0.085)	(0.084)	(0.080)
Note:				*p<0.1; **p<0.05; ***p<0.01		

Starting pitcher

```r
# Create a model to store the results
fielder_simple_random <- list()

# To store the results
fielder_results_simple_random_1 <- list()
fielder_results_simple_random_2 <- list()
fielder_results_simple_random_3 <- list()
fielder_results_simple_random_4 <- list()
```

```r
fielder_results_simple_random_5 <- list()
fielder_results_simple_random <- list(result_1 = fielder_results_simple_random_1,
                                      result_2 = fielder_results_simple_random_2,
                                      result_3 = fielder_results_simple_random_3,
                                      result_4 = fielder_results_simple_random_4,
                                      result_5 = fielder_results_simple_random_5)

# Loop over the variables in var_hitter_list
for (j in 1:fielder_rep){

  for (i in 1:fielder_stat_num){
    # Run linear regression with grouped errors by country and robust errors
    base_vars_h  <- paste(vars_ms, stat_fielder_t[[i + fielder_stat_num*(j - 1)]],
                          sep = '+')
    formula <- paste(base_vars_h,
                     stat_fielder_t_1[[i + fielder_stat_num*(j - 1)]],
                     sep = " + ")

    fielder_simple_random[[i + hitter_stat_num*(j - 1)]] <- plm(formula, data = starting_data,
                                                    model = "random",
                                                    index = c("id", "Anio_ref"))

    fielder_results_simple_random[[j]][[i]] <- coeftest(fielder_simple_random[[i + fielder_stat_num*(j
                                                        vcov = vcovHC(fielder_simple_random[[i + fielde
                                                                      type = "HC1",
                                                                      cluster = "group"))
  }

  # Print the third block of results
  stargazer(fielder_results_simple_random[[j]],
          no.space = TRUE,
          type = "text",
          title = "Lanzadores Iniciales: Efectos Aleatorios",
          covariate.labels = fielder_stats[[j]])
}
```

```
Lanzadores Iniciales: Efectos Aleatorios
=========================================================================
                                Dependent variable:
                    ---------------------------------------------------

                      (1)       (2)       (3)       (4)       (5)       (6)
-------------------------------------------------------------------------
Edadt              -0.010** -0.011** -0.011** -0.011** -0.010** -0.011**
                   (0.005)   (0.005)   (0.005)   (0.005)   (0.005)   (0.005)
Años contratot      -0.007    -0.012    -0.011    -0.011    -0.010    -0.011
                   (0.007)   (0.007)   (0.007)   (0.007)   (0.007)   (0.007)
Eqipot              0.003*   0.003**   0.003**    0.003*   0.003**   0.003**
                   (0.001)   (0.001)   (0.001)   (0.001)   (0.001)   (0.001)
XH2t               -0.0001
                   (0.0001)
XH2t-1             -0.00003
                   (0.0001)
```

```
XHt                      0.0004
                        (0.002)
XHt-1                   -0.0001
                        (0.001)
XR2t                             0.0001
                                (0.0002)
XR2t-1                          -0.0001
                                (0.0001)
XER2t                                    0.0001
                                        (0.0002)
XER2t-1                                 -0.0002
                                        (0.0001)
XERt                                             -0.001
                                                (0.002)
XERt-1                                           -0.001
                                                (0.001)
XRt                                                       0.0001
                                                         (0.002)
XRt-1                                                    -0.001
                                                         (0.001)
Agentet          0.290*  0.328**  0.324**  0.327**  0.311**  0.316**
                (0.150)  (0.152)  (0.153)  (0.160)  (0.154)  (0.154)
=================================================================
=================================================================
Note:                                  *p<0.1; **p<0.05; ***p<0.01

Lanzadores Iniciales: Efectos Aleatorios
=================================================================
                              Dependent variable:
              ---------------------------------------------------

                   (1)      (2)       (3)      (4)      (5)      (6)
-----------------------------------------------------------------------
Edadt          -0.010**  -0.010** -0.010**  -0.009** -0.009** -0.009*
                (0.005)  (0.005)   (0.005)  (0.005)  (0.005)  (0.005)
Años contratot  -0.010    -0.010   -0.010   -0.012*   -0.011   -0.012
                (0.007)  (0.008)   (0.007)  (0.007)  (0.007)  (0.007)
Eqipot          0.003*    0.003*   0.003**   0.003*  0.003**   0.003*
                (0.001)  (0.002)   (0.001)  (0.001)  (0.001)  (0.001)
XComando2t      -0.002
                (0.006)
XComando2t-1   -0.00000
               (0.00000)
XComandot                -0.003
                        (0.013)
XComandot-1             -0.0004
                        (0.001)
XControl2t                       -0.057
                                 (0.042)
XControl2t-1                    -0.106***
                                 (0.030)
ControlHt                                  0.030
                                          (0.028)
XControlt-1                               -0.072**
```

```
                                          (0.032)
XDominio2t                                                 -0.012
                                                          (0.020)
XDominio2t-1                                              0.042**
                                                          (0.019)
XDominiot                                                           -0.010
                                                                   (0.018)
XDominiot-1                                                        0.044***
                                                                   (0.017)
Agentet          0.306**  0.307**   0.279*    0.268*   0.277*   0.272*
                 (0.147)  (0.145)   (0.147)  (0.145)  (0.143)  (0.145)
=========================================================================
=========================================================================
Note:                                       *p<0.1; **p<0.05; ***p<0.01

Lanzadores Iniciales: Efectos Aleatorios
=========================================================================
                                Dependent variable:
                ---------------------------------------------------

                   (1)       (2)       (3)       (4)       (5)       (6)
-------------------------------------------------------------------------
Edadt           -0.010** -0.010**  -0.010** -0.011** -0.010** -0.010**
                (0.005)   (0.004)  (0.005)  (0.005)  (0.005)  (0.005)
Años contratot  -0.010   -0.012    -0.008   -0.011   -0.011   -0.010
                (0.008)   (0.008)  (0.007)  (0.008)  (0.007)  (0.007)
Eqipot           0.003*   0.003*    0.003*  0.003**  0.003**  0.003**
                (0.001)   (0.001)  (0.001)  (0.001)  (0.001)  (0.001)
XERA2t          -0.0004
                (0.002)
XERA2t-1        -0.006**
                (0.003)
XERAt                     -0.009
                          (0.007)
XERAt-1                  -0.021***
                          (0.006)
XIP2t                              -0.0001
                                   (0.0001)
XIP2t-1                            -0.00000
                                   (0.0001)
XIPt                                         -0.0002
                                             (0.001)
XIPt-1                                       -0.0001
                                             (0.001)
XL2t                                                   -0.001
                                                      (0.002)
XL2t-1                                                 -0.001
                                                      (0.001)
XLt                                                             -0.003
                                                               (0.006)
XLt-1                                                           -0.005
                                                               (0.004)
Agentet          0.291*   0.292**  0.294**   0.315*  0.309**  0.309**
                (0.152)   (0.139)  (0.148)  (0.163)  (0.154)  (0.155)
```

```
=============================================================================
=============================================================================
Note:                                        *p<0.1; **p<0.05; ***p<0.01

Lanzadores Iniciales: Efectos Aleatorios
=============================================================================
                                Dependent variable:
                    ---------------------------------------------------

                      (1)       (2)       (3)       (4)       (5)       (6)
-----------------------------------------------------------------------------
Edadt              -0.011** -0.012** -0.011** -0.011** -0.011** -0.011**
                   (0.005)  (0.005)  (0.005)  (0.005)  (0.005)  (0.005)
Años contratot      -0.012  -0.012*   -0.009  -0.013*   -0.011  -0.014*
                   (0.007)  (0.007)  (0.007)  (0.008)  (0.007)  (0.008)
Eqipot             0.003**  0.003**  0.003**   0.003*  0.003**  0.003**
                   (0.001)  (0.001)  (0.001)  (0.001)  (0.001)  (0.001)
XS2t               0.104***
                   (0.033)
XS2t-1             0.024***
                   (0.008)
XSt                         0.067***
                            (0.025)
XSt-1                       0.060**
                            (0.026)
XSO2t                                -0.0001
                                     (0.0001)
XSO2t-1                               0.0001
                                     (0.0001)
XSOt                                           0.001
                                              (0.001)
XSOt-1                                         0.0002
                                              (0.001)
XWAR2t                                                    0.001
                                                         (0.004)
XWAR2t-1                                                  -0.002
                                                         (0.004)
XWARt                                                               0.010
                                                                   (0.009)
XWARt-1                                                             0.007
                                                                   (0.011)
Agentet            0.342**  0.353**  0.317**  0.335**  0.319**  0.351**
                   (0.155)  (0.157)  (0.148)  (0.156)  (0.143)  (0.146)
=============================================================================
=============================================================================
Note:                                        *p<0.1; **p<0.05; ***p<0.01

Lanzadores Iniciales: Efectos Aleatorios
=============================================================================
                                Dependent variable:
                    ---------------------------------------------------

                        (1)       (2)       (3)       (4)       (5)       (6)
-----------------------------------------------------------------------------
```

```
Edadt           -0.008*  -0.011**  -0.011** -0.011** -0.011** -0.010**
                (0.004)   (0.004)  (0.005)  (0.005)  (0.005)  (0.005)
Años contratot  -0.013    -0.013*   -0.010   -0.012  -0.012*   -0.009
                (0.008)   (0.008)  (0.007)  (0.007)  (0.007)  (0.007)
Eqipot          0.003**   0.003**  0.003**   0.003*  0.003**  0.003**
                (0.001)   (0.001)  (0.001)  (0.001)  (0.001)  (0.001)
XWHIP2t         -0.006
                (0.011)
XWHIP2t-1      -0.039***
                (0.010)
XWHIPt                    -0.005
                          (0.010)
XWHIPt-1                 -0.032***
                          (0.011)
XBB2t                              -0.0002
                                   (0.0003)
XBB2t-1                             0.0001
                                   (0.0003)
XBBt                                         0.001
                                            (0.002)
XBBt-1                                       -0.001
                                            (0.002)
XW2t                                                  0.001
                                                     (0.001)
XW2t-1                                                0.0002
                                                     (0.001)
XWt                                                            -0.004
                                                               (0.005)
XWt-1                                                           0.001
                                                               (0.004)
Agentet          0.222    0.317**  0.314**  0.326**  0.326**   0.295*
                (0.136)   (0.141)  (0.149)  (0.156)  (0.150)  (0.161)
=================================================================================
=================================================================================
Note:                                          *p<0.1; **p<0.05; ***p<0.01
```

First Differences

Bateadores

Se obtendrán las estimaciones de las variables referentes a estadísticas deportivas sin controles

```r
# Create a model to store the results
hitter_simple_fd <- list()

# To store the results
hitter_results_simple_fd_1 <- list()
hitter_results_simple_fd_2 <- list()
hitter_results_simple_fd_3 <- list()
hitter_results_simple_fd_4 <- list()
hitter_results_simple_fd <- list(result_1 = hitter_results_simple_fd_1,
                                 result_2 = hitter_results_simple_fd_2,
                                 result_3 = hitter_results_simple_fd_3,
```

```
                                result_4 = hitter_results_simple_fd_4)

# Loop over the variables in var_hitter_list
for (j in 1:hitter_rep){

  for (i in 1:hitter_stat_num){
    # Run linear regression with grouped errors by country and robust errors
    base_vars_h  <- paste(vars_fe, stat_hitter_t[[i + hitter_stat_num*(j - 1)]],
                          sep = '+')
    formula <- paste(base_vars_h,
                     stat_hitter_t_1[[i + hitter_stat_num*(j - 1)]],
                     sep = " + ")

    hitter_simple_fd[[i + hitter_stat_num*(j - 1)]] <- plm(formula, data = hitter_data,
                                                           model = "fd",
                                                           index = c("id", "Anio_ref"))

    hitter_results_simple_fd[[j]][[i]] <- coeftest(hitter_simple_fd[[i + hitter_stat_num*(j - 1)]],
                                                         vcov = vcovHC(hitter_simple_fd[[i + hitter_stat_r
                                                                       type = "HC1",
                                                                       cluster = "group"))
  }

  # Print the third block of results
  stargazer(hitter_results_simple_fd[[j]],
          no.space = TRUE,
          type = "text",
          title = "Bateadores: Primeras Diferencias",
          covariate.labels = hitter_stats[[j]])
}
```

```
Bateadores: Primeras Diferencias
================================================================================
                                  Dependent variable:
                ---------------------------------------------------------------

                    (1)        (2)        (3)        (4)        (5)        (6)
--------------------------------------------------------------------------------
Edadt           -0.011*** -0.011*** -0.011*** -0.012***  -0.012*** -0.011***
                 (0.002)   (0.002)   (0.002)   (0.002)    (0.002)   (0.002)
Años contratot -0.045*** -0.045*** -0.045*** -0.043***  -0.044*** -0.044***
                 (0.009)   (0.009)   (0.009)   (0.009)    (0.009)   (0.009)
Eqipot          0.002***  0.002***  0.002***   0.002***  0.002***  0.002***
                 (0.001)   (0.001)   (0.001)   (0.001)    (0.001)   (0.001)
XABt             -0.0001
                (0.0004)
XABt-1          0.001***
                (0.0003)
XAB2t                     -0.00002
                          (0.00001)
XAB2t-1                    0.00001
                          (0.00003)
XHt                                  -0.001*
```

```
                                  (0.001)
XHt-1                              0.001
                                  (0.001)
XH2t                                       -0.0001***
                                            (0.0001)
XH2t-1                                      -0.0002*
                                            (0.0001)
XBAt                                                    0.0001
                                                        (0.012)
XBAt-1                                                 0.039***
                                                        (0.010)
XBA2t                                                             -0.004
                                                                  (0.021)
XBA2t-1                                                          0.030***
                                                                  (0.009)
=========================================================================
=========================================================================
Note:                                          *p<0.1; **p<0.05; ***p<0.01

Bateadores: Primeras Diferencias
=========================================================================
                                Dependent variable:
              ---------------------------------------------------------

                  (1)       (2)       (3)       (4)       (5)       (6)
-------------------------------------------------------------------------
Edadt          -0.011*** -0.011*** -0.011*** -0.012*** -0.011*** -0.011***
                (0.002)   (0.002)   (0.002)   (0.002)   (0.002)   (0.002)
Años contratot -0.045*** -0.045*** -0.047*** -0.049*** -0.046*** -0.045***
                (0.009)   (0.009)   (0.010)   (0.010)   (0.009)   (0.009)
Eqipot         0.002***  0.002***  0.002***  0.002***  0.002***  0.002***
                (0.001)   (0.001)   (0.001)   (0.001)   (0.001)   (0.001)
XDt             -0.002
                (0.002)
XDt-1           -0.001
                (0.002)
XD2t                       0.0001
                          (0.0004)
XD2t-1                     -0.001
                          (0.0003)
XHRt                                 0.006*
                                    (0.004)
XHRt-1                               0.001
                                    (0.002)
XHR2t                                         0.001***
                                              (0.0004)
XHR2t-1                                        0.0002
                                              (0.0003)
XGSt                                                    -0.001
                                                        (0.001)
XGSt-1                                                 0.002***
                                                        (0.001)
XGS2t                                                             -0.00003
                                                                  (0.0001)
```

```
XGS2t-1                                                                 0.00004
                                                                       (0.0001)
=========================================================================
=========================================================================
Note:                                          *p<0.1; **p<0.05; ***p<0.01

Bateadores: Primeras Diferencias
=========================================================================
                                Dependent variable:
                ---------------------------------------------------------

                   (1)       (2)       (3)       (4)       (5)       (6)
-------------------------------------------------------------------------
Edadt          -0.012*** -0.011*** -0.011*** -0.012*** -0.011*** -0.012***
                (0.002)   (0.002)   (0.002)   (0.002)   (0.002)   (0.002)
Años contratot -0.044*** -0.043*** -0.045*** -0.046*** -0.044*** -0.044***
                (0.009)   (0.009)   (0.009)   (0.009)   (0.009)   (0.009)
Eqipot         0.002***  0.002***  0.002***  0.002***  0.002***  0.002***
                (0.001)   (0.001)   (0.001)   (0.001)   (0.001)   (0.001)
XOPSt           -0.007
                (0.009)
XOPSt-1         0.013*
                (0.007)
XOPS2t                    -0.013
                          (0.008)
XOPS2t-1                  -0.005
                          (0.006)
XOBPt                               0.017
                                   (0.022)
XOBPt-1                            0.049***
                                   (0.015)
XOBP2t                                        0.052**
                                              (0.026)
XOBP2t-1                                     0.029***
                                              (0.010)
XSLGt                                                   -0.011
                                                        (0.012)
XSLGt-1                                                 -0.010
                                                        (0.014)
XSLG2t                                                            -0.010
                                                                  (0.014)
XSLG2t-1                                                          -0.023*
                                                                  (0.014)
=========================================================================
=========================================================================
Note:                                          *p<0.1; **p<0.05; ***p<0.01

Bateadores: Primeras Diferencias
=========================================================================
                                Dependent variable:
                ---------------------------------------------------------

                   (1)       (2)       (3)       (4)       (5)       (6)
-------------------------------------------------------------------------
```

```
Edadt          -0.011*** -0.012*** -0.009*** -0.011*** -0.014*** -0.012***
                (0.002)   (0.002)   (0.002)   (0.002)   (0.002)   (0.002)
Años contratot -0.046*** -0.045*** -0.045*** -0.044*** -0.051*** -0.050***
                (0.009)   (0.009)   (0.009)   (0.009)   (0.009)   (0.009)
Eqipot         0.002***  0.002***  0.002***  0.002***  0.002***  0.002***
                (0.001)   (0.001)   (0.001)   (0.001)   (0.001)   (0.001)
XRBIt           0.0004
                (0.001)
XRBIt-1          0.002
                (0.001)
XRBI2t                    0.0003
                         (0.0003)
XRBI2t-1                  -0.0002
                         (0.0001)
XTt                               -0.029***
                                   (0.007)
XTt-1                               0.002
                                   (0.009)
XT2t                                        -0.002
                                            (0.003)
XT2t-1                                      0.003**
                                            (0.001)
XWARt                                                 0.030***
                                                       (0.003)
XWARt-1                                                0.004
                                                       (0.005)
XWAR2t                                                          0.014***
                                                                 (0.004)
XWAR2t-1                                                         0.0002
                                                                 (0.001)
================================================================================
================================================================================
Note:                                          *p<0.1; **p<0.05; ***p<0.01
```

Starting pitcher

```
# Create a model to store the results
fielder_simple_fd <- list()

# To store the results
fielder_results_simple_fd_1 <- list()
fielder_results_simple_fd_2 <- list()
fielder_results_simple_fd_3 <- list()
fielder_results_simple_fd_4 <- list()
fielder_results_simple_fd_5 <- list()
fielder_results_simple_fd <- list(result_1 = fielder_results_simple_fd_1,
                                  result_2 = fielder_results_simple_fd_2,
                                  result_3 = fielder_results_simple_fd_3,
                                  result_4 = fielder_results_simple_fd_4,
                                  result_5 = fielder_results_simple_fd_5)

# Loop over the variables in var_hitter_list
```

```r
for (j in 1:fielder_rep){

  for (i in 1:fielder_stat_num){
    # Run linear regression with grouped errors by country and robust errors
    base_vars_h  <- paste(vars_fe, stat_fielder_t[[i + fielder_stat_num*(j - 1)]],
                          sep = '+')
    formula <- paste(base_vars_h,
                     stat_fielder_t_1[[i + fielder_stat_num*(j - 1)]],
                     sep = " + ")

    fielder_simple_fd[[i + hitter_stat_num*(j - 1)]] <- plm(formula, data = starting_data,
                                                            model = "fd",
                                                            index = c("id", "Anio_ref"))

    fielder_results_simple_fd[[j]][[i]] <- coeftest(fielder_simple_fd[[i + fielder_stat_num*(j - 1)]],
                                                                vcov = vcovHC(fielder_simple_fd[[i + fielder_s
                                                                              type = "HC1",
                                                                              cluster = "group"))
  }

  # Print the third block of results
  stargazer(fielder_results_simple_fd[[j]],
          no.space = TRUE,
          type = "text",
          title = "Lanzadores Iniciales: Efectos Aleatorios",
          covariate.labels = fielder_stats[[j]])
}
```

```
Lanzadores Iniciales: Efectos Aleatorios
================================================================================
                                   Dependent variable:
                ---------------------------------------------------------------

                    (1)         (2)         (3)         (4)         (5)         (6)
--------------------------------------------------------------------------------
Edadt            -0.019**   -0.018***   -0.019**    -0.017**    -0.015**    -0.016**
                 (0.009)     (0.007)    (0.008)     (0.008)     (0.008)     (0.007)
Años contratot -0.025***   -0.043***   -0.035***   -0.033***   -0.033***   -0.036***
                 (0.009)     (0.007)    (0.007)     (0.007)     (0.008)     (0.008)
Eqipot           0.002**    0.004***    0.003***    0.003***    0.003***    0.003***
                 (0.001)     (0.001)    (0.001)     (0.001)     (0.001)     (0.001)
XH2t           -0.0003***
                 (0.0001)
XH2t-1           0.00002
                 (0.0001)
XHt                          0.003*
                             (0.001)
XHt-1                        0.0005
                             (0.001)
XR2t                                     -0.0002
                                        (0.0001)
XR2t-1                                   0.00003
                                        (0.0001)
```

```
XER2t                                          -0.0005***
                                                (0.0002)
XER2t-1                                         -0.00004
                                                (0.0001)
XERt                                                        -0.001
                                                            (0.001)
XERt-1                                                     0.003***
                                                            (0.001)
XRt                                                                    -0.0002
                                                                       (0.001)
XRt-1                                                                  0.003**
                                                                       (0.001)
================================================================================
================================================================================
Note:                                            *p<0.1; **p<0.05; ***p<0.01
```

Lanzadores Iniciales: Efectos Aleatorios

	Dependent variable:					
	(1)	(2)	(3)	(4)	(5)	(6)
Edadt	-0.020**	-0.019**	-0.018**	-0.016**	-0.019***	-0.019***
	(0.008)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Años contratot	-0.038***	-0.041***	-0.033***	-0.036***	-0.035***	-0.040***
	(0.009)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
Eqipot	0.004***	0.003***	0.004***	0.003***	0.004***	0.003***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
XComando2t	-0.002					
	(0.003)					
XComando2t-1	0.00001***					
	(0.00000)					
XComandot		0.017*				
		(0.009)				
XComandot-1		0.001***				
		(0.0003)				
XControl2t			-0.069***			
			(0.018)			
XControl2t-1			-0.026***			
			(0.005)			
ControlHt				0.009		
				(0.034)		
XControlt-1				-0.058***		
				(0.016)		
XDominio2t					-0.010***	
					(0.003)	
XDominio2t-1					0.009***	
					(0.003)	
XDominiot						0.030***
						(0.006)
XDominiot-1						0.012**
						(0.005)

```
================================================================================
Note:                                          *p<0.1; **p<0.05; ***p<0.01

Lanzadores Iniciales: Efectos Aleatorios
================================================================================
                                Dependent variable:
               ------------------------------------------------------------

                   (1)       (2)       (3)        (4)       (5)       (6)
--------------------------------------------------------------------------------
Edadt          -0.016**   -0.014*   -0.017**   -0.015*  -0.020*** -0.018**
                (0.008)   (0.007)   (0.008)    (0.008)   (0.007)   (0.008)
Años contratot -0.033*** -0.035*** -0.029***  -0.029*** -0.034*** -0.033***
                (0.010)   (0.011)   (0.008)    (0.009)   (0.007)   (0.007)
Eqipot         0.003***  0.003***   0.003***  0.003***  0.003***  0.003***
                (0.001)   (0.001)   (0.001)    (0.001)   (0.001)   (0.001)
XERA2t           0.001
                (0.002)
XERA2t-1        -0.003
                (0.003)
XERAt                     -0.003
                          (0.009)
XERAt-1                  -0.021***
                          (0.005)
XIP2t                              -0.0002***
                                    (0.0001)
XIP2t-1                             0.00004
                                    (0.0001)
XIPt                                          -0.002**
                                               (0.001)
XIPt-1                                         0.002*
                                               (0.001)
XL2t                                                     -0.003*
                                                         (0.002)
XL2t-1                                                  -0.00002
                                                         (0.001)
XLt                                                                -0.007
                                                                   (0.005)
XLt-1                                                              -0.0005
                                                                   (0.003)
================================================================================
================================================================================
Note:                                          *p<0.1; **p<0.05; ***p<0.01

Lanzadores Iniciales: Efectos Aleatorios
================================================================================
                                Dependent variable:
               ------------------------------------------------------------

                   (1)       (2)       (3)        (4)       (5)       (6)
--------------------------------------------------------------------------------
Edadt          -0.019*** -0.018**   -0.018**  -0.017**  -0.018**  -0.017**
                (0.007)   (0.007)   (0.007)    (0.008)   (0.007)   (0.008)
Años contratot -0.036*** -0.036*** -0.035***  -0.042*** -0.030*** -0.035***
```

```
                (0.008)   (0.008)   (0.009)    (0.008)   (0.009)   (0.010)
Eqipot         0.003***  0.003***   0.004***  0.004***  0.003***  0.003***
                (0.001)   (0.001)   (0.001)    (0.001)   (0.001)   (0.001)
XS2t           0.100***
                (0.001)
XS2t-1         0.020***
                (0.006)
XSt                      0.074***
                          (0.007)
XSt-1                     -0.014
                          (0.022)
XSO2t                              -0.0001***
                                   (0.00003)
XSO2t-1                            0.0003***
                                    (0.0001)
XSOt                                          0.001*
                                             (0.0005)
XSOt-1                                       0.002***
                                              (0.001)
XWAR2t                                                  -0.002
                                                        (0.002)
XWAR2t-1                                               -0.004***
                                                        (0.001)
XWARt                                                             -0.005
                                                                  (0.006)
XWARt-1                                                            0.005
                                                                  (0.008)
================================================================================
================================================================================
Note:                                          *p<0.1; **p<0.05; ***p<0.01

Lanzadores Iniciales: Efectos Aleatorios
================================================================================
                                Dependent variable:
                ------------------------------------------------------------

                   (1)       (2)       (3)       (4)       (5)       (6)
--------------------------------------------------------------------------------
Edadt           -0.013*   -0.014*  -0.017**  -0.015**  -0.018**   -0.015*
                (0.007)   (0.008)   (0.007)   (0.008)   (0.009)   (0.008)
Años contratot -0.032*** -0.036*** -0.034*** -0.025*** -0.034*** -0.026***
                (0.009)   (0.009)   (0.008)   (0.008)   (0.010)   (0.009)
Eqipot         0.003***  0.004***  0.003***  0.004***  0.003***  0.003***
                (0.001)   (0.001)   (0.001)   (0.001)   (0.001)   (0.001)
XWHIP2t          0.003
                (0.004)
XWHIP2t-1      -0.021***
                (0.006)
XWHIPt                    -0.004
                          (0.007)
XWHIPt-1                 -0.034**
                          (0.013)
XBB2t                              -0.0002
                                   (0.0002)
```

```
XBB2t-1                          0.0005**
                                 (0.0002)
XBBt                                      -0.005***
                                           (0.001)
XBBt-1                                    0.004***
                                           (0.001)
XW2t                                                  -0.001
                                                      (0.001)
XW2t-1                                                0.0003
                                                      (0.001)
XWt                                                             -0.010***
                                                                 (0.004)
XWt-1                                                             0.003
                                                                 (0.003)
=========================================================================
=========================================================================
Note:                                          *p<0.1; **p<0.05; ***p<0.01
```

Estimaciones conjuntas

Lo que se hará ahora es volver a estimar los modelos anteriores, pero con todas las variables que fueron significativas para un nivel del %5.

Bateadores

Para los bateadores las variables significativas son:

```r
# Significant variables:
# Pooling:
hitter_vars_1 <- c("X_Bateos",
                   "X_Porcentaje_On_base_plus_slugging_2",
                    "X_Porcentaje_on_base",
                    "X_Porcentaje_on_base_2",
                    "X_Porcentaje_slugging_2",
                    "X_Runs_batted_in",
                    "X_Triples",
                    "X_WAR",
                    "X_WAR_2")
# Add suffix "_t" to each name
stat_hitter_t <- paste0(hitter_vars_1, "_t")
stat_hitter_t_1 <- paste0(hitter_vars_1, "_t_1")
# Lista
hitter_vars_1 <- c(paste(stat_hitter_t, collapse = " + "),
                   paste(stat_hitter_t_1, collapse = " + "))
# Within
hitter_vars_2 <- c("X_Bateos",
                   "X_Porcentaje_On_base_plus_slugging_2",
                   "X_Porcentaje_on_base",
                   "X_Porcentaje_on_base_2",
                    "X_Porcentaje_slugging_2",
                    "X_Runs_batted_in",
                    "X_Triples",
```

```
                    "X_WAR",
                    "X_WAR_2")
# Add suffix "_t" to each name
stat_hitter_t <- paste0(hitter_vars_2, "_t")
stat_hitter_t_1 <- paste0(hitter_vars_2, "_t_1")
# Lista
hitter_vars_2 <- c(paste(stat_hitter_t, collapse = " + "),
                   paste(stat_hitter_t_1, collapse = " + "))
# Random effects
hitter_vars_3 <- c("X_Porcentaje_On_base_plus_slugging_2",
                   "X_Triples",
                   "X_WAR",
                   "X_WAR_2")
# Add suffix "_t" to each name
stat_hitter_t <- paste0(hitter_vars_3, "_t")
stat_hitter_t_1 <- paste0(hitter_vars_3, "_t_1")
# Lista
hitter_vars_3 <- c(paste(stat_hitter_t, collapse = " + "),
                   paste(stat_hitter_t_1, collapse = " + "))
# First Differences
hitter_vars_4 <- c("X_At_bats",
                   "X_Bateos_2",
                   "X_Bateos",
                   "X_Bateos_promedio",
                   "X_Bateos_promedio_2",
                   "X_Home_runs",
                   "X_Home_runs_2",
                   "X_Juegos_iniciados",
                   "X_Porcentaje_On_base_plus_slugging",
                   "X_Porcentaje_On_base_plus_slugging_2",
                   "X_Porcentaje_on_base",
                   "X_Porcentaje_on_base_2",
                   "X_Runs_batted_in",
                   "X_Triples",
                   "X_Triples_2",
                   "X_WAR",
                   "X_WAR_2")
# Add suffix "_t" to each name
stat_hitter_t <- paste0(hitter_vars_4, "_t")
stat_hitter_t_1 <- paste0(hitter_vars_4, "_t_1")
# Lista
hitter_vars_4 <- c(paste(stat_hitter_t, collapse = " + "),
                   paste(stat_hitter_t_1, collapse = " + "))


# Pooling:
formula <- paste(vars_ms,
                 hitter_vars_1[[1]],
                 sep = " + ")
formula <- paste(formula,
                 hitter_vars_1[[2]],
                 sep = " + ")
# Create a model to store the results
```

```
hitter_stimation_1 <- plm(formula, data = hitter_data,
                         model = "pooling",
                         index = c("id", "Anio_ref"))
# To store the results
hitter_results_stimation_1 <- coeftest(hitter_stimation_1,
                                       vcov = vcovHC(hitter_stimation_1,
                                                     type = "HC1",
                                                     cluster = "group"))
# Within:
formula <- paste(vars_fe,
                 hitter_vars_2[[1]],
                 sep = " + ")
formula <- paste(formula,
                 hitter_vars_2[[2]],
                 sep = " + ")
# Create a model to store the results
hitter_stimation_2 <- plm(formula, data = hitter_data,
                         model = "within",
                         index = c("id", "Anio_ref"))
# To store the results
hitter_results_stimation_2 <- coeftest(hitter_stimation_2,
                                       vcov = vcovHC(hitter_stimation_2,
                                                     type = "HC1",
                                                     cluster = "group"))
# Random:
formula <- paste(vars_ms,
                 hitter_vars_3[[1]],
                 sep = " + ")
formula <- paste(formula,
                 hitter_vars_3[[2]],
                 sep = " + ")
# Create a model to store the results
hitter_stimation_3 <- plm(formula, data = hitter_data,
                         model = "random",
                         index = c("id", "Anio_ref"))
# To store the results
hitter_results_stimation_3 <- coeftest(hitter_stimation_3,
                                       vcov = vcovHC(hitter_stimation_3,
                                                     type = "HC1",
                                                     cluster = "group"))
# First Differences:
formula <- paste(vars_fe,
                 hitter_vars_4[[1]],
                 sep = " + ")
formula <- paste(formula,
                 hitter_vars_4[[2]],
                 sep = " + ")
# Create a model to store the results
hitter_stimation_4 <- plm(formula, data = hitter_data,
                         model = "fd",
                         index = c("id", "Anio_ref"))
# To store the results
hitter_results_stimation_4 <- coeftest(hitter_stimation_4,
```

```
                                      vcov = vcovHC(hitter_stimation_4,
                                                    type = "HC1",
                                                    cluster = "group"))

# Modelos
hitter_models <- list(pooling = hitter_results_stimation_1,
                      within = hitter_results_stimation_2,
                      random = hitter_results_stimation_3,
                      fd = hitter_results_stimation_4)


# Print the third block of results
stargazer(hitter_models,
          no.space = TRUE,
          align = TRUE,
          type = "text",
          title = "Bateadores: Comparación de los modelos",
          covariate.labels = c("$Edad_{t}$" , "Años contrato$_{t}$", "Eqipo$_{t}$",
                               "$X_{AB_{t}}$", "$X_{H^{2}_{t}}$", "$X_{H_{t}}$",
                               "$X_{BA_{t}}$", "$X_{BA^{2}_{t}}$",
                               "$X_{HR_{t}}$", "$X_{HR^{2}_{t}}$",
                               "$X_{GS_{t}}$", "$X_{OPS_{t}}$", "$X_{OPS^{2}_{t}}$",
                               "$X_{OBP_{t}}$", "$X_{OBP^{2}_{t}}$",
                               "$X_{SLG^{2}_{t}}$", "$X_{RBI_{t}}$",
                               "$X_{T_{t}}$","$X_{T^{2}_{t}}$",
                               "$X_{WAR_{t}}$", "$X_{WAR^{2}_{t}}$",
                               "$X_{AB_{t-1}}$", "$X_{H^{2}_{t-1}}$", "$X_{H_{t-1}}$",
                               "$X_{BA_{t-1}}$", "$X_{BA^{2}_{t-1}}$",
                               "$X_{HR_{t-1}}$", "$X_{HR^{2}_{t-1}}$",
                               "$X_{GS_{t-1}}$", "$X_{OPS_{t-1}}$", "$X_{OPS^{2}_{t-1}}$",
                               "$X_{OBP_{t-1}}$", "$X_{OBP^{2}_{t-1}}$",
                               "$X_{SLG^{2}_{t-1}}$", "$X_{RBI_{t-1}}$",
                               "$X_{T_{t-1}}$","$X_{T^{2}_{t-1}}$",
                               "$X_{WAR_{t-1}}$", "$X_{WAR^{2}_{t-1}}$",
                               "Agente$_{t}$"),
          column.labels = c("Pooling", "Within",
                            "Random effects","First-Differences"))
```

```
Bateadores: Comparación de los modelos
=================================================================
                              Dependent variable:
                ----------------------------------------------
                Pooling   Within   Random effects First-Differences
                  (1)       (2)         (3)              (4)
-----------------------------------------------------------------
Edadt          -0.006**  -0.005      -0.006**        -0.012***
               (0.003)   (0.005)     (0.003)          (0.003)
Años contratot  -0.003  -0.042***     -0.006         -0.047***
               (0.005)   (0.014)     (0.005)          (0.010)
Eqipot          0.001     0.001       0.001           0.001*
               (0.001)   (0.001)     (0.001)          (0.001)
XABt                                                 0.005***
```

				(0.001)
XH2t				-0.0002**
				(0.0001)
XHt	-0.0002	-0.001		-0.003**
	(0.001)	(0.003)		(0.001)
XBAt				-0.014
				(0.023)
XBA2t				0.0003
				(0.027)
XHRt				0.006
				(0.004)
XHR2t				0.0002
				(0.001)
XGSt				-0.007***
				(0.003)
XOPSt				-0.032
				(0.020)
XOPS2t	-0.007	-0.030	-0.017*	-0.041**
	(0.023)	(0.033)	(0.010)	(0.016)
XOBPt	-0.028	-0.017		0.047
	(0.025)	(0.039)		(0.041)
XOBP2t	-0.017	0.077		0.103***
	(0.036)	(0.049)		(0.031)
XSLG2t	0.004	0.033		
	(0.036)	(0.035)		
XRBIt	-0.003	0.001		0.002
	(0.002)	(0.004)		(0.002)
XTt	-0.005	-0.015	-0.006	-0.053***
	(0.008)	(0.012)	(0.008)	(0.009)
XT2t				0.017***
				(0.004)
XWARt	0.017**	0.037***	0.019**	0.014***
	(0.008)	(0.013)	(0.007)	(0.005)
XWAR2t	-0.001	-0.002	-0.002	0.010**
	(0.004)	(0.010)	(0.004)	(0.005)
XABt-1				-0.001**
				(0.0004)
XH2t-1				-0.0004***
				(0.0001)
XHt-1	-0.001	-0.001		-0.0005
	(0.002)	(0.002)		(0.002)
XBAt-1				0.060**
				(0.023)
XBA2t-1				0.077***
				(0.027)
XHRt-1				-0.006***
				(0.002)
XHR2t-1				0.0001
				(0.0004)
XGSt-1				0.004***
				(0.001)
XOPSt-1				-0.054***
				(0.018)
XOPS2t-1	0.015	-0.041	0.004	-0.073***

```
                (0.022)    (0.025)     (0.010)          (0.015)
XOBPt-1          0.030     0.066*                      0.097***
                (0.026)    (0.039)                      (0.027)
XOBP2t-1         -0.033     0.059                       -0.009
                (0.029)    (0.047)                      (0.030)
XSLG2t-1         -0.005    -0.037
                (0.028)    (0.028)
XRBIt-1          0.001      0.004                      0.006***
                (0.003)    (0.003)                      (0.001)
XTt-1           0.012**     0.001       0.009*           0.004
                (0.006)    (0.011)     (0.005)          (0.005)
XT2t-1                                                  -0.001
                                                        (0.001)
XWARt-1          0.010     -0.003       0.007            0.007
                (0.007)    (0.011)     (0.006)          (0.005)
XWAR2t-1         0.003     -0.001       0.002           -0.001
                (0.002)    (0.003)     (0.002)          (0.002)
Agentet         0.166**                0.177**
                (0.081)                (0.086)
=================================================================
=================================================================
Note:                                  *p<0.1; **p<0.05; ***p<0.01
```

Como se puede observar, no todas las variables son significativas de manera conjunta. Reducieremos la cantidad de variables en la estimación ya que muchas de estas están correlacionadas con otras dentro de la misma. Nos quedaremos con las que fueron significativas en el modelo anterior, además de las WAR puesto que son un tipo de PCA.

```r
# Significant variables:
# Pooling:
hitter_vars_1 <- c("X_Triples_t_1",
                   "X_WAR_t")
# Lista
hitter_vars_1 <- paste(hitter_vars_1, collapse = " + ")
# Within
hitter_vars_2 <- c("X_Porcentaje_on_base_t_1",
                   "X_WAR_t")
# Lista
hitter_vars_2 <- paste(hitter_vars_2, collapse = " + ")
# Random effects
hitter_vars_3 <- c("X_Porcentaje_On_base_plus_slugging_2_t",
                   "X_Triples_t",
                   "X_WAR_t")
# Lista
hitter_vars_3 <- paste(hitter_vars_3, collapse = " + ")
# First Differences
hitter_vars_4 <- c("X_At_bats_t", "X_At_bats_t_1",
                   "X_Bateos_t", "X_Bateos_2_t_1",
                   "X_Bateos_promedio_t_1", "X_Bateos_promedio_2_t_1",
                   "X_Home_runs_t_1",
                   "X_Juegos_iniciados_t","X_Juegos_iniciados_t_1",
                   "X_Porcentaje_On_base_plus_slugging_2_t",
                   "X_Porcentaje_on_base_2_t",
                   "X_Triples_t", "X_Triples_2_t",
```

```
                  "X_WAR_t","X_WAR_2_t")
# Lista
hitter_vars_4 <- paste(hitter_vars_4, collapse = " + ")


# Pooling:
formula <- paste(vars_ms,
                 hitter_vars_1,
                 sep = " + ")
# Create a model to store the results
hitter_stimation_1 <- plm(formula, data = hitter_data,
                          model = "pooling",
                          index = c("id", "Anio_ref"))
# To store the results
hitter_results_stimation_1 <- coeftest(hitter_stimation_1,
                                       vcov = vcovHC(hitter_stimation_1,
                                                     type = "HC1",
                                                     cluster = "group"))
# Within:
formula <- paste(vars_fe,
                 hitter_vars_2,
                 sep = " + ")
# Create a model to store the results
hitter_stimation_2 <- plm(formula, data = hitter_data,
                          model = "within",
                          index = c("id", "Anio_ref"))
# To store the results
hitter_results_stimation_2 <- coeftest(hitter_stimation_2,
                                       vcov = vcovHC(hitter_stimation_2,
                                                     type = "HC1",
                                                     cluster = "group"))
# Random:
formula <- paste(vars_ms,
                 hitter_vars_3,
                 sep = " + ")
# Create a model to store the results
hitter_stimation_3 <- plm(formula, data = hitter_data,
                          model = "random",
                          index = c("id", "Anio_ref"))
# To store the results
hitter_results_stimation_3 <- coeftest(hitter_stimation_3,
                                       vcov = vcovHC(hitter_stimation_3,
                                                     type = "HC1",
                                                     cluster = "group"))
# First Differences:
formula <- paste(vars_fe,
                 hitter_vars_4,
                 sep = " + ")
# Create a model to store the results
hitter_stimation_4 <- plm(formula, data = hitter_data,
                          model = "fd",
                          index = c("id", "Anio_ref"))
# To store the results
```

```r
hitter_results_stimation_4 <- coeftest(hitter_stimation_4,
                                       vcov = vcovHC(hitter_stimation_4,
                                                     type = "HC1",
                                                     cluster = "group"))

# Modelos
hitter_models <- list(pooling = hitter_results_stimation_1,
                      within = hitter_results_stimation_2,
                      random = hitter_results_stimation_3,
                      fd = hitter_results_stimation_4)


# Print the third block of results
stargazer(hitter_models,
          no.space = TRUE,
          align = TRUE,
          type = "text",
          title = "Bateadores: Comparación de los modelos - Primer refinamiento",
          column.labels = c("Pooling", "Within",
                            "Random effects","First-Differences"))
```

```
Bateadores: Comparación de los modelos - Primer refinamiento
=================================================================================================
                                                  Dependent variable:
                                    ---------------------------------------------------
                                    Pooling    Within    Random effects First-Differences
                                      (1)        (2)          (3)              (4)
-------------------------------------------------------------------------------------------------
Edad_t                              -0.006**  -0.006       -0.006**         -0.009***
                                    (0.003)   (0.005)      (0.003)           (0.002)
Anios_de_contrato_t                  -0.004  -0.038***      -0.006          -0.047***
                                    (0.004)   (0.012)      (0.004)           (0.009)
team_num_t                           0.001     0.001        0.001           0.002***
                                    (0.001)   (0.001)      (0.001)           (0.001)
X_Triples_t_1                        0.010*
                                    (0.005)
X_Porcentaje_on_base_t_1                       0.033
                                              (0.028)
X_At_bats_t                                                                  0.004***
                                                                              (0.001)
X_At_bats_t_1                                                               -0.001***
                                                                            (0.0003)
X_Bateos_t                                                                   -0.002
                                                                              (0.001)
X_Bateos_2_t_1                                                              -0.0004***
                                                                            (0.0001)
X_Bateos_promedio_t_1                                                        0.050***
                                                                              (0.016)
X_Bateos_promedio_2_t_1                                                      -0.007
                                                                              (0.014)
X_Home_runs_t_1                                                              -0.001
                                                                              (0.002)
```

```
X_Juegos_iniciados_t                                                                  -0.005***
                                                                                       (0.002)
X_Juegos_iniciados_t_1                                                                0.006***
                                                                                       (0.001)
X_Porcentaje_On_base_plus_slugging_2_t                                 -0.017         -0.028*
                                                                      (0.010)          (0.017)
X_Porcentaje_on_base_2_t                                                              0.099**
                                                                                       (0.040)
X_Triples_t                                                            -0.007         -0.068***
                                                                      (0.008)          (0.008)
X_Triples_2_t                                                                         0.024***
                                                                                       (0.004)
X_WAR_t                              0.016**  0.036***     0.019***                  0.010**
                                     (0.007)   (0.009)     (0.006)                   (0.005)
X_WAR_2_t                                                                             0.012**
                                                                                       (0.005)
Constant                             0.187**                0.164**
                                     (0.081)                (0.081)
================================================================================================
================================================================================================
Note:                                                                  *p<0.1; **p<0.05; ***p<0.01
```

```r
# Significant variables:
# Pooling:
hitter_vars_1 <- c("X_Triples_t_1",
                   "X_WAR_t")
# Lista
hitter_vars_1 <- paste(hitter_vars_1, collapse = " + ")

# Within
hitter_vars_2 <- c("X_WAR_t")

# Random effects
hitter_vars_3 <- c("X_WAR_t")

# First Differences
hitter_vars_4 <- c("X_At_bats_t", "X_At_bats_t_1",
                   "X_Bateos_t", "X_Bateos_2_t_1",
                   "X_Bateos_promedio_t_1",
                   "X_Juegos_iniciados_t","X_Juegos_iniciados_t_1",
                   "X_Porcentaje_On_base_plus_slugging_2_t",
                   "X_Porcentaje_on_base_2_t",
                   "X_Triples_t", "X_Triples_2_t",
                   "X_WAR_t","X_WAR_2_t")
# Lista
hitter_vars_4 <- paste(hitter_vars_4, collapse = " + ")


# Pooling:
formula <- paste(vars_ms,
                 hitter_vars_1,
                 sep = " + ")
# Create a model to store the results
hitter_stimation_1 <- plm(formula, data = hitter_data,
```

```
                          model = "pooling",
                          index = c("id", "Anio_ref"))
# To store the results
hitter_results_stimation_1 <- coeftest(hitter_stimation_1,
                                       vcov = vcovHC(hitter_stimation_1,
                                                     type = "HC1",
                                                     cluster = "group"))
# Within:
formula <- paste(vars_fe,
                 hitter_vars_2,
                 sep = " + ")
# Create a model to store the results
hitter_stimation_2 <- plm(formula, data = hitter_data,
                          model = "within",
                          index = c("id", "Anio_ref"))
# To store the results
hitter_results_stimation_2 <- coeftest(hitter_stimation_2,
                                       vcov = vcovHC(hitter_stimation_2,
                                                     type = "HC1",
                                                     cluster = "group"))
# Random:
formula <- paste(vars_ms,
                 hitter_vars_3,
                 sep = " + ")
# Create a model to store the results
hitter_stimation_3 <- plm(formula, data = hitter_data,
                          model = "random",
                          index = c("id", "Anio_ref"))
# To store the results
hitter_results_stimation_3 <- coeftest(hitter_stimation_3,
                                       vcov = vcovHC(hitter_stimation_3,
                                                     type = "HC1",
                                                     cluster = "group"))
# First Differences:
formula <- paste(vars_fe,
                 hitter_vars_4,
                 sep = " + ")
# Create a model to store the results
hitter_stimation_4 <- plm(formula, data = hitter_data,
                          model = "fd",
                          index = c("id", "Anio_ref"))
# To store the results
hitter_results_stimation_4 <- coeftest(hitter_stimation_4,
                                       vcov = vcovHC(hitter_stimation_4,
                                                     type = "HC1",
                                                     cluster = "group"))

# Modelos
hitter_models <- list(pooling = hitter_results_stimation_1,
                      within = hitter_results_stimation_2,
                      random = hitter_results_stimation_3,
                      fd = hitter_results_stimation_4)
```

```r
# Print the third block of results
stargazer(hitter_models,
          no.space = TRUE,
          align = TRUE,
          type = "text",
          title = "Bateadores: Comparación de los modelos - Segundo refinamiento",
          column.labels = c("Pooling", "Within",
                            "Random effects","First-Differences"))
```

Bateadores: Comparación de los modelos - Segundo refinamiento

	Dependent variable:			
	Pooling	Within	Random effects	First-Differences
	(1)	(2)	(3)	(4)
Edad_t	-0.006**	-0.006	-0.006**	-0.009***
	(0.003)	(0.004)	(0.003)	(0.002)
Anios_de_contrato_t	-0.004	-0.039***	-0.007*	-0.047***
	(0.004)	(0.012)	(0.004)	(0.009)
team_num_t	0.001	0.001	0.001	0.002***
	(0.001)	(0.001)	(0.001)	(0.001)
X_Triples_t_1	0.010*			
	(0.005)			
X_At_bats_t				0.004***
				(0.001)
X_At_bats_t_1				-0.001***
				(0.0004)
X_Bateos_t				-0.002
				(0.001)
X_Bateos_2_t_1				-0.0004***
				(0.0001)
X_Bateos_promedio_t_1				0.046***
				(0.010)
X_Juegos_iniciados_t				-0.005***
				(0.002)
X_Juegos_iniciados_t_1				0.006***
				(0.001)
X_Porcentaje_On_base_plus_slugging_2_t				-0.029*
				(0.017)
X_Porcentaje_on_base_2_t				0.103***
				(0.036)
X_Triples_t				-0.068***
				(0.008)
X_Triples_2_t				0.024***
				(0.005)
X_WAR_t	0.016**	0.035***	0.019***	0.009**
	(0.007)	(0.009)	(0.006)	(0.005)
X_WAR_2_t				0.012***
				(0.005)
Constant	0.187**		0.181**	
	(0.081)		(0.082)	

```
================================================================================================
================================================================================================
Note:                                                          *p<0.1; **p<0.05; ***p<0.01
```

```r
# Significant variables:
# Pooling:
hitter_vars_1 <- c("X_Triples_t_1",
                   "X_WAR_t")
# Lista
hitter_vars_1 <- paste(hitter_vars_1, collapse = " + ")

# Within
hitter_vars_2 <- c("X_WAR_t")

# Random effects
hitter_vars_3 <- c("X_WAR_t")

# First Differences
hitter_vars_4 <- c("X_At_bats_t", "X_At_bats_t_1",
                   "X_Bateos_2_t_1",
                   "X_Bateos_promedio_t_1",
                   "X_Juegos_iniciados_t","X_Juegos_iniciados_t_1",
                   "X_Porcentaje_On_base_plus_slugging_2_t",
                   "X_Porcentaje_on_base_2_t",
                   "X_Triples_t", "X_Triples_2_t",
                   "X_WAR_t","X_WAR_2_t")
# Lista
hitter_vars_4 <- paste(hitter_vars_4, collapse = " + ")


# Pooling:
formula <- paste(vars_ms,
                 hitter_vars_1,
                 sep = " + ")
# Create a model to store the results
hitter_stimation_1 <- plm(formula, data = hitter_data,
                          model = "pooling",
                          index = c("id", "Anio_ref"))
# To store the results
hitter_results_stimation_1 <- coeftest(hitter_stimation_1,
                                       vcov = vcovHC(hitter_stimation_1,
                                                     type = "HC1",
                                                     cluster = "group"))
# Within:
formula <- paste(vars_fe,
                 hitter_vars_2,
                 sep = " + ")
# Create a model to store the results
hitter_stimation_2 <- plm(formula, data = hitter_data,
                          model = "within",
                          index = c("id", "Anio_ref"))
# To store the results
hitter_results_stimation_2 <- coeftest(hitter_stimation_2,
                                       vcov = vcovHC(hitter_stimation_2,
```

```
                                                    type = "HC1",
                                                    cluster = "group"))
# Random:
formula <- paste(vars_ms,
                 hitter_vars_3,
                 sep = " + ")
# Create a model to store the results
hitter_stimation_3 <- plm(formula, data = hitter_data,
                          model = "random",
                          index = c("id", "Anio_ref"))
# To store the results
hitter_results_stimation_3 <- coeftest(hitter_stimation_3,
                                       vcov = vcovHC(hitter_stimation_3,
                                                     type = "HC1",
                                                     cluster = "group"))
# First Differences:
formula <- paste(vars_fe,
                 hitter_vars_4,
                 sep = " + ")
# Create a model to store the results
hitter_stimation_4 <- plm(formula, data = hitter_data,
                          model = "fd",
                          index = c("id", "Anio_ref"))
# To store the results
hitter_results_stimation_4 <- coeftest(hitter_stimation_4,
                                       vcov = vcovHC(hitter_stimation_4,
                                                     type = "HC1",
                                                     cluster = "group"))

# Modelos
hitter_models <- list(pooling = hitter_results_stimation_1,
                      within = hitter_results_stimation_2,
                      random = hitter_results_stimation_3,
                      fd = hitter_results_stimation_4)


# Print the third block of results
stargazer(hitter_models,
          no.space = TRUE,
          align = TRUE,
          type = "text",
          title = "Bateadores: Comparación de los modelos - Tercer refinamiento",
          column.labels = c("Pooling", "Within",
                            "Random effects","First-Differences"))
```

```
Bateadores: Comparación de los modelos - Tercer refinamiento
================================================================================================
                                                Dependent variable:
                                    ------------------------------------------------------------

                                    Pooling    Within    Random effects First-Differences
                                      (1)        (2)          (3)              (4)
------------------------------------------------------------------------------------------------
```

```
Edad_t                                -0.006**  -0.006      -0.006**       -0.010***
                                      (0.003)   (0.004)     (0.003)         (0.002)
Anios_de_contrato_t                    -0.004  -0.039***    -0.007*        -0.047***
                                      (0.004)   (0.012)     (0.004)         (0.009)
team_num_t                             0.001     0.001       0.001         0.002***
                                      (0.001)   (0.001)     (0.001)         (0.001)
X_Triples_t_1                          0.010*
                                      (0.005)
X_At_bats_t                                                                0.003***
                                                                            (0.001)
X_At_bats_t_1                                                              -0.001***
                                                                           (0.0004)
X_Bateos_2_t_1                                                            -0.0004***
                                                                           (0.0001)
X_Bateos_promedio_t_1                                                      0.047***
                                                                            (0.010)
X_Juegos_iniciados_t                                                       -0.006***
                                                                            (0.001)
X_Juegos_iniciados_t_1                                                     0.006***
                                                                            (0.001)
X_Porcentaje_On_base_plus_slugging_2_t                                     -0.032**
                                                                            (0.016)
X_Porcentaje_on_base_2_t                                                   0.107***
                                                                            (0.035)
X_Triples_t                                                                -0.067***
                                                                            (0.008)
X_Triples_2_t                                                              0.023***
                                                                            (0.004)
X_WAR_t                               0.016**   0.035***    0.019***       0.011**
                                      (0.007)   (0.009)     (0.006)         (0.005)
X_WAR_2_t                                                                  0.011**
                                                                            (0.005)
Constant                              0.187**               0.181**
                                      (0.081)               (0.082)
=============================================================================================
=============================================================================================
Note:                                                      *p<0.1; **p<0.05; ***p<0.01
```

Ahora se refinará con respecto al signo puesto que no se espera ningún signo negativo en estas variables

```r
# Significant variables:
# Pooling:
hitter_vars_1 <- c("X_Triples_t_1",
                   "X_WAR_t")
# Lista
hitter_vars_1 <- paste(hitter_vars_1, collapse = " + ")

# Within
hitter_vars_2 <- c("X_WAR_t")

# Random effects
hitter_vars_3 <- c("X_WAR_t")

# First Differences
```

```r
hitter_vars_4 <- c("X_At_bats_t",
                   "X_Bateos_promedio_t_1",
                   "X_Juegos_iniciados_t_1",
                   "X_Porcentaje_on_base_2_t",
                   "X_Triples_2_t",
                   "X_WAR_t","X_WAR_2_t")
# Lista
hitter_vars_4 <- paste(hitter_vars_4, collapse = " + ")


# Pooling:
formula <- paste(vars_ms,
                 hitter_vars_1,
                 sep = " + ")
# Create a model to store the results
hitter_stimation_1 <- plm(formula, data = hitter_data,
                          model = "pooling",
                          index = c("id", "Anio_ref"))
# To store the results
hitter_results_stimation_1 <- coeftest(hitter_stimation_1,
                                       vcov = vcovHC(hitter_stimation_1,
                                                     type = "HC1",
                                                     cluster = "group"))
# Within:
formula <- paste(vars_fe,
                 hitter_vars_2,
                 sep = " + ")
# Create a model to store the results
hitter_stimation_2 <- plm(formula, data = hitter_data,
                          model = "within",
                          index = c("id", "Anio_ref"))
# To store the results
hitter_results_stimation_2 <- coeftest(hitter_stimation_2,
                                       vcov = vcovHC(hitter_stimation_2,
                                                     type = "HC1",
                                                     cluster = "group"))
# Random:
formula <- paste(vars_ms,
                 hitter_vars_3,
                 sep = " + ")
# Create a model to store the results
hitter_stimation_3 <- plm(formula, data = hitter_data,
                          model = "random",
                          index = c("id", "Anio_ref"))
# To store the results
hitter_results_stimation_3 <- coeftest(hitter_stimation_3,
                                       vcov = vcovHC(hitter_stimation_3,
                                                     type = "HC1",
                                                     cluster = "group"))
# First Differences:
formula <- paste(vars_fe,
                 hitter_vars_4,
                 sep = " + ")
```

```r
# Create a model to store the results
hitter_stimation_4 <- plm(formula, data = hitter_data,
                          model = "fd",
                          index = c("id", "Anio_ref"))
# To store the results
hitter_results_stimation_4 <- coeftest(hitter_stimation_4,
                                       vcov = vcovHC(hitter_stimation_4,
                                                     type = "HC1",
                                                     cluster = "group"))

# Modelos
hitter_models <- list(pooling = hitter_results_stimation_1,
                      within = hitter_results_stimation_2,
                      random = hitter_results_stimation_3,
                      fd = hitter_results_stimation_4)


# Print the third block of results
stargazer(hitter_models,
          no.space = TRUE,
          align = TRUE,
          type = "text",
          title = "Bateadores: Comparación de los modelos - Cuarto refinamiento",
          column.labels = c("Pooling", "Within",
                            "Random effects","First-Differences"))
```

```
Bateadores: Comparación de los modelos - Cuarto refinamiento
=================================================================================
                                Dependent variable:
                    ---------------------------------------------
                    Pooling   Within   Random effects First-Differences
                      (1)       (2)         (3)              (4)
---------------------------------------------------------------------------------
Edad_t              -0.006**  -0.006      -0.006**        -0.013***
                    (0.003)   (0.004)     (0.003)          (0.002)
Anios_de_contrato_t  -0.004  -0.039***    -0.007*         -0.054***
                    (0.004)   (0.012)     (0.004)          (0.009)
team_num_t           0.001     0.001       0.001          0.002***
                    (0.001)   (0.001)     (0.001)          (0.001)
X_Triples_t_1        0.010*
                    (0.005)
X_At_bats_t                                                -0.0001
                                                          (0.0004)
X_Bateos_promedio_t_1                                      0.044***
                                                           (0.010)
X_Juegos_iniciados_t_1                                     0.003***
                                                           (0.001)
X_Porcentaje_on_base_2_t                                    0.049**
                                                           (0.025)
X_Triples_2_t                                              -0.001
                                                           (0.002)
X_WAR_t             0.016**  0.035***     0.019***        0.019***
```

```
                        (0.007)   (0.009)     (0.006)          (0.004)
X_WAR_2_t                                                      0.010**
                                                               (0.005)
Constant                0.187**               0.181**
                        (0.081)               (0.082)
================================================================================
================================================================================
Note:                                           *p<0.1; **p<0.05; ***p<0.01
```

```r
# Significant variables:
# Pooling:
hitter_vars_1 <- c("X_Triples_t_1",
                   "X_WAR_t")
# Lista
hitter_vars_1 <- paste(hitter_vars_1, collapse = " + ")

# Within
hitter_vars_2 <- c("X_WAR_t")

# Random effects
hitter_vars_3 <- c("X_WAR_t")

# First Differences
hitter_vars_4 <- c("X_Bateos_promedio_t_1",
                   "X_Juegos_iniciados_t_1",
                   "X_Porcentaje_on_base_2_t",
                   "X_WAR_t","X_WAR_2_t")
# Lista
hitter_vars_4 <- paste(hitter_vars_4, collapse = " + ")


# Pooling:
formula <- paste(vars_ms,
                 hitter_vars_1,
                 sep = " + ")
# Create a model to store the results
hitter_stimation_1 <- plm(formula, data = hitter_data,
                          model = "pooling",
                          index = c("id", "Anio_ref"))
# To store the results
hitter_results_stimation_1 <- coeftest(hitter_stimation_1,
                                       vcov = vcovHC(hitter_stimation_1,
                                                     type = "HC1",
                                                     cluster = "group"))
# Within:
formula <- paste(vars_fe,
                 hitter_vars_2,
                 sep = " + ")
# Create a model to store the results
hitter_stimation_2 <- plm(formula, data = hitter_data,
                          model = "within",
                          index = c("id", "Anio_ref"))
# To store the results
hitter_results_stimation_2 <- coeftest(hitter_stimation_2,
```

```
                                        vcov = vcovHC(hitter_stimation_2,
                                                      type = "HC1",
                                                      cluster = "group"))
# Random:
formula <- paste(vars_ms,
                 hitter_vars_3,
                 sep = " + ")
# Create a model to store the results
hitter_stimation_3 <- plm(formula, data = hitter_data,
                          model = "random",
                          index = c("id", "Anio_ref"))
# To store the results
hitter_results_stimation_3 <- coeftest(hitter_stimation_3,
                                        vcov = vcovHC(hitter_stimation_3,
                                                      type = "HC1",
                                                      cluster = "group"))
# First Differences:
formula <- paste(vars_fe,
                 hitter_vars_4,
                 sep = " + ")
# Create a model to store the results
hitter_stimation_4 <- plm(formula, data = hitter_data,
                          model = "fd",
                          index = c("id", "Anio_ref"))
# To store the results
hitter_results_stimation_4 <- coeftest(hitter_stimation_4,
                                        vcov = vcovHC(hitter_stimation_4,
                                                      type = "HC1",
                                                      cluster = "group"))

# Models
hitter_models_end <- list(pooling = hitter_results_stimation_1,
                          within = hitter_results_stimation_2,
                          random = hitter_results_stimation_3,
                          fd = hitter_results_stimation_4)
# List to store results
hitter_end_models <- list(pooling = hitter_stimation_1,
                          within = hitter_stimation_2,
                          random = hitter_stimation_3,
                          fd = hitter_stimation_4)

# Print the third block of results
stargazer(hitter_models_end,
          no.space = TRUE,
          align = TRUE,
          type = "text",
          title = "Bateadores: Comparación de los modelos - Refinamiento final",
          column.labels = c("Pooling", "Within",
                            "Random effects","First-Differences"),
          covariate.labels = c("$Edad_{t}$" , "Años contrato$_{t}$", "Eqipo$_{t}$",
                               "$X_{T_{t-1}}$", "$X_{BA_{t-1}}$", "$X_{GS_{t-1}}$",
                               "$X_{OBP^{2}_{t}}$", "$X_{WAR_{t}}$", "$X_{WAR^{2}_{t}}$",
                               "Intercepto"))
```

```
Bateadores: Comparación de los modelos - Refinamiento final
=================================================================
                              Dependent variable:
               ---------------------------------------------------
               Pooling   Within   Random effects First-Differences
                 (1)       (2)         (3)              (4)
-----------------------------------------------------------------
Edadt          -0.006**  -0.006      -0.006**        -0.013***
               (0.003)   (0.004)     (0.003)          (0.002)
Años contratot  -0.004  -0.039***    -0.007*         -0.054***
               (0.004)   (0.012)     (0.004)          (0.009)
Eqipot          0.001     0.001       0.001          0.002***
               (0.001)   (0.001)     (0.001)          (0.001)
XTt-1           0.010*
               (0.005)
XBAt-1                                                0.044***
                                                      (0.010)
XGSt-1                                                0.003***
                                                      (0.001)
XOBP2t                                                0.049**
                                                      (0.025)
XWARt          0.016**  0.035***     0.019***        0.019***
               (0.007)   (0.009)     (0.006)          (0.004)
XWAR2t                                                0.010**
                                                      (0.005)
Intercepto     0.187**               0.181**
               (0.081)               (0.082)
=================================================================
=================================================================
Note:                                  *p<0.1; **p<0.05; ***p<0.01
```

Aplicaremos un teest de Hausmann a cada pareja de modelos

```
# create an empty list to store the test results
test_results <- list()

# loop through every possible pair of models
for (i in 1:(length(hitter_end_models)-1)) {
  for (j in (i+1):length(hitter_end_models)) {
    # apply phtest to the pair of models
    test_result <- phtest(hitter_end_models[[i]], hitter_end_models[[j]])
    # add the test result to the list
    test_results[[paste0(names(hitter_end_models[i]), "_vs_", names(hitter_end_models[j]))]] <- test_res
  }
}

# view the test results
test_results
```

```
$pooling_vs_within

    Hausman Test
```

```
data:  formula
chisq = 24.791, df = 4, p-value = 5.542e-05
alternative hypothesis: one model is inconsistent


$pooling_vs_random

    Hausman Test

data:  formula
chisq = 34.85, df = 4, p-value = 4.988e-07
alternative hypothesis: one model is inconsistent


$pooling_vs_fd

    Hausman Test

data:  formula
chisq = 37.4, df = 4, p-value = 1.49e-07
alternative hypothesis: one model is inconsistent


$within_vs_random

    Hausman Test

data:  formula
chisq = 19.316, df = 4, p-value = 0.0006812
alternative hypothesis: one model is inconsistent


$within_vs_fd

    Hausman Test

data:  formula
chisq = 36.437, df = 4, p-value = 2.352e-07
alternative hypothesis: one model is inconsistent


$random_vs_fd

    Hausman Test

data:  formula
chisq = 33.902, df = 4, p-value = 7.803e-07
alternative hypothesis: one model is inconsistent
```

Lanzadores

```
# Significant variables:
fielder_vars_1 <- c('X_Control_2',
                    'X_Control',
                    'X_Dominio_2',
                    'X_Dominio',
                    'X_ERA_2',
                    'X_ERA',
                    'X_Saves_2',
                    'X_Saves',
                    'X_WHIP_2',
                    'X_WHIP')
# Add suffix "_t" to each name
stat_fielder_t <- paste0(fielder_vars_1, "_t")
stat_fielder_t_1 <- paste0(fielder_vars_1, "_t_1")
# Lista
fielder_vars_1 <- c(paste(stat_fielder_t, collapse = " + "),
                    paste(stat_fielder_t_1, collapse = " + "))
# Within
fielder_vars_2 <- c('X_Carreras',
                    'X_Comando_2',
                    'X_ERA',
                    'X_Saves_2',
                    'X_Saves',
                    'X_Strike_outs_2',
                    'X_WAR_2')
# Add suffix "_t" to each name
stat_fielder_t <- paste0(fielder_vars_2, "_t")
stat_fielder_t_1 <- paste0(fielder_vars_2, "_t_1")
# Lista
fielder_vars_2 <- c(paste(stat_fielder_t, collapse = " + "),
                    paste(stat_fielder_t_1, collapse = " + "))
# Random effects
fielder_vars_3 <- c('X_Control_2',
                    'X_Control',
                    'X_Dominio_2',
                    'X_Dominio',
                    'X_ERA_2',
                    'X_ERA',
                    'X_Saves_2',
                    'X_Saves',
                    'X_WHIP_2',
                    'X_WHIP')
# Add suffix "_t" to each name
stat_fielder_t <- paste0(fielder_vars_3, "_t")
stat_fielder_t_1 <- paste0(fielder_vars_3, "_t_1")
# Lista
fielder_vars_3 <- c(paste(stat_fielder_t, collapse = " + "),
                    paste(stat_fielder_t_1, collapse = " + "))
# First Differences
fielder_vars_4 <- c('X_Bateos_2',
                    'X_Bateos',
```

```
                    'X_Carreras_ganadas_2',
                    'X_Carreras_ganadas',
                    'X_ERA',
                    'X_Carreras',
                    'X_Comando_2',
                    'X_Comando',
                    'X_Control_2',
                    'X_Control',
                    'X_Dominio_2',
                    'X_Dominio',
                    'X_Inning_pitched_2',
                    'X_Inning_pitched',
                    'X_Losses_2',
                    'X_Saves_2',
                    'X_Saves',
                    'X_Strike_outs_2',
                    'X_Strike_outs',
                    'X_WAR_2',
                    'X_WHIP_2',
                    'X_WHIP',
                    'X_Walks_2',
                    'X_Walks',
                    'X_Wins')
# Add suffix "_t" to each name
stat_fielder_t <- paste0(fielder_vars_4, "_t")
stat_fielder_t_1 <- paste0(fielder_vars_4, "_t_1")
# Lista
fielder_vars_4 <- c(paste(stat_fielder_t, collapse = " + "),
                    paste(stat_fielder_t_1, collapse = " + "))


# Pooling:
formula <- paste(vars_ms,
                 fielder_vars_1[[1]],
                 sep = " + ")
formula <- paste(formula,
                 fielder_vars_1[[2]],
                 sep = " + ")
# Create a model to store the results
fielder_stimation_1 <- plm(formula, data = starting_data,
                           model = "pooling",
                           index = c("id", "Anio_ref"))
# To store the results
fielder_results_stimation_1 <- coeftest(fielder_stimation_1,
                                        vcov = vcovHC(fielder_stimation_1,
                                                      type = "HC1",
                                                      cluster = "group"))
# Within:
formula <- paste(vars_fe,
                 fielder_vars_2[[1]],
                 sep = " + ")
formula <- paste(formula,
                 fielder_vars_2[[2]],
```

```
                sep = " + ")
# Create a model to store the results
fielder_stimation_2 <- plm(formula, data = starting_data,
                           model = "within",
                           index = c("id", "Anio_ref"))
# To store the results
fielder_results_stimation_2 <- coeftest(fielder_stimation_2,
                                        vcov = vcovHC(fielder_stimation_2,
                                                      type = "HC1",
                                                      cluster = "group"))
# Random:
formula <- paste(vars_ms,
                 fielder_vars_3[[1]],
                 sep = " + ")
formula <- paste(formula,
                 fielder_vars_3[[2]],
                 sep = " + ")
# Create a model to store the results
fielder_stimation_3 <- plm(formula, data = starting_data,
                           model = "random",
                           index = c("id", "Anio_ref"))
# To store the results
fielder_results_stimation_3 <- coeftest(fielder_stimation_3,
                                        vcov = vcovHC(fielder_stimation_3,
                                                      type = "HC1",
                                                      cluster = "group"))
# First Differences:
formula <- paste(vars_fe,
                 fielder_vars_4[[1]],
                 sep = " + ")
formula <- paste(formula,
                 fielder_vars_4[[2]],
                 sep = " + ")
# Create a model to store the results
fielder_stimation_4 <- plm(formula, data = starting_data ,
                           model = "fd",
                           index = c("id", "Anio_ref"))
# To store the results
fielder_results_stimation_4 <- coeftest(fielder_stimation_4,
                                        vcov = vcovHC(fielder_stimation_4,
                                                      type = "HC1",
                                                      cluster = "group"))

# Models
fielder_models <- list(pooling = fielder_results_stimation_1,
                       within = fielder_results_stimation_2,
                       random = fielder_results_stimation_3,
                       fd = fielder_results_stimation_4)

# Print the third block of results
stargazer(fielder_models,
          no.space = TRUE,
          align = TRUE,
```

```
        type = "text",
        title = "Lanzadores Iniciales: Comparación de los modelos",
        column.labels = c("Pooling", "Within",
                          "Random effects","First-Differences"))
```

```
Lanzadores Iniciales: Comparación de los modelos
================================================================================
                                        Dependent variable:
                        ---------------------------------------------------
                        Pooling   Within   Random effects First-Differences
                          (1)       (2)         (3)              (4)
--------------------------------------------------------------------------------
Edad_t                  -0.008**  -0.023*     -0.009**        -0.028***
                        (0.004)   (0.012)     (0.004)          (0.007)
Anios_de_contrato_t     -0.015*   -0.025      -0.015*         -0.042***
                        (0.009)   (0.023)     (0.009)          (0.013)
team_num_t              0.003**   0.005**     0.003**           0.001
                        (0.001)   (0.002)     (0.001)          (0.002)
X_Bateos_2_t                                                  0.001***
                                                              (0.0004)
X_Bateos_t                                                    0.023***
                                                               (0.003)
X_Carreras_ganadas_2_t                                        -0.001***
                                                              (0.0004)
X_Carreras_ganadas_t                                           0.007
                                                               (0.006)
X_Control_2_t           -0.181**              -0.176**         -0.051
                        (0.074)               (0.075)          (0.082)
X_Control_t              0.082*                0.076*          -0.011
                        (0.045)               (0.046)          (0.045)
X_Dominio_2_t            -0.045                -0.047         -0.194***
                        (0.029)               (0.030)          (0.050)
X_Dominio_t              0.008                 0.010          0.159***
                        (0.023)               (0.023)          (0.048)
X_ERA_2_t                0.001                 0.001
                        (0.003)               (0.003)
X_Inning_pitched_2_t                                          -0.001***
                                                              (0.0003)
X_Inning_pitched_t                                            -0.008**
                                                               (0.003)
X_Losses_2_t                                                   -0.003
                                                               (0.002)
X_Carreras_t                       0.003                      -0.037***
                                  (0.003)                      (0.009)
X_Comando_2_t                     -0.005                       -0.014
                                  (0.008)                      (0.009)
X_Comando_t                                                   0.036***
                                                               (0.013)
X_ERA_t                 -0.017*   0.0004      -0.016*         -0.066***
                        (0.009)   (0.013)     (0.009)          (0.015)
X_Saves_2_t              -0.253   -1.291*      -0.284          -4.154**
                        (0.874)   (0.708)     (0.864)          (1.822)
```

X_Saves_t	0.261	0.975**	0.291	3.006**
	(0.579)	(0.482)	(0.573)	(1.237)
X_WHIP_2_t	0.006		0.007	0.114***
	(0.020)		(0.020)	(0.021)
X_WHIP_t	0.005		0.004	0.031
	(0.020)		(0.019)	(0.020)
X_Walks_2_t				0.001**
				(0.0005)
X_Walks_t				0.013**
				(0.006)
X_Wins_t				-0.008
				(0.012)
X_Bateos_2_t_1				-0.001**
				(0.0003)
X_Bateos_t_1				0.010
				(0.006)
X_Carreras_ganadas_2_t_1				0.001
				(0.0003)
X_Carreras_ganadas_t_1				0.007
				(0.007)
X_Control_2_t_1	-0.019		-0.021	-0.099***
	(0.036)		(0.037)	(0.035)
X_Control_t_1	-0.027		-0.028	-0.039
	(0.037)		(0.037)	(0.025)
X_Dominio_2_t_1	0.009		0.008	-0.131***
	(0.037)		(0.037)	(0.027)
X_Dominio_t_1	0.044*		0.041*	0.048**
	(0.024)		(0.024)	(0.022)
X_ERA_2_t_1	0.006		0.005	
	(0.005)		(0.004)	
X_Inning_pitched_2_t_1				0.0002
				(0.0003)
X_Inning_pitched_t_1				-0.011***
				(0.002)
X_Losses_2_t_1				-0.007***
				(0.002)
X_Strike_outs_2_t		-0.0001		0.0001
		(0.0001)		(0.0001)
X_Strike_outs_t				0.011***
				(0.003)
X_WAR_2_t		0.002		-0.002
		(0.004)		(0.005)
X_Carreras_t_1		-0.002		0.003
		(0.003)		(0.003)
X_Comando_2_t_1		0.00001		0.0004***
		(0.00000)		(0.0001)
X_Comando_t_1				-0.054***
				(0.012)
X_ERA_t_1	-0.016*	-0.029**	-0.017*	-0.043***
	(0.009)	(0.012)	(0.009)	(0.009)
X_Saves_2_t_1	-0.217**	0.166*	-0.214**	0.046
	(0.106)	(0.097)	(0.104)	(0.148)
X_Saves_t_1	0.419**	-0.168	0.412**	0.116
	(0.182)	(0.163)	(0.179)	(0.280)

```
X_WHIP_2_t_1              -0.020                -0.017           0.010
                         (0.021)               (0.021)          (0.029)
X_WHIP_t_1                -0.003                -0.004           0.003
                         (0.019)               (0.019)          (0.025)
X_Walks_2_t_1                                                    0.001
                                                                (0.0005)
X_Walks_t_1                                                     -0.010
                                                                 (0.007)
X_Wins_t_1                                                      0.017**
                                                                 (0.007)
X_Strike_outs_2_t_1                0.0003                      0.001***
                                  (0.0002)                     (0.0002)
X_Strike_outs_t_1                                               -0.010*
                                                                 (0.005)
X_WAR_2_t_1                       -0.008**                     -0.021***
                                   (0.004)                      (0.003)
Constant                 0.251**               0.261**
                         (0.121)               (0.126)
================================================================================
================================================================================
Note:                                          *p<0.1; **p<0.05; ***p<0.01
```

Seguiremos el proceso análogo de refinamiento para cada modelo

```r
# Significant variables:
fielder_vars_1 <- c('X_Control_2_t',
                    'X_Control_t',
                    'X_Dominio_t_1',
                    'X_ERA_t_1',
                    'X_ERA_t',
                    'X_Saves_2_t_1',
                    'X_Saves_t_1')
# Lista
fielder_vars_1 <- paste(fielder_vars_1, collapse = " + ")
# Within
fielder_vars_2 <- c('X_ERA_t_1',
                    'X_Saves_2_t',
                    'X_Saves_2_t_1',
                    'X_Saves_t',
                    'X_WAR_2_t_1')
# Lista
fielder_vars_2 <- paste(fielder_vars_2, collapse = " + ")
# Random effects
fielder_vars_3 <- c('X_Control_2_t',
                    'X_Control_t',
                    'X_Dominio_t_1',
                    'X_ERA_t',
                    'X_ERA_t_1',
                    'X_Saves_2_t_1',
                    'X_Saves_t_1')
# Lista
fielder_vars_3 <- paste(fielder_vars_3, collapse = " + ")
# First Differences
fielder_vars_4 <- c('X_Bateos_2_t',
```

```
                    'X_Bateos_2_t_1',
                    'X_Bateos_t',
                    'X_Carreras_ganadas_2_t',
                    'X_ERA_t',
                    'X_ERA_t_1',
                    'X_Carreras_t',
                    'X_Comando_2_t_1',
                    'X_Comando_t',
                    'X_Comando_t_1',
                    'X_Control_2_t_1',
                    'X_Control_t_1',
                    'X_Dominio_2_t',
                    'X_Dominio_t',
                    'X_Dominio_2_t_1',
                    'X_Dominio_t_1',
                    'X_Inning_pitched_2_t',
                    'X_Inning_pitched_t',
                    'X_Inning_pitched_t_1',
                    'X_Losses_2_t_1',
                    'X_Saves_2_t',
                    'X_Saves_t',
                    'X_Strike_outs_2_t_1',
                    'X_Strike_outs_t',
                    'X_Strike_outs_t_1',
                    'X_WAR_2_t_1',
                    'X_WHIP_2_t',
                    'X_Walks_2_t',
                    'X_Walks_t',
                    'X_Wins_t_1')
# Lista
fielder_vars_4 <- paste(fielder_vars_4, collapse = " + ")


# Pooling:
formula <- paste(vars_ms,
                 fielder_vars_1,
                 sep = " + ")
# Create a model to store the results
fielder_stimation_1 <- plm(formula, data = starting_data,
                           model = "pooling",
                           index = c("id", "Anio_ref"))
# To store the results
fielder_results_stimation_1 <- coeftest(fielder_stimation_1,
                                        vcov = vcovHC(fielder_stimation_1,
                                                      type = "HC1",
                                                      cluster = "group"))
# Within:
formula <- paste(vars_fe,
                 fielder_vars_2,
                 sep = " + ")
# Create a model to store the results
fielder_stimation_2 <- plm(formula, data = starting_data,
                           model = "within",
```

```
                          index = c("id", "Anio_ref"))
# To store the results
fielder_results_stimation_2 <- coeftest(fielder_stimation_2,
                                        vcov = vcovHC(fielder_stimation_2,
                                                      type = "HC1",
                                                      cluster = "group"))
# Random:
formula <- paste(vars_ms,
                 fielder_vars_3,
                 sep = " + ")
# Create a model to store the results
fielder_stimation_3 <- plm(formula, data = starting_data,
                           model = "random",
                           index = c("id", "Anio_ref"))
# To store the results
fielder_results_stimation_3 <- coeftest(fielder_stimation_3,
                                        vcov = vcovHC(fielder_stimation_3,
                                                      type = "HC1",
                                                      cluster = "group"))
# First Differences:
formula <- paste(vars_fe,
                 fielder_vars_4,
                 sep = " + ")
# Create a model to store the results
fielder_stimation_4 <- plm(formula, data = starting_data ,
                           model = "fd",
                           index = c("id", "Anio_ref"))
# To store the results
fielder_results_stimation_4 <- coeftest(fielder_stimation_4,
                                        vcov = vcovHC(fielder_stimation_4,
                                                      type = "HC1",
                                                      cluster = "group"))

# Modelos
fielder_models <- list(pooling = fielder_results_stimation_1,
                       within = fielder_results_stimation_2,
                       random = fielder_results_stimation_3,
                       fd = fielder_results_stimation_4)


# Print the third block of results
stargazer(fielder_models,
          no.space = TRUE,
          align = TRUE,
          type = "text",
          title = "Lanzadores Iniciales: Comparación de los modelos - Primer refinamiento",
          column.labels = c("Pooling", "Within",
                            "Random effects","First-Differences"))
```

```
Lanzadores Iniciales: Comparación de los modelos - Primer refinamiento
================================================================================
                                      Dependent variable:
                          ---------------------------------------------------
```

	Pooling	Within	Random effects	First-Differences
	(1)	(2)	(3)	(4)
Edad_t	-0.008**	-0.020*	-0.009**	-0.016***
	(0.004)	(0.012)	(0.004)	(0.005)
Anios_de_contrato_t	-0.013*	-0.017	-0.013*	-0.057***
	(0.007)	(0.020)	(0.007)	(0.012)
team_num_t	0.002	0.004	0.002	0.002
	(0.001)	(0.002)	(0.001)	(0.001)
X_Control_2_t	-0.157**		-0.148**	
	(0.071)		(0.071)	
X_Control_t	0.091**		0.084**	
	(0.041)		(0.041)	
X_Bateos_2_t				0.0005**
				(0.0002)
X_Bateos_2_t_1				-0.0004***
				(0.0001)
X_Bateos_t				0.020***
				(0.002)
X_Carreras_ganadas_2_t				-0.001***
				(0.0003)
X_Dominio_t_1	0.047***		0.043***	0.042***
	(0.014)		(0.014)	(0.009)
X_Inning_pitched_2_t				-0.001***
				(0.0001)
X_Inning_pitched_t				-0.001
				(0.002)
X_Inning_pitched_t_1				0.001
				(0.001)
X_Losses_2_t_1				-0.003***
				(0.001)
X_ERA_t_1	-0.019***	-0.034***	-0.019***	-0.035***
	(0.006)	(0.011)	(0.006)	(0.006)
X_Carreras_t				-0.023***
				(0.003)
X_Comando_2_t_1				0.0004***
				(0.0001)
X_Comando_t				0.047***
				(0.006)
X_Comando_t_1				-0.046***
				(0.006)
X_Control_2_t_1				-0.098***
				(0.014)
X_Control_t_1				-0.047**
				(0.020)
X_Dominio_2_t				-0.152***
				(0.012)
X_Dominio_t				0.136***
				(0.021)
X_Dominio_2_t_1				-0.084***
				(0.011)
X_ERA_t	-0.013**		-0.012**	-0.047***
	(0.006)		(0.006)	(0.007)

```
X_Saves_2_t                       -1.883***                    -2.416***
                                   (0.656)                      (0.448)
X_Saves_2_t_1          -0.194**    0.066***     -0.170**
                        (0.090)    (0.019)      (0.083)
X_Saves_t_1             0.374**                 0.332**
                        (0.159)                 (0.145)
X_Saves_t                          1.447***                     1.745***
                                   (0.465)                      (0.294)
X_Strike_outs_2_t_1                                             0.001***
                                                                (0.0001)
X_Strike_outs_t                                                 0.006***
                                                                 (0.001)
X_Strike_outs_t_1                                               -0.006***
                                                                 (0.002)
X_WAR_2_t_1                        -0.008**                     -0.017***
                                   (0.003)                      (0.002)
X_WHIP_2_t                                                      0.084***
                                                                 (0.012)
X_Walks_2_t                                                     0.001***
                                                                (0.0002)
X_Walks_t                                                       0.007***
                                                                 (0.002)
X_Wins_t_1                                                       0.004
                                                                 (0.003)
Constant                0.257**                 0.275**
                        (0.123)                 (0.132)
================================================================================
================================================================================
Note:                                          *p<0.1; **p<0.05; ***p<0.01
```

```r
# Significant variables:
fielder_vars_1 <- c('X_Control_2_t',
                    'X_Control_t',
                    'X_Dominio_t_1',
                    'X_ERA_t_1',
                    'X_ERA_t',
                    'X_Saves_2_t_1',
                    'X_Saves_t_1')
# Lista
fielder_vars_1 <- paste(fielder_vars_1, collapse = " + ")
# Within
fielder_vars_2 <- c('X_ERA_t_1',
                    'X_Saves_2_t',
                    'X_Saves_2_t_1',
                    'X_Saves_t',
                    'X_WAR_2_t_1')
# Lista
fielder_vars_2 <- paste(fielder_vars_2, collapse = " + ")
# Random effects
fielder_vars_3 <- c('X_Control_2_t',
                    'X_Control_t',
                    'X_Dominio_t_1',
                    'X_ERA_t',
                    'X_ERA_t_1',
```

```
                    'X_Saves_2_t_1',
                    'X_Saves_t_1')
# Lista
fielder_vars_3 <- paste(fielder_vars_3, collapse = " + ")
# First Differences
fielder_vars_4 <- c('X_Bateos_2_t',
                    'X_Bateos_2_t_1',
                    'X_Bateos_t',
                    'X_Carreras_ganadas_2_t',
                    'X_ERA_t',
                    'X_ERA_t_1',
                    'X_Carreras_t',
                    'X_Comando_2_t_1',
                    'X_Comando_t',
                    'X_Comando_t_1',
                    'X_Control_2_t_1',
                    'X_Control_t_1',
                    'X_Dominio_2_t',
                    'X_Dominio_t',
                    'X_Dominio_2_t_1',
                    'X_Dominio_t_1',
                    'X_Inning_pitched_2_t',
                    'X_Losses_2_t_1',
                    'X_Saves_2_t',
                    'X_Saves_t',
                    'X_Strike_outs_2_t_1',
                    'X_Strike_outs_t',
                    'X_Strike_outs_t_1',
                    'X_WAR_2_t_1',
                    'X_WHIP_2_t',
                    'X_Walks_2_t',
                    'X_Walks_t',
                    '-1')
# Lista
fielder_vars_4 <- paste(fielder_vars_4, collapse = " + ")


# Pooling:
formula <- paste(vars_ms,
                 fielder_vars_1,
                 sep = " + ")
# Create a model to store the results
fielder_stimation_1 <- plm(formula, data = starting_data,
                           model = "pooling",
                           index = c("id", "Anio_ref"))
# To store the results
fielder_results_stimation_1 <- coeftest(fielder_stimation_1,
                                        vcov = vcovHC(fielder_stimation_1,
                                                      type = "HC1",
                                                      cluster = "group"))
# Within:
formula <- paste(vars_fe,
                 fielder_vars_2,
```

```
                  sep = " + ")
# Create a model to store the results
fielder_stimation_2 <- plm(formula, data = starting_data,
                           model = "within",
                           index = c("id", "Anio_ref"))
# To store the results
fielder_results_stimation_2 <- coeftest(fielder_stimation_2,
                                        vcov = vcovHC(fielder_stimation_2,
                                                      type = "HC1",
                                                      cluster = "group"))
# Random:
formula <- paste(vars_ms,
                 fielder_vars_3,
                 sep = " + ")
# Create a model to store the results
fielder_stimation_3 <- plm(formula, data = starting_data,
                           model = "random",
                           index = c("id", "Anio_ref"))
# To store the results
fielder_results_stimation_3 <- coeftest(fielder_stimation_3,
                                        vcov = vcovHC(fielder_stimation_3,
                                                      type = "HC1",
                                                      cluster = "group"))
# First Differences:
formula <- paste(vars_fe,
                 fielder_vars_4,
                 sep = " + ")
# Create a model to store the results
fielder_stimation_4 <- plm(formula, data = starting_data ,
                           model = "fd",
                           index = c("id", "Anio_ref"))
# To store the results
fielder_results_stimation_4 <- coeftest(fielder_stimation_4,
                                        vcov = vcovHC(fielder_stimation_4,
                                                      type = "HC1",
                                                      cluster = "group"))

# Modelos
fielder_models <- list(pooling = fielder_results_stimation_1,
                       within = fielder_results_stimation_2,
                       random = fielder_results_stimation_3,
                       fd = fielder_results_stimation_4)


# Print the third block of results
stargazer(fielder_models,
          no.space = TRUE,
          align = TRUE,
          type = "text",
          title = "Lanzadores Iniciales: Comparación de los modelos - Segundo refinamiento",
          column.labels = c("Pooling", "Within",
                            "Random effects","First-Differences"))
```

Lanzadores Iniciales: Comparación de los modelos - Segundo refinamiento

	Dependent variable:			
	Pooling	Within	Random effects	First-Differences
	(1)	(2)	(3)	(4)
Edad_t	-0.008**	-0.020*	-0.009**	-0.016***
	(0.004)	(0.012)	(0.004)	(0.004)
Anios_de_contrato_t	-0.013*	-0.017	-0.013*	-0.058***
	(0.007)	(0.020)	(0.007)	(0.012)
team_num_t	0.002	0.004	0.002	0.002*
	(0.001)	(0.002)	(0.001)	(0.001)
X_Control_2_t	-0.157**		-0.148**	
	(0.071)		(0.071)	
X_Control_t	0.091**		0.084**	
	(0.041)		(0.041)	
X_Bateos_2_t				0.0005**
				(0.0002)
X_Bateos_2_t_1				-0.0004***
				(0.0001)
X_Bateos_t				0.020***
				(0.002)
X_Carreras_ganadas_2_t				-0.001***
				(0.0003)
X_Dominio_t_1	0.047***		0.043***	0.042***
	(0.014)		(0.014)	(0.009)
X_Inning_pitched_2_t				-0.001***
				(0.0001)
X_Losses_2_t_1				-0.003***
				(0.001)
X_ERA_t_1	-0.019***	-0.034***	-0.019***	-0.036***
	(0.006)	(0.011)	(0.006)	(0.006)
X_Carreras_t				-0.023***
				(0.003)
X_Comando_2_t_1				0.0004***
				(0.0001)
X_Comando_t				0.048***
				(0.006)
X_Comando_t_1				-0.046***
				(0.006)
X_Control_2_t_1				-0.098***
				(0.013)
X_Control_t_1				-0.053***
				(0.012)
X_Dominio_2_t				-0.151***
				(0.011)
X_Dominio_t				0.134***
				(0.020)
X_Dominio_2_t_1				-0.084***
				(0.011)
X_ERA_t	-0.013**		-0.012**	-0.046***
	(0.006)		(0.006)	(0.007)

```
X_Saves_2_t                        -1.883***                      -2.435***
                                    (0.656)                        (0.439)
X_Saves_2_t_1          -0.194**     0.066***      -0.170**
                        (0.090)     (0.019)       (0.083)
X_Saves_t_1             0.374**                   0.332**
                        (0.159)                   (0.145)
X_Saves_t                          1.447***                       1.770***
                                    (0.465)                        (0.295)
X_Strike_outs_2_t_1                                               0.001***
                                                                  (0.0001)
X_Strike_outs_t                                                   0.005***
                                                                   (0.001)
X_Strike_outs_t_1                                                -0.005***
                                                                   (0.001)
X_WAR_2_t_1                        -0.008**                       -0.017***
                                    (0.003)                        (0.002)
X_WHIP_2_t                                                        0.081***
                                                                   (0.012)
X_Walks_2_t                                                       0.001***
                                                                  (0.0002)
X_Walks_t                                                         0.006***
                                                                   (0.002)
Constant                0.257**                   0.275**
                        (0.123)                   (0.132)
================================================================================
================================================================================
Note:                                          *p<0.1; **p<0.05; ***p<0.01
```

Ahora omitamos las variables cuyo estimador tiene un signo que no tiene sentido. Veamos sí podemos corregir el signo del EHIP en el siguiente refinamiento, así como el de las BB en contra

```
# Significant variables:
fielder_vars_1 <- c('X_Control_t',
                    'X_Dominio_t_1',
                    'X_ERA_t_1',
                    'X_ERA_t',
                    'X_Saves_t_1')
# Lista
fielder_vars_1 <- paste(fielder_vars_1, collapse = " + ")
# Within
fielder_vars_2 <- c('X_ERA_t_1',
                    'X_Saves_2_t_1',
                    'X_Saves_t')
# Lista
fielder_vars_2 <- paste(fielder_vars_2, collapse = " + ")
# Random effects
fielder_vars_3 <- c('X_Control_2_t',
                    'X_Control_t',
                    'X_Dominio_t_1',
                    'X_ERA_t',
                    'X_ERA_t_1',
                    'X_Saves_t_1')
# Lista
fielder_vars_3 <- paste(fielder_vars_3, collapse = " + ")
```

```r
# First Differences
fielder_vars_4 <- c('X_Bateos_2_t',
                    'X_Bateos_t',
                    'X_Carreras_ganadas_2_t',
                    'X_ERA_t',
                    'X_ERA_t_1',
                    'X_Carreras_t',
                    'X_Comando_2_t_1',
                    'X_Comando_t',
                    'X_Dominio_t',
                    'X_Dominio_2_t_1',
                    'X_Dominio_t_1',
                    'X_Losses_2_t_1',
                    'X_Saves_t',
                    'X_Strike_outs_2_t_1',
                    'X_Strike_outs_t',
                    'X_WHIP_2_t',
                    'X_Walks_2_t',
                    'X_Walks_t',
                    '-1')
# Lista
fielder_vars_4 <- paste(fielder_vars_4, collapse = " + ")


# Pooling:
formula <- paste(vars_ms,
                 fielder_vars_1,
                 sep = " + ")
# Create a model to store the results
fielder_stimation_1 <- plm(formula, data = starting_data,
                           model = "pooling",
                           index = c("id", "Anio_ref"))
# To store the results
fielder_results_stimation_1 <- coeftest(fielder_stimation_1,
                                        vcov = vcovHC(fielder_stimation_1,
                                                      type = "HC1",
                                                      cluster = "group"))
# Within:
formula <- paste(vars_fe,
                 fielder_vars_2,
                 sep = " + ")
# Create a model to store the results
fielder_stimation_2 <- plm(formula, data = starting_data,
                           model = "within",
                           index = c("id", "Anio_ref"))
# To store the results
fielder_results_stimation_2 <- coeftest(fielder_stimation_2,
                                        vcov = vcovHC(fielder_stimation_2,
                                                      type = "HC1",
                                                      cluster = "group"))
# Random:
formula <- paste(vars_ms,
                 fielder_vars_3,
```

```r
                 sep = " + ")
# Create a model to store the results
fielder_stimation_3 <- plm(formula, data = starting_data,
                          model = "random",
                          index = c("id", "Anio_ref"))
# To store the results
fielder_results_stimation_3 <- coeftest(fielder_stimation_3,
                                        vcov = vcovHC(fielder_stimation_3,
                                                      type = "HC1",
                                                      cluster = "group"))
# First Differences:
formula <- paste(vars_fe,
                 fielder_vars_4,
                 sep = " + ")
# Create a model to store the results
fielder_stimation_4 <- plm(formula, data = starting_data ,
                          model = "fd",
                          index = c("id", "Anio_ref"))
# To store the results
fielder_results_stimation_4 <- coeftest(fielder_stimation_4,
                                        vcov = vcovHC(fielder_stimation_4,
                                                      type = "HC1",
                                                      cluster = "group"))

# Modelos
fielder_models <- list(pooling = fielder_results_stimation_1,
                      within = fielder_results_stimation_2,
                      random = fielder_results_stimation_3,
                      fd = fielder_results_stimation_4)


# Print the third block of results
stargazer(fielder_models,
         no.space = TRUE,
         align = TRUE,
         type = "text",
         title = "Lanzadores Iniciales: Comparación de los modelos - Tercer refinamiento",
         column.labels = c("Pooling", "Within",
                          "Random effects","First-Differences"))
```

```
Lanzadores Iniciales: Comparación de los modelos - Tercer refinamiento
===========================================================================
                                       Dependent variable:
                       ----------------------------------------------------

                        Pooling   Within   Random effects First-Differences
                          (1)       (2)         (3)              (4)
---------------------------------------------------------------------------
Edad_t                  -0.006*   -0.021      -0.008**         -0.012**
                        (0.004)   (0.013)     (0.004)          (0.006)
Anios_de_contrato_t     -0.012    -0.023       -0.011          -0.057***
                        (0.007)   (0.017)     (0.007)          (0.013)
team_num_t               0.002     0.003       0.002            0.002*
```

```
                        (0.001)   (0.002)     (0.001)          (0.001)
X_Control_2_t                                -0.144**
                                             (0.072)
X_Control_t              0.042               0.082**
                        (0.028)              (0.040)
X_Bateos_2_t                                                  -0.0003**
                                                              (0.0001)
X_Bateos_t                                                     0.008**
                                                               (0.004)
X_Carreras_ganadas_2_t                                        -0.001***
                                                              (0.0002)
X_Dominio_t_1          0.042***              0.040***         -0.026**
                        (0.015)              (0.014)          (0.011)
X_Losses_2_t_1                                                -0.004***
                                                               (0.001)
X_ERA_t_1             -0.019*** -0.031***   -0.020***        -0.021***
                        (0.006)   (0.011)     (0.006)          (0.004)
X_Carreras_t                                                   -0.002
                                                               (0.004)
X_Comando_2_t_1                                               0.00000***
                                                              (0.00000)
X_Comando_t                                                    0.033***
                                                               (0.007)
X_Dominio_t                                                    0.064***
                                                               (0.013)
X_Dominio_2_t_1                                                0.021**
                                                               (0.009)
X_ERA_t                 -0.011*              -0.011*          -0.014
                        (0.006)              (0.006)          (0.009)
X_Saves_t_1             0.082**              0.064**
                        (0.033)              (0.025)
X_Saves_2_t_1                    0.060***
                                  (0.020)
X_Saves_t                        0.213***                      0.0005
                                  (0.053)                     (0.028)
X_Strike_outs_2_t_1                                           0.0003***
                                                              (0.0001)
X_Strike_outs_t                                                0.002***
                                                               (0.001)
X_WHIP_2_t                                                     0.037***
                                                               (0.010)
X_Walks_2_t                                                    0.001***
                                                              (0.0002)
X_Walks_t                                                     -0.007***
                                                               (0.001)
Constant                0.207*                0.250*
                        (0.117)              (0.129)
================================================================================
================================================================================
Note:                                          *p<0.1; **p<0.05; ***p<0.01
```

```r
# Significant variables:
fielder_vars_1 <- c('X_Control_t',
                    'X_Dominio_t_1',
```

```
                    'X_ERA_t_1',
                    'X_ERA_t',
                    'X_Saves_t_1')
# Lista
fielder_vars_1 <- paste(fielder_vars_1, collapse = " + ")
# Within
fielder_vars_2 <- c('X_ERA_t_1',
                    'X_Saves_2_t_1',
                    'X_Saves_t')
# Lista
fielder_vars_2 <- paste(fielder_vars_2, collapse = " + ")
# Random effects
fielder_vars_3 <- c('X_Control_2_t',
                    'X_Control_t',
                    'X_Dominio_t_1',
                    'X_ERA_t',
                    'X_ERA_t_1',
                    'X_Saves_t_1')
# Lista
fielder_vars_3 <- paste(fielder_vars_3, collapse = " + ")
# First Differences
fielder_vars_4 <- c('X_Bateos_2_t',
                    'X_Bateos_t',
                    'X_Carreras_ganadas_2_t',
                    'X_ERA_t',
                    'X_ERA_t_1',
                    'X_Comando_2_t_1',
                    'X_Comando_t',
                    'X_Dominio_t',
                    'X_Dominio_2_t_1',
                    'X_Dominio_t_1',
                    'X_Losses_2_t_1',
                    'X_Strike_outs_2_t_1',
                    'X_Strike_outs_t',
                    'X_WHIP_2_t',
                    'X_Walks_t',
                    '-1')
# Lista
fielder_vars_4 <- paste(fielder_vars_4, collapse = " + ")


# Pooling:
formula <- paste(vars_ms,
                 fielder_vars_1,
                 sep = " + ")
# Create a model to store the results
fielder_stimation_1 <- plm(formula, data = starting_data,
                           model = "pooling",
                           index = c("id", "Anio_ref"))
# To store the results
fielder_results_stimation_1 <- coeftest(fielder_stimation_1,
                                        vcov = vcovHC(fielder_stimation_1,
                                                      type = "HC1",
```

```
                                                cluster = "group"))
# Within:
formula <- paste(vars_fe,
                 fielder_vars_2,
                 sep = " + ")
# Create a model to store the results
fielder_stimation_2 <- plm(formula, data = starting_data,
                           model = "within",
                           index = c("id", "Anio_ref"))
# To store the results
fielder_results_stimation_2 <- coeftest(fielder_stimation_2,
                                        vcov = vcovHC(fielder_stimation_2,
                                                      type = "HC1",
                                                      cluster = "group"))
# Random:
formula <- paste(vars_ms,
                 fielder_vars_3,
                 sep = " + ")
# Create a model to store the results
fielder_stimation_3 <- plm(formula, data = starting_data,
                           model = "random",
                           index = c("id", "Anio_ref"))
# To store the results
fielder_results_stimation_3 <- coeftest(fielder_stimation_3,
                                        vcov = vcovHC(fielder_stimation_3,
                                                      type = "HC1",
                                                      cluster = "group"))
# First Differences:
formula <- paste(vars_fe,
                 fielder_vars_4,
                 sep = " + ")
# Create a model to store the results
fielder_stimation_4 <- plm(formula, data = starting_data ,
                           model = "fd",
                           index = c("id", "Anio_ref"))
# To store the results
fielder_results_stimation_4 <- coeftest(fielder_stimation_4,
                                        vcov = vcovHC(fielder_stimation_4,
                                                      type = "HC1",
                                                      cluster = "group"))

# Modelos
fielder_models <- list(pooling = fielder_results_stimation_1,
                       within = fielder_results_stimation_2,
                       random = fielder_results_stimation_3,
                       fd = fielder_results_stimation_4)


# Print the third block of results
stargazer(fielder_models,
          no.space = TRUE,
          align = TRUE,
          type = "text",
```

```
        title = "Lanzadores Iniciales: Comparación de los modelos - Cuarto refinamiento",
        column.labels = c("Pooling", "Within",
                          "Random effects","First-Differences"))
```

Lanzadores Iniciales: Comparación de los modelos - Cuarto refinamiento

	Dependent variable:			
	Pooling	Within	Random effects	First-Differences
	(1)	(2)	(3)	(4)
Edad_t	-0.006*	-0.021	-0.008**	-0.015**
	(0.004)	(0.013)	(0.004)	(0.007)
Anios_de_contrato_t	-0.012	-0.023	-0.011	-0.062***
	(0.007)	(0.017)	(0.007)	(0.012)
team_num_t	0.002	0.003	0.002	0.002*
	(0.001)	(0.002)	(0.001)	(0.001)
X_Control_2_t			-0.144**	
			(0.072)	
X_Control_t	0.042		0.082**	
	(0.028)		(0.040)	
X_Bateos_2_t				-0.0002
				(0.0001)
X_Bateos_t				0.007***
				(0.002)
X_Carreras_ganadas_2_t				-0.001***
				(0.0002)
X_Dominio_t_1	0.042***		0.040***	-0.029**
	(0.015)		(0.014)	(0.013)
X_Losses_2_t_1				-0.003***
				(0.001)
X_Strike_outs_2_t_1				0.0003***
				(0.0001)
X_Strike_outs_t				0.003***
				(0.001)
X_WHIP_2_t				0.023**
				(0.009)
X_Walks_t				-0.004***
				(0.001)
X_ERA_t_1	-0.019***	-0.031***	-0.020***	-0.016***
	(0.006)	(0.011)	(0.006)	(0.004)
X_Comando_2_t_1				0.00001***
				(0.00000)
X_Comando_t				0.034***
				(0.009)
X_Dominio_t				0.059***
				(0.010)
X_Dominio_2_t_1				0.018
				(0.011)
X_ERA_t	-0.011*		-0.011*	-0.006
	(0.006)		(0.006)	(0.008)
X_Saves_t_1	0.082**		0.064**	

```
                        (0.033)               (0.025)
X_Saves_2_t_1                    0.060***
                                  (0.020)
X_Saves_t                        0.213***
                                  (0.053)
Constant                0.207*                0.250*
                        (0.117)               (0.129)
================================================================================
================================================================================
Note:                                          *p<0.1; **p<0.05; ***p<0.01
```

```r
# Significant variables:
fielder_vars_1 <- c('X_Dominio_t_1',
                    'X_ERA_t_1',
                    'X_ERA_t',
                    'X_Saves_t_1',
                    '-1')
# Lista
fielder_vars_1 <- paste(fielder_vars_1, collapse = " + ")
# Within
fielder_vars_2 <- c('X_ERA_t_1',
                    'X_Saves_2_t_1',
                    'X_Saves_t')
# Lista
fielder_vars_2 <- paste(fielder_vars_2, collapse = " + ")
# Random effects
fielder_vars_3 <- c('X_Control_2_t',
                    'X_Control_t',
                    'X_Dominio_t_1',
                    'X_ERA_t',
                    'X_ERA_t_1',
                    'X_Saves_t_1')
# Lista
fielder_vars_3 <- paste(fielder_vars_3, collapse = " + ")
# First Differences
fielder_vars_4 <- c('X_Bateos_t',
                    'X_Carreras_ganadas_2_t',
                    'X_ERA_t_1',
                    'X_Comando_2_t_1',
                    'X_Comando_t',
                    'X_Dominio_t',
                    'X_Losses_2_t_1',
                    'X_Strike_outs_2_t_1',
                    'X_Strike_outs_t',
                    'X_Walks_t',
                    '-1')
# Lista
fielder_vars_4 <- paste(fielder_vars_4, collapse = " + ")


# Pooling:
formula <- paste(vars_ms,
                 fielder_vars_1,
                 sep = " + ")
```

```r
# Create a model to store the results
fielder_stimation_1 <- plm(formula, data = starting_data,
                           model = "pooling",
                           index = c("id", "Anio_ref"))
# To store the results
fielder_results_stimation_1 <- coeftest(fielder_stimation_1,
                                        vcov = vcovHC(fielder_stimation_1,
                                                      type = "HC1",
                                                      cluster = "group"))
# Within:
formula <- paste(vars_fe,
                 fielder_vars_2,
                 sep = " + ")
# Create a model to store the results
fielder_stimation_2 <- plm(formula, data = starting_data,
                           model = "within",
                           index = c("id", "Anio_ref"))
# To store the results
fielder_results_stimation_2 <- coeftest(fielder_stimation_2,
                                        vcov = vcovHC(fielder_stimation_2,
                                                      type = "HC1",
                                                      cluster = "group"))
# Random:
formula <- paste(vars_ms,
                 fielder_vars_3,
                 sep = " + ")
# Create a model to store the results
fielder_stimation_3 <- plm(formula, data = starting_data,
                           model = "random",
                           index = c("id", "Anio_ref"))
# To store the results
fielder_results_stimation_3 <- coeftest(fielder_stimation_3,
                                        vcov = vcovHC(fielder_stimation_3,
                                                      type = "HC1",
                                                      cluster = "group"))
# First Differences:
formula <- paste(vars_fe,
                 fielder_vars_4,
                 sep = " + ")
# Create a model to store the results
fielder_stimation_4 <- plm(formula, data = starting_data ,
                           model = "fd",
                           index = c("id", "Anio_ref"))
# To store the results
fielder_results_stimation_4 <- coeftest(fielder_stimation_4,
                                        vcov = vcovHC(fielder_stimation_4,
                                                      type = "HC1",
                                                      cluster = "group"))

# Modelos
fielder_models_end <- list(pooling = fielder_results_stimation_1,
                           within = fielder_results_stimation_2,
                           random = fielder_results_stimation_3,
```

```
                           fd = fielder_results_stimation_4)
# List to store models:
fielder_end_models <- list(pooling = fielder_stimation_1,
                           within = fielder_stimation_2,
                           random = fielder_stimation_3,
                           fd = fielder_stimation_4)


# Print the third block of results
stargazer(fielder_models_end,
          no.space = TRUE,
          align = TRUE,
          type = "text",
          title = "Lanzadores Iniciales: Comparación de los modelos - Cuarto refinamiento",
          column.labels = c("Pooling", "Within",
                            "Random effects","First-Differences"),
          covariate.labels = c("$Edad_{t}$" , "Años contrato$_{t}$", "Eqipo$_{t}$",
                               "$X_{Control^{2}_{t}}$", "$X_{Control_{t}}$",
                               "$X_{Dominio_{t-1}}$", "$X_{H_{t}}$",
                               "$X_{ER^{2}_{t}}$","$X_{ERA_{t-1}}$","$X_{ERA_{t}}$",
                               "$X_{S_{t-1}}$","$X_{S^{2}_{t-1}}$","$X_{S_{t}}$",
                               "$X_{Comando^{2}_{t-1}}$","$X_{Comando_{t}}$",
                               "$X_{Dominio_{t}}$","$X_{L^{2}_{t-1}}$",
                               "$X_{SO^{2}_{t-1}}$","$X_{SO_{t}}$","$X_{BB_{t}}$",
                               "Intercepto"))
```

```
Lanzadores Iniciales: Comparación de los modelos - Cuarto refinamiento
================================================================
                              Dependent variable:
                ---------------------------------------------
                 Pooling   Within   Random effects First-Differences
                   (1)       (2)         (3)               (4)
----------------------------------------------------------------
Edadt            -0.0005   -0.021      -0.008**         -0.017**
                 (0.001)   (0.013)     (0.004)           (0.007)
Años contratot   -0.010    -0.023       -0.011          -0.070***
                 (0.007)   (0.017)     (0.007)           (0.008)
Eqipot           0.003*     0.003       0.002           0.003***
                 (0.001)   (0.002)     (0.001)           (0.001)
XControl2t                             -0.144**
                                       (0.072)
XControlt                              0.082**
                                       (0.040)
XDominiot-1     0.048***               0.040***
                 (0.014)               (0.014)
XHt                                                     0.006***
                                                         (0.002)
XER2t                                                   -0.001***
                                                        (0.0002)
XERAt-1         -0.019*** -0.031***   -0.020***         -0.018***
                 (0.006)   (0.011)     (0.006)           (0.004)
XERAt            -0.011*               -0.011*
```

```
                (0.006)              (0.006)
XSt-1           0.060**              0.064**
                (0.024)              (0.025)
XS2t-1                   0.060***
                          (0.020)
XSt                      0.213***
                          (0.053)
XComando2t-1                                          0.00001***
                                                       (0.00000)
XComandot                                              0.023***
                                                        (0.008)
XDominiot                                              0.061***
                                                        (0.011)
XL2t-1                                                 -0.003***
                                                        (0.001)
XSO2t-1                                                0.0003***
                                                       (0.0001)
XSOt                                                    0.002*
                                                        (0.001)
XBBt                                                   -0.003***
                                                        (0.001)
Intercepto                            0.250*
                                     (0.129)
=======================================================================
=======================================================================
Note:                                   *p<0.1; **p<0.05; ***p<0.01
```

Aplicaremos un teest de Hausmann a cada pareja de modelos

```
# create an empty list to store the test results
test_results <- list()

# loop through every possible pair of models
for (i in 1:(length(fielder_end_models)-1)) {
  for (j in (i+1):length(fielder_end_models)) {
    # apply phtest to the pair of models
    test_result <- phtest(fielder_end_models[[i]], fielder_end_models[[j]])
    # add the test result to the list
    test_results[[paste0(names(fielder_end_models[i]), "_vs_", names(fielder_end_models[j]))]] <- test_
  }
}

# view the test results
test_results
```

```
$pooling_vs_within

    Hausman Test

data:  formula
chisq = 9.7758, df = 4, p-value = 0.04438
alternative hypothesis: one model is inconsistent
```

```
$pooling_vs_random

    Hausman Test

data:  formula
chisq = 10.804, df = 7, p-value = 0.1474
alternative hypothesis: one model is inconsistent


$pooling_vs_fd

    Hausman Test

data:  formula
chisq = 9.3329, df = 4, p-value = 0.0533
alternative hypothesis: one model is inconsistent


$within_vs_random

    Hausman Test

data:  formula
chisq = 5.9681, df = 4, p-value = 0.2015
alternative hypothesis: one model is inconsistent


$within_vs_fd

    Hausman Test

data:  formula
chisq = 1.8519, df = 4, p-value = 0.763
alternative hypothesis: one model is inconsistent


$random_vs_fd

    Hausman Test

data:  formula
chisq = 10.225, df = 4, p-value = 0.03681
alternative hypothesis: one model is inconsistent
```

Tanto para bateadores comunes y bateadores iniciales, se filtraron las variables para obtener el modelo conjunto más adecuado.

Cambio estructural para el 2020 - COVID-19

Estimaremos los mismos modelos refinados, pero omitiendo el año 2020 para evaluar si hay un cambio estructural

Bateadores

```
# Pooling:
formula <- paste(vars_ms,
                 hitter_vars_1,
                 sep = " + ")
# Create a model to store the results
hitter_stimation_1_cov <- plm(formula, data = hitter_cov_data,
                              model = "pooling",
                              index = c("id", "Anio_ref"))
# To store the results
hitter_results_stimation_1_cov <- coeftest(hitter_stimation_1,
                                           vcov = vcovHC(hitter_stimation_1,
                                                         type = "HC1",
                                                         cluster = "group"))
# Within:
formula <- paste(vars_ms,
                 hitter_vars_2,
                 sep = " + ")
# Create a model to store the results
hitter_stimation_2_cov <- plm(formula, data = hitter_cov_data,
                              model = "within",
                              index = c("id", "Anio_ref"))
# To store the results
hitter_results_stimation_2_cov <- coeftest(hitter_stimation_2,
                                           vcov = vcovHC(hitter_stimation_2,
                                                         type = "HC1",
                                                         cluster = "group"))
# Random:
formula <- paste(vars_ms,
                 hitter_vars_3,
                 sep = " + ")
# Create a model to store the results
hitter_stimation_3_cov <- plm(formula, data = hitter_cov_data,
                              model = "random",
                              index = c("id", "Anio_ref"))
# To store the results
hitter_results_stimation_3_cov <- coeftest(hitter_stimation_3,
                                           vcov = vcovHC(hitter_stimation_3,
                                                         type = "HC1",
                                                         cluster = "group"))
# First Differences:
formula <- paste(vars_fe,
                 hitter_vars_4,
                 sep = " + ")
# Create a model to store the results
hitter_stimation_4_cov <- plm(formula, data = hitter_cov_data,
                              model = "fd",
                              index = c("id", "Anio_ref"))
# To store the results
hitter_results_stimation_4_cov <- coeftest(hitter_stimation_4,
                                           vcov = vcovHC(hitter_stimation_4,
                                                         type = "HC1",
```

```
                                                    cluster = "group"))

# Models:
hitter_models_cov <- list(pooling = hitter_results_stimation_1_cov,
                          within = hitter_results_stimation_2_cov,
                          random = hitter_results_stimation_3_cov,
                          fd = hitter_results_stimation_4_cov)
# Store models:
hitter_end_models_cov <- list(pooling = hitter_stimation_1_cov,
                              within = hitter_stimation_2_cov,
                              random = hitter_stimation_3_cov,
                              fd = hitter_stimation_4_cov)

# Print the third block of results
stargazer(hitter_models_cov,
          no.space = TRUE,
          align = TRUE,
          type = "text",
          title = "Bateadores: Comparación de los modelos - COVID-19",
          column.labels = c("Pooling", "Within",
                            "Random effects","First-Differences"),
          covariate.labels = c("$Edad_{t}$" , "Años contrato$_{t}$", "Eqipo$_{t}$",
                               "$X_{T_{t-1}}$", "$X_{BA_{t-1}}$", "$X_{GS_{t-1}}$",
                               "$X_{OBP^{2}_{t}}$", "$X_{WAR_{t}}$", "$X_{WAR^{2}_{t}}$",
                               "Intercepto"))
```

```
Bateadores: Comparación de los modelos - COVID-19
=================================================================
                              Dependent variable:
                ---------------------------------------------
                Pooling   Within   Random effects First-Differences
                  (1)       (2)         (3)               (4)
-----------------------------------------------------------------
Edadt          -0.006**  -0.006      -0.006**         -0.013***
               (0.003)   (0.004)     (0.003)           (0.002)
Años contratot  -0.004  -0.039***    -0.007*          -0.054***
               (0.004)   (0.012)     (0.004)           (0.009)
Eqipot          0.001     0.001       0.001           0.002***
               (0.001)   (0.001)     (0.001)           (0.001)
XTt-1           0.010*
               (0.005)
XBAt-1                                                0.044***
                                                       (0.010)
XGSt-1                                                0.003***
                                                       (0.001)
XOBP2t                                                 0.049**
                                                       (0.025)
XWARt          0.016**  0.035***     0.019***         0.019***
               (0.007)   (0.009)     (0.006)           (0.004)
XWAR2t                                                 0.010**
                                                       (0.005)
Intercepto     0.187**               0.181**
```

```
               (0.081)               (0.082)
=====================================================================
=====================================================================
Note:                                   *p<0.1; **p<0.05; ***p<0.01
```

Fildeadores

```
# Pooling:
formula <- paste(vars_ms,
                 fielder_vars_1,
                 sep = " + ")
# Create a model to store the results
fielder_stimation_1_cov <- plm(formula, data = starting_cov_data,
                               model = "pooling",
                               index = c("id", "Anio_ref"))
# To store the results
fielder_results_stimation_1_cov <- coeftest(fielder_stimation_1,
                                            vcov = vcovHC(fielder_stimation_1,
                                                          type = "HC1",
                                                          cluster = "group"))
# Within:
formula <- paste(vars_fe,
                 fielder_vars_2,
                 sep = " + ")
# Create a model to store the results
fielder_stimation_2_cov <- plm(formula, data = starting_cov_data,
                               model = "within",
                               index = c("id", "Anio_ref"))
# To store the results
fielder_results_stimation_2_cov <- coeftest(fielder_stimation_2,
                                            vcov = vcovHC(fielder_stimation_2,
                                                          type = "HC1",
                                                          cluster = "group"))
# Random:
formula <- paste(vars_ms,
                 fielder_vars_3,
                 sep = " + ")
# Create a model to store the results
fielder_stimation_3_cov <- plm(formula, data = starting_cov_data,
                               model = "random",
                               index = c("id", "Anio_ref"))
# To store the results
fielder_results_stimation_3_cov <- coeftest(fielder_stimation_3,
                                            vcov = vcovHC(fielder_stimation_3,
                                                          type = "HC1",
                                                          cluster = "group"))
# First Differences:
formula <- paste(vars_fe,
                 fielder_vars_4,
                 sep = " + ")
# Create a model to store the results
fielder_stimation_4_cov <- plm(formula, data = starting_cov_data,
```

```
                                model = "fd",
                                index = c("id", "Anio_ref"))
# To store the results
fielder_results_stimation_4_cov <- coeftest(fielder_stimation_4,
                                            vcov = vcovHC(fielder_stimation_4,
                                                          type = "HC1",
                                                          cluster = "group"))

# Modelos
fielder_models_cov <- list(pooling = fielder_results_stimation_1_cov,
                           within = fielder_results_stimation_2_cov,
                           random = fielder_results_stimation_3_cov,
                           fd = fielder_results_stimation_4_cov)
# Store model results:
fielder_end_models_cov <- list(pooling = fielder_stimation_1_cov,
                               within = fielder_stimation_2_cov,
                               random = fielder_stimation_3_cov,
                               fd = fielder_stimation_4_cov)

# Print the third block of results
stargazer(fielder_models_cov,
          no.space = TRUE,
          align = TRUE,
          type = "text",
          title = "Lanzadores Iniciales: Comparación de los modelos - COVID-19",
          column.labels = c("Pooling", "Within",
                            "Random effects","First-Differences"),
          covariate.labels = c("$Edad_{t}$" , "Años contrato$_{t}$", "Eqipo$_{t}$",
                               "$X_{Control^{2}_{t}}$", "$X_{Control_{t}}$",
                               "$X_{Dominio_{t-1}}$", "$X_{H_{t}}$",
                               "$X_{ER^{2}_{t}}$","$X_{ERA_{t-1}}$","$X_{ERA_{t}}$",
                               "$X_{S_{t-1}}$","$X_{S^{2}_{t-1}}$","$X_{S_{t}}$",
                               "$X_{Comando^{2}_{t-1}}$","$X_{Comando_{t}}$",
                               "$X_{Dominio_{t}}$","$X_{L^{2}_{t-1}}$",
                               "$X_{SO^{2}_{t-1}}$","$X_{SO_{t}}$","$X_{BB_{t}}$",
                               "Intercepto"))
```

```
Lanzadores Iniciales: Comparación de los modelos - COVID-19
=================================================================
                              Dependent variable:
                ---------------------------------------------------
                 Pooling   Within   Random effects First-Differences
                   (1)       (2)         (3)              (4)
-----------------------------------------------------------------
Edadt            -0.0005   -0.021      -0.008**         -0.017**
                 (0.001)   (0.013)     (0.004)           (0.007)
Años contratot   -0.010    -0.023       -0.011          -0.070***
                 (0.007)   (0.017)     (0.007)           (0.008)
Eqipot           0.003*     0.003       0.002           0.003***
                 (0.001)   (0.002)     (0.001)           (0.001)
XControl2t                             -0.144**
                                       (0.072)
```

```
XControlt                                0.082**
                                         (0.040)
XDominiot-1      0.048***                0.040***
                  (0.014)                (0.014)
XHt                                                                0.006***
                                                                    (0.002)
XER2t                                                              -0.001***
                                                                    (0.0002)
XERAt-1          -0.019*** -0.031***    -0.020***                  -0.018***
                  (0.006)   (0.011)      (0.006)                    (0.004)
XERAt             -0.011*                -0.011*
                  (0.006)                (0.006)
XSt-1             0.060**                0.064**
                  (0.024)                (0.025)
XS2t-1                     0.060***
                            (0.020)
XSt                        0.213***
                            (0.053)
XComando2t-1                                                      0.00001***
                                                                   (0.00000)
XComandot                                                          0.023***
                                                                    (0.008)
XDominiot                                                          0.061***
                                                                    (0.011)
XL2t-1                                                             -0.003***
                                                                    (0.001)
XSO2t-1                                                            0.0003***
                                                                   (0.0001)
XSOt                                                                0.002*
                                                                    (0.001)
XBBt                                                               -0.003***
                                                                    (0.001)
Intercepto                                0.250*
                                         (0.129)
=================================================================================
=================================================================================
Note:                                      *p<0.1; **p<0.05; ***p<0.01
```

Procedamos a realizar el test de Hausman para cada modelo

```
# List to store results
hitter_test_covid <- list()
model_names <- c("Pooling",
                 "Within",
                 "Random effects",
                 "First-Differences")

# Title:
print("Bateadores: Pruebas de Hausman para el COVID-19")
```

```
[1] "Bateadores: Pruebas de Hausman para el COVID-19"
```

```r
print("")
```

```
[1] ""
```

```r
# Loop for applying results
for (i in 1:4){
  hitter_test_covid[[i]] <- phtest(hitter_end_models[[i]],hitter_end_models_cov[[i]])
  print(model_names[[i]])
  print(hitter_test_covid[[i]])
}
```

```
[1] "Pooling"

    Hausman Test

data:  formula
chisq = 3.9513, df = 5, p-value = 0.5565
alternative hypothesis: one model is inconsistent

[1] "Within"

    Hausman Test

data:  formula
chisq = 3.0371, df = 4, p-value = 0.5516
alternative hypothesis: one model is inconsistent

[1] "Random effects"

    Hausman Test

data:  formula
chisq = 1.392, df = 4, p-value = 0.8456
alternative hypothesis: one model is inconsistent

[1] "First-Differences"

    Hausman Test

data:  formula
chisq = 29.012, df = 8, p-value = 0.0003156
alternative hypothesis: one model is inconsistent
```

```r
# List to store results
fielder_test_covid <- list()
model_names <- c("Pooling",
                 "Within",
                 "Random effects",
                 "First-Differences")

# Title:
print("Lanzadores iniciales: Pruebas de Hausman para el COVID-19")
```

```
[1] "Lanzadores iniciales: Pruebas de Hausman para el COVID-19"
```

```
print("")
```

```
[1] ""
```

```
# Loop for applying results
for (i in 1:4){
  fielder_test_covid[[i]] <- phtest(fielder_end_models[[i]],
                                    fielder_end_models_cov[[i]])
  print(model_names[[i]])
  print(fielder_test_covid[[i]])
}
```

```
[1] "Pooling"

    Hausman Test

data:  formula
chisq = 2.2847, df = 7, p-value = 0.9424
alternative hypothesis: one model is inconsistent

[1] "Within"

    Hausman Test

data:  formula
chisq = 1.8029, df = 6, p-value = 0.9369
alternative hypothesis: one model is inconsistent

[1] "Random effects"

    Hausman Test

data:  formula
chisq = 6.2631, df = 9, p-value = 0.7133
alternative hypothesis: one model is inconsistent

[1] "First-Differences"

    Hausman Test

data:  formula
chisq = 18.292, df = 13, p-value = 0.1468
alternative hypothesis: one model is inconsistent
```

Vemos que solo hay un cambio estructural para el caso de los bateadores bajo el modelo de primeras diferencias.

PCA - Estimación directa

Lo que haremos ahore es obtener los estimadores con los componentes principales obtenidos en el tratamiento de los páneles, lo cuales ya son el número óptimo de componentes.

Pooling

Bateadores

```
# run linear regression with grouped errors by country and robust errors
pca_vars <- 'pca1_t + pca1_t_1'

formula <- paste(vars_ms,
                 pca_vars,
                 sep = " + ")

# Create a model to store the results
hitter_simple_pooling_pca <- plm(formula, data = hitter_data,
                         model = "pooling",
                         index = c("id", "Anio_ref"))

# To store the results
hitter_results_simple_pooling_pca <- coeftest(hitter_simple_pooling_pca,
                                      vcov = vcovHC(hitter_simple_pooling_pca,
                                                    type = "HC1",
                                                    cluster = "group"))

# Print the third block of results
stargazer(hitter_results_simple_pooling_pca,
        no.space = TRUE,
        type = "text",
        title = "Bateadores: Modelo Pooling con PCA",
        covariate.labels = c("$Edad_{t}$" , "Años contrato$_{t}$", "Eqipo$_{t}$",
                             "PCA$_{1_{t}}$", "PCA$_{1_{t-1}}$",
                             "Intercepto"))
```

```
Bateadores: Modelo Pooling con PCA
==========================================
                   Dependent variable:
               ---------------------------

------------------------------------------
Edadt                    -0.006**
                          (0.003)
Años contratot            -0.001
                          (0.004)
Eqipot                     0.001
                          (0.001)
PCA1t                      0.00002
                          (0.00003)
PCA1t-1                   -0.00000
                          (0.00002)
Intercepto                 0.157*
                          (0.081)
==========================================
==========================================
Note:          *p<0.1; **p<0.05; ***p<0.01
```

Starting pitcher

```
# run linear regression with grouped errors by country and robust errors
pca_vars <- 'pca1_t + pca2_t + pca1_t_1 + pca2_t_1'
formula <- paste(vars_ms,
                 pca_vars,
                 sep = " + ")

# Create a model to store the results
fielder_simple_pooling_pca <- plm(formula, data = starting_data,
                                  model = "pooling",
                                  index = c("id", "Anio_ref"))

# To store the results
fielder_results_simple_pooling_pca <- coeftest(fielder_simple_pooling_pca,
                                       vcov = vcovHC(fielder_simple_pooling_pca,
                                                     type = "HC1",
                                                     cluster = "group"))

# Print the third block of results
stargazer(fielder_results_simple_pooling_pca,
          no.space = TRUE,
          type = "text",
          title = "Lanzadores Iniciales: Modelo Pooling con PCA",
          covariate.labels = c("$Edad_{t}$" , "Años contrato$_{t}$", "Eqipo$_{t}$",
                               "PCA$_{1_{t}}$", "PCA$_{2_{t}}$", "PCA$_{1_{t-1}}$", "PCA$_{2_{t-1}}$",
                              "Intercepto"))
```

```
Lanzadores Iniciales: Modelo Pooling con PCA
=========================================
                  Dependent variable:
              ---------------------------

-----------------------------------------
Edadt                    -0.008**
                          (0.004)
Años contratot            -0.006
                          (0.007)
Eqipot                    0.003*
                          (0.002)
PCA1t                     -0.002
                          (0.006)
PCA2t                     -0.0001
                         (0.0001)
PCA1t-1                   0.00001
                         (0.00001)
PCA2t-1                  -0.00000
                         (0.00005)
Intercepto                0.242*
                          (0.142)
=========================================
=========================================
Note:          *p<0.1; **p<0.05; ***p<0.01
```

Efectos fijos

Bateadores

```
# run linear regression with grouped errors by country and robust errors
pca_vars <- 'pca1_t + pca1_t_1'
formula <- paste(vars_fe,
                 pca_vars,
                 sep = " + ")

# Create a model to store the results
hitter_simple_within_pca <- plm(formula, data = hitter_data,
                        model = "within",
                        index = c("id", "Anio_ref"))

# To store the results
hitter_results_simple_within_pca <- coeftest(hitter_simple_within_pca,
                                       vcov = vcovHC(hitter_simple_within_pca,
                                         type = "HC1",
                                         cluster = "group"))

# Print the third block of results
stargazer(hitter_results_simple_within_pca,
        no.space = TRUE,
        type = "text",
        title = "Bateadores: Estimador Within con PCA",
        covariate.labels = c("$Edad_{t}$" , "Años contrato$_{t}$", "Eqipo$_{t}$",
                             "PCA$_{1_{t}}$", "PCA$_{1_{t-1}}$",
                             "Intercepto"))
```

```
Bateadores: Estimador Within con PCA
=========================================
                   Dependent variable:
               ---------------------------

-----------------------------------------
Edadt                      -0.004
                           (0.006)
Años contratot            -0.032**
                           (0.012)
Eqipot                      0.001
                           (0.001)
PCA1t                     -0.00000
                          (0.00004)
PCA1t-1                   -0.00000
                          (0.00004)
=========================================
=========================================
Note:          *p<0.1; **p<0.05; ***p<0.01
```

Starting pitcher

```
# run linear regression with grouped errors by country and robust errors
pca_vars <- 'pca1_t + pca2_t + pca1_t_1 + pca2_t_1'
formula <- paste(vars_fe,
                 pca_vars,
                 sep = " + ")

# Create a model to store the results
fielder_simple_within_pca <- plm(formula, data = starting_data,
                                 model = "within",
                                 index = c("id", "Anio_ref"))

# To store the results
fielder_results_simple_within_pca <- coeftest(fielder_simple_within_pca,
                                              vcov = vcovHC(fielder_simple_within_pca,
                                                            type = "HC1",
                                                            cluster = "group"))


# Print the third block of results
stargazer(fielder_results_simple_within_pca,
        no.space = TRUE,
        type = "text",
        title = "Lanzadores Iniciales: Estimador Within con PCA",
        covariate.labels = c("$Edad_{t}$" , "Años contrato$_{t}$", "Eqipo$_{t}$",
                             "PCA$_{1_{t}}$", "PCA$_{2_{t}}$", "PCA$_{1_{t-1}}$", "PCA$_{2_{t-1}}$",
                             "Intercepto"))
```

```
Lanzadores Iniciales: Estimador Within con PCA
==========================================
                   Dependent variable:
               ---------------------------

------------------------------------------
Edadt                    -0.030**
                          (0.015)
Años contratot            -0.025
                          (0.019)
Eqipot                     0.004
                          (0.002)
PCA1t                     -0.013
                          (0.008)
PCA2t                    -0.00001
                          (0.0001)
PCA1t-1                  -0.00001**
                          (0.00000)
PCA2t-1                   0.00001
                          (0.0001)
==========================================
==========================================
Note:          *p<0.1; **p<0.05; ***p<0.01
```

Efectos aleatorios

Bateadores

```
# run linear regression with grouped errors by country and robust errors
pca_vars <- 'pca1_t + pca1_t_1'
formula <- paste(vars_ms,
                 pca_vars,
                 sep = " + ")

# Create a model to store the results
hitter_simple_random_pca <- plm(formula, data = hitter_data,
                                model = "random",
                                index = c("id", "Anio_ref"))

# To store the results
hitter_results_simple_random_pca <- coeftest(hitter_simple_random_pca,
                                             vcov = vcovHC(hitter_simple_random_pca,
                                                           type = "HC1",
                                                           cluster = "group"))

# Print the third block of results
stargazer(hitter_results_simple_random_pca,
        no.space = TRUE,
        type = "text",
        title = "Bateadores: Efectos Aleatorios con PCA",
        covariate.labels = c("Edad$_{t}$" , "Años contrato$_{t}$", "Eqipo$_{t}$",
                             "PCA$_{1_{t}}$", "PCA$_{1_{t-1}}$",
                             "Intercepto"))
```

```
Bateadores: Efectos Aleatorios con PCA
==========================================
                   Dependent variable:
               ---------------------------

------------------------------------------
Edadt                    -0.005**
                          (0.003)
Años contratot            -0.003
                          (0.004)
Eqipot                     0.001
                          (0.001)
PCA1t                      0.00001
                          (0.00003)
PCA1t-1                   -0.00000
                          (0.00002)
Intercepto                 0.148*
                          (0.083)
==========================================
==========================================
Note:          *p<0.1; **p<0.05; ***p<0.01
```

Starting pitcher

```
# run linear regression with grouped errors by country and robust errors
pca_vars <- 'pca1_t + pca2_t + pca1_t_1 + pca2_t_1'
formula <- paste(vars_ms,
                 pca_vars,
                 sep = " + ")

# Create a model to store the results
fielder_simple_random_pca <- plm(formula, data = starting_data,
                                 model = "random",
                                 index = c("id", "Anio_ref"))

# To store the results
fielder_results_simple_random_pca <- coeftest(fielder_simple_random_pca,
                                              vcov = vcovHC(fielder_simple_random_pca,
                                                            type = "HC1",
                                                            cluster = "group"))

# Print the third block of results
stargazer(fielder_results_simple_random_pca,
        no.space = TRUE,
        type = "text",
        title = "Lanzadores Iniciales: Efectos Aleatorios con PCA",
        covariate.labels = c("Edad$_{t}$" , "Años contrato$_{t}$", "Eqipo$_{t}$",
                             "PCA$_{1_{t}}$", "PCA$_{2_{t}}$", "PCA$_{1_{t-1}}$", "PCA$_{2_{t-1}}$",
                             "Intercepto"))
```

```
Lanzadores Iniciales: Efectos Aleatorios con PCA
=========================================
                  Dependent variable:
              ---------------------------

-----------------------------------------
Edadt                    -0.010**
                          (0.005)
Años contratot            -0.006
                          (0.007)
Eqipot                    0.003*
                          (0.001)
PCA1t                     -0.003
                          (0.006)
PCA2t                     -0.0001
                         (0.0001)
PCA1t-1                   0.00000
                         (0.00000)
PCA2t-1                  -0.00001
                         (0.00004)
Intercepto                0.310*
                          (0.173)
=========================================
=========================================
Note:          *p<0.1; **p<0.05; ***p<0.01
```

First Differences

Bateadores

```
# run linear regression with grouped errors by country and robust errors
pca_vars <- 'pca1_t+ pca1_t_1'
formula <- paste(vars_fe,
                 pca_vars,
                 sep = " + ")

hitter_simple_fd_pca <- plm(formula, data = hitter_data,
                            model = "fd",
                            index = c("id", "Anio_ref"))

# To store the results
hitter_results_simple_fd_pca <- coeftest(hitter_simple_fd_pca,
                                         vcov = vcovHC(hitter_simple_fd_pca,
                                                       type = "HC1",
                                                       cluster = "group"))

# Print the third block of results
stargazer(hitter_results_simple_fd_pca,
        no.space = TRUE,
        type = "text",
        title = "Bateadores: Primeras Diferencias con PCA",
        covariate.labels = c("Edad$_{t}$" , "Años contrato$_{t}$", "Eqipo$_{t}$",
                             "PCA$_{1_{t}}$", "PCA$_{1_{t-1}}$",
                             "Intercepto"))
```

```
Bateadores: Primeras Diferencias con PCA
=========================================
                   Dependent variable:
               --------------------------

-----------------------------------------
Edadt                    -0.011***
                          (0.002)
Años contratot           -0.045***
                          (0.009)
Eqipot                   0.002***
                          (0.001)
PCA1t                     0.00002
                         (0.00001)
PCA1t-1                  -0.00000
                         (0.00002)
=========================================
=========================================
Note:          *p<0.1; **p<0.05; ***p<0.01
```

Starting pitcher

```
# run linear regression with grouped errors by country and robust errors
pca_vars <- 'pca1_t + pca2_t + pca1_t_1 + pca2_t_1'
formula <- paste(vars_fe,
                 pca_vars,
                 sep = " + ")

fielder_simple_fd_pca <- plm(formula, data = starting_data,
                             model = "fd",
                             index = c("id", "Anio_ref"))

# To store the results
fielder_results_simple_fd_pca <- coeftest(fielder_simple_fd_pca,
                                          vcov = vcovHC(fielder_simple_fd_pca,
                                                        type = "HC1",
                                                        cluster = "group"))

# Print the third block of results
stargazer(fielder_results_simple_fd_pca,
        no.space = TRUE,
        type = "text",
        title = "Lanzadores Iniciales: Primeras Diferencias con PCA",
        covariate.labels = c("Edad$_{t}$" , "Años contrato$_{t}$", "Eqipo$_{t}$",
                             "PCA$_{1_{t}}$", "PCA$_{2_{t}}$", "PCA$_{1_{t-1}}$", "PCA$_{2_{t-1}}$",
                             "Intercepto"))
```

```
Lanzadores Iniciales: Primeras Diferencias con PCA
==========================================
                   Dependent variable:
               ---------------------------

------------------------------------------
Edadt                      -0.017*
                           (0.009)
Años contratot            -0.029***
                           (0.009)
Eqipot                    0.003***
                           (0.001)
PCA1t                      -0.001
                           (0.003)
PCA2t                    -0.0001***
                           (0.00003)
PCA1t-1                  -0.00001**
                           (0.00000)
PCA2t-1                    -0.0001
                           (0.00004)
==========================================
==========================================
Note:          *p<0.1; **p<0.05; ***p<0.01
```

Mostremos los resultados de manera conjunta

```
hitter_pca_models <- list(hitter_simple_pooling_pca,
                          hitter_simple_within_pca,
                          hitter_simple_random_pca,
                          hitter_simple_fd_pca)

# Print the third block of results
stargazer(hitter_pca_models,
          no.space = TRUE,
          type = "text",
          title = "Bateadores regulares: Modelos con PCA",
          column.labels = c("Pooling", "Within",
                            "RE","FD"),
          covariate.labels = c("Edad$_{t}$" , "Años contrato$_{t}$", "Eqipo$_{t}$",
                               "PCA$_{1_{t}}$", "PCA$_{1_{t-1}}$",
                               "Intercepto"))
```

```
Bateadores regulares: Modelos con PCA
================================================================================================
                                          Dependent variable:
                    ------------------------------------------------------------------------
                                          Y_Sueldo_regular_norm_t
                          Pooling                 Within                RE                 FD
                            (1)                     (2)                 (3)                (4)
------------------------------------------------------------------------------------------------
Edadt                    -0.006***                -0.004           -0.005**           -0.011**
                          (0.002)                 (0.004)           (0.002)            (0.005)
Años contratot            -0.001                 -0.032***          -0.003            -0.045***
                          (0.004)                 (0.009)           (0.004)            (0.010)
Eqipot                     0.001                   0.001             0.001              0.002*
                          (0.001)                 (0.001)           (0.001)            (0.001)
PCA1t                     0.00002                 -0.00000          0.00001            0.00002
                         (0.00003)               (0.00004)         (0.00003)          (0.00004)
PCA1t-1                   -0.00000                -0.00000          -0.00000           -0.00000
                         (0.00002)               (0.00004)         (0.00002)          (0.00004)
Intercepto                0.157**                                   0.148**
                          (0.069)                                   (0.072)
------------------------------------------------------------------------------------------------
Observations                538                     538               538                225
R2                         0.018                   0.064             0.014              0.135
Adjusted R2                0.009                  -1.285             0.005              0.120
F Statistic    1.970* (df = 5; 532) 3.006** (df = 5; 220)   7.681   6.173*** (df = 5; 220)
================================================================================================
Note:                                                                *p<0.1; **p<0.05; ***p<0.01
```

```
fielder_pca_models <- list(fielder_simple_pooling_pca,
                           fielder_simple_within_pca,
                           fielder_simple_random_pca,
                           fielder_simple_fd_pca)

# Print the third block of results
stargazer(fielder_pca_models,
          no.space = TRUE,
          type = "text",
```

```
          title = "Lanzadores Iniciales: Modelos con PCA",
          column.labels = c("Pooling", "Within",
                            "RE","FD"),
          covariate.labels = c("Edad$_{t}$" , "Años contrato$_{t}$", "Eqipo$_{t}$",
                               "PCA$_{1_{t}}$", "PCA$_{1_{t-1}}$",
                               "Intercepto"))
```

Lanzadores Iniciales: Modelos con PCA

	Dependent variable:			
	Y_Sueldo_regular_norm_t			
	Pooling	Within	RE	FD
	(1)	(2)	(3)	(4)
Edadt	-0.008**	-0.030***	-0.010**	-0.017
	(0.004)	(0.011)	(0.004)	(0.014)
Años contratot	-0.006	-0.025	-0.006	-0.029
	(0.009)	(0.020)	(0.009)	(0.020)
Eqipot	0.003*	0.004*	0.003*	0.003
	(0.001)	(0.002)	(0.001)	(0.002)
PCA1t	-0.002	-0.013	-0.003	-0.001
	(0.006)	(0.010)	(0.006)	(0.011)
PCA1t-1	-0.0001	-0.00001	-0.0001	-0.0001
	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Intercepto	0.00001	-0.00001	0.00000	-0.00001
	(0.00001)	(0.00002)	(0.00001)	(0.00002)
pca2_t_1	-0.00000	0.00001	-0.00001	-0.0001
	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Constant	0.242*		0.310**	
	(0.125)		(0.147)	
Observations	206	206	206	88
R2	0.058	0.130	0.058	0.081
Adjusted R2	0.025	-1.203	0.024	0.013
F Statistic	1.738 (df = 7; 198)	1.725 (df = 7; 81)	12.099*	1.168 (df = 7; 81)
Note:				*p<0.1; **p<0.05; ***p<0.01

Comparación entre periodos

Obtendremos los estimadores para los primeros dos años de observación para luego compararlos con los estimadores para el resto de años. Primero, aseguremos que los páneles estén ordenados por nombre y año de referencia

```
# Sort dataframe by player name and year_ref
hitter_data <- hitter_data %>% arrange(Jugador, Anio_ref)
# Sort dataframe by player name and year_ref
starting_data <- starting_data %>% arrange(Jugador, Anio_ref)
```

Haremos las estimaciones con todos los modelos para obtener un análisis robusto

Primeros dos años

Pooling

Bateadores

```
# loop over the variables in var_hitter_list
for (i in 1:length(stat_hitter_t_1)){
  # run linear regression with grouped errors by country and robust errors
  base_vars_h  <- paste(vars_ms, stat_hitter_t[[i]],
                        sep = '+')
  formula <- paste(base_vars_h,
                   stat_hitter_t_1[[i]],
                   sep = " + ")

  print("First two years")
  h_m_pooled_i <- plm(formula, data = hitter_first_two,
                      model = "pooling",
                      index = c("id", "Anio_ref"))

  my_lm_cluster_i <- coeftest(h_m_pooled_i,
                              vcov = vcovHC(h_m_pooled_i,
                                            type = "HC1",
                                            cluster = "group"))
  print(my_lm_cluster_i)

  print("Remaining years")
  h_m_pooled_f <- plm(formula, data = hitter_remaining,
                      model = "pooling",
                      index = c("id", "Anio_ref"))

  my_lm_cluster_f <- coeftest(h_m_pooled_f,
                              vcov = vcovHC(h_m_pooled_f,
                                            type = "HC1",
                                            cluster = "group"))

  print(my_lm_cluster_f)

  print("Test")
  print(phtest(h_m_pooled_i,h_m_pooled_f))
}
```

```
[1] "First two years"

t test of coefficients:

                      Estimate  Std. Error t value Pr(>|t|)
(Intercept)          0.31987144  0.14523097  2.2025  0.02851 *
Edad_t              -0.01142930  0.00458768 -2.4913  0.01335 *
Anios_de_contrato_t  0.00027683  0.01010340  0.0274  0.97816
team_num_t           0.00072107  0.00105077  0.6862  0.49318
X_At_bats_t         -0.00154096  0.00102712 -1.5003  0.13476
```

```
X_At_bats_t_1       -0.00081375  0.00099950 -0.8142  0.41630
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years"

t test of coefficients:

                      Estimate  Std. Error t value Pr(>|t|)
(Intercept)          0.14730014  0.15070693  0.9774  0.33112
Edad_t              -0.00599500  0.00420692 -1.4250  0.15777
Anios_de_contrato_t -0.00404358  0.02639353 -0.1532  0.87860
team_num_t           0.00327754  0.00194174  1.6879  0.09505 .
X_At_bats_t          0.00267821  0.00197190  1.3582  0.17796
X_At_bats_t_1        0.00020167  0.00172089  0.1172  0.90698
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Test"

    Hausman Test

data:  formula
chisq = 291.74, df = 5, p-value < 2.2e-16
alternative hypothesis: one model is inconsistent

[1] "First two years"

t test of coefficients:

                      Estimate  Std. Error t value Pr(>|t|)
(Intercept)          0.30188822  0.15285998  1.9749  0.04933 *
Edad_t              -0.01082992  0.00471676 -2.2960  0.02247 *
Anios_de_contrato_t -0.00101770  0.01050160 -0.0969  0.92287
team_num_t           0.00041028  0.00107700  0.3809  0.70356
X_Bateos_2_t        -0.00030350  0.00021461 -1.4142  0.15849
X_Bateos_2_t_1       0.00020514  0.00015597  1.3153  0.18958
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years"

t test of coefficients:

                      Estimate  Std. Error t value Pr(>|t|)
(Intercept)          0.17828073  0.13120176  1.3588  0.17775
Edad_t              -0.00672895  0.00358246 -1.8783  0.06373 .
Anios_de_contrato_t -0.00586647  0.02462441 -0.2382  0.81226
team_num_t           0.00300668  0.00191489  1.5702  0.12005
X_Bateos_2_t         0.00075574  0.00045153  1.6737  0.09782 .
X_Bateos_2_t_1      -0.00043892  0.00033419 -1.3134  0.19254
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
[1] "Test"

    Hausman Test

data:  formula
chisq = 38.797, df = 5, p-value = 2.609e-07
alternative hypothesis: one model is inconsistent

[1] "First two years"

t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
(Intercept)          0.31347372  0.14430813  2.1723  0.03074 *
Edad_t              -0.01126375  0.00454911 -2.4760  0.01392 *
Anios_de_contrato_t -0.00063349  0.00982888 -0.0645  0.94866
team_num_t           0.00068738  0.00103293  0.6655  0.50634
X_Bateos_t          -0.00429642  0.00207194 -2.0736  0.03910 *
X_Bateos_t_1         0.00055317  0.00152007  0.3639  0.71622
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years"

t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
(Intercept)          0.13635211  0.14934646  0.9130   0.3638
Edad_t              -0.00548465  0.00412963 -1.3281   0.1877
Anios_de_contrato_t -0.00504398  0.02649388 -0.1904   0.8495
team_num_t           0.00315986  0.00188384  1.6774   0.0971 .
X_Bateos_t           0.00447501  0.00437194  1.0236   0.3089
X_Bateos_t_1         0.00067516  0.00384992  0.1754   0.8612
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Test"

    Hausman Test

data:  formula
chisq = 122.07, df = 5, p-value < 2.2e-16
alternative hypothesis: one model is inconsistent

[1] "First two years"

t test of coefficients:

                         Estimate  Std. Error t value Pr(>|t|)
(Intercept)            0.29321655  0.15683284  1.8696  0.06266 .
Edad_t                -0.01064808  0.00485561 -2.1929  0.02920 *
Anios_de_contrato_t   -0.00260374  0.00977477 -0.2664  0.79016
team_num_t             0.00062791  0.00116740  0.5379  0.59113
X_Bateos_promedio_t   -0.03837923  0.03289819 -1.1666  0.24444
```

```
X_Bateos_promedio_t_1  0.02445148  0.03446263  0.7095  0.47865
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years"

t test of coefficients:

                       Estimate Std. Error t value Pr(>|t|)
(Intercept)            0.0852613  0.1238838  0.6882   0.4932
Edad_t                -0.0042655  0.0031361 -1.3601   0.1773
Anios_de_contrato_t    0.0014179  0.0268797  0.0527   0.9581
team_num_t             0.0028365  0.0020149  1.4078   0.1628
X_Bateos_promedio_t   -0.0580572  0.0539308 -1.0765   0.2847
X_Bateos_promedio_t_1  0.0521408  0.0497778  1.0475   0.2978

[1] "Test"

    Hausman Test

data:  formula
chisq = 18.388, df = 5, p-value = 0.002498
alternative hypothesis: one model is inconsistent

[1] "First two years"

t test of coefficients:

                           Estimate  Std. Error t value Pr(>|t|)
(Intercept)              0.29606464  0.15641101  1.8929  0.05949 .
Edad_t                  -0.01064780  0.00488197 -2.1810  0.03008 *
Anios_de_contrato_t     -0.00386690  0.00953759 -0.4054  0.68549
team_num_t               0.00054558  0.00111551  0.4891  0.62519
X_Bateos_promedio_2_t   -0.05446068  0.04055500 -1.3429  0.18048
X_Bateos_promedio_2_t_1  0.03124875  0.03115844  1.0029  0.31684
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years"

t test of coefficients:

                          Estimate Std. Error t value Pr(>|t|)
(Intercept)              0.0288122  0.1414892  0.2036   0.8391
Edad_t                  -0.0028164  0.0036460 -0.7725   0.4420
Anios_de_contrato_t      0.0031189  0.0275668  0.1131   0.9102
team_num_t               0.0032685  0.0020243  1.6147   0.1100
X_Bateos_promedio_2_t   -0.0980410  0.0926342 -1.0584   0.2929
X_Bateos_promedio_2_t_1 -0.0205729  0.0320940 -0.6410   0.5232

[1] "Test"

    Hausman Test
```

```
data:  formula
chisq = 6.2366, df = 5, p-value = 0.2839
alternative hypothesis: one model is inconsistent

[1] "First two years"

t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
(Intercept)          0.31632007  0.14684827  2.1541  0.03215 *
Edad_t              -0.01119962  0.00466310 -2.4018  0.01702 *
Anios_de_contrato_t -0.00356675  0.00963777 -0.3701  0.71162
team_num_t           0.00047343  0.00105694  0.4479  0.65458
X_Home_runs_t       -0.00307117  0.00606612 -0.5063  0.61309
X_Home_runs_t_1      0.00277227  0.00363087  0.7635  0.44584
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years"

t test of coefficients:

                      Estimate Std. Error t value Pr(>|t|)
(Intercept)          0.1410351  0.1419252  0.9937  0.32314
Edad_t              -0.0047094  0.0034914 -1.3489  0.18092
Anios_de_contrato_t -0.0140764  0.0258543 -0.5445  0.58754
team_num_t           0.0026970  0.0020214  1.3342  0.18566
X_Home_runs_t        0.0165957  0.0112863  1.4704  0.14509
X_Home_runs_t_1      0.0148981  0.0072890  2.0439  0.04402 *
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Test"

    Hausman Test

data:  formula
chisq = 51.721, df = 5, p-value = 6.155e-10
alternative hypothesis: one model is inconsistent

[1] "First two years"

t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
(Intercept)          0.31994221  0.14729924  2.1721  0.03076 *
Edad_t              -0.01132553  0.00463143 -2.4454  0.01513 *
Anios_de_contrato_t -0.00380035  0.00978071 -0.3886  0.69792
team_num_t           0.00045396  0.00108151  0.4197  0.67502
X_Home_runs_2_t     -0.00084105  0.00125084 -0.6724  0.50193
X_Home_runs_2_t_1    0.00036018  0.00065770  0.5476  0.58441
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
[1] "Remaining years"

t test of coefficients:

                      Estimate Std. Error t value Pr(>|t|)
(Intercept)          0.0681184  0.1378340  0.4942  0.62242
Edad_t              -0.0039232  0.0034592 -1.1341  0.25989
Anios_de_contrato_t -0.0093067  0.0292648 -0.3180  0.75124
team_num_t           0.0032417  0.0020168  1.6073  0.11165
X_Home_runs_2_t     -0.0033026  0.0057435 -0.5750  0.56679
X_Home_runs_2_t_1   -0.0024618  0.0014074 -1.7492  0.08383 .
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Test"

    Hausman Test

data:  formula
chisq = 23.4, df = 5, p-value = 0.000283
alternative hypothesis: one model is inconsistent

[1] "First two years"

t test of coefficients:

                          Estimate  Std. Error t value Pr(>|t|)
(Intercept)            0.32471700  0.14467138  2.2445  0.02564 *
Edad_t                -0.01153767  0.00457387 -2.5225  0.01225 *
Anios_de_contrato_t   -0.00051619  0.01003378 -0.0514  0.95901
team_num_t             0.00055115  0.00105836  0.5208  0.60298
X_Juegos_iniciados_t  -0.00331356  0.00185426 -1.7870  0.07510 .
X_Juegos_iniciados_t_1 -0.00146243  0.00193400 -0.7562  0.45023
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years"

t test of coefficients:

                          Estimate  Std. Error t value Pr(>|t|)
(Intercept)            1.3865e-01  1.5646e-01  0.8862   0.3780
Edad_t                -5.5405e-03  4.1618e-03 -1.3313   0.1866
Anios_de_contrato_t   -4.1911e-03  2.6990e-02 -0.1553   0.8770
team_num_t             3.1455e-03  1.9086e-03  1.6480   0.1030
X_Juegos_iniciados_t   4.2954e-03  4.2490e-03  1.0109   0.3149
X_Juegos_iniciados_t_1 -6.0371e-05  3.3546e-03 -0.0180   0.9857

[1] "Test"

    Hausman Test

data:  formula
chisq = 104.15, df = 5, p-value < 2.2e-16
```

```
alternative hypothesis: one model is inconsistent

[1] "First two years"

t test of coefficients:

                                      Estimate  Std. Error t value Pr(>|t|)
(Intercept)                           0.30149351  0.15690249  1.9215  0.05576
Edad_t                               -0.01066315  0.00488554 -2.1826  0.02996
Anios_de_contrato_t                  -0.00341236  0.00979889 -0.3482  0.72794
team_num_t                            0.00061337  0.00111641  0.5494  0.58320
X_Porcentaje_On_base_plus_slugging_t  -0.03298685  0.02323284 -1.4198  0.15685
X_Porcentaje_On_base_plus_slugging_t_1  0.01184361  0.02672083  0.4432  0.65796

(Intercept)                          .
Edad_t                               *
Anios_de_contrato_t
team_num_t
X_Porcentaje_On_base_plus_slugging_t
X_Porcentaje_On_base_plus_slugging_t_1
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years"

t test of coefficients:

                                      Estimate  Std. Error t value Pr(>|t|)
(Intercept)                           0.07117156  0.13304896  0.5349  0.59408
Edad_t                               -0.00361898  0.00355288 -1.0186  0.31125
Anios_de_contrato_t                  -0.00049689  0.02714227 -0.0183  0.98544
team_num_t                            0.00334621  0.00183787  1.8207  0.07213
X_Porcentaje_On_base_plus_slugging_t  -0.00617295  0.03776486 -0.1635  0.87054
X_Porcentaje_On_base_plus_slugging_t_1 -0.02584499  0.03010099 -0.8586  0.39294

(Intercept)
Edad_t
Anios_de_contrato_t
team_num_t                           .
X_Porcentaje_On_base_plus_slugging_t
X_Porcentaje_On_base_plus_slugging_t_1
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Test"

    Hausman Test

data:  formula
chisq = 14.838, df = 5, p-value = 0.01108
alternative hypothesis: one model is inconsistent

[1] "First two years"
```

```
t test of coefficients:

                                       Estimate Std. Error t value Pr(>|t|)
(Intercept)                           0.2684011  0.1544540  1.7377  0.08344
Edad_t                               -0.0097977  0.0048424 -2.0233  0.04407
Anios_de_contrato_t                  -0.0018433  0.0095123 -0.1938  0.84650
team_num_t                            0.0003521  0.0010848  0.3246  0.74576
X_Porcentaje_On_base_plus_slugging_2_t   -0.0355895  0.0175920 -2.0231  0.04409
X_Porcentaje_On_base_plus_slugging_2_t_1  0.0173304  0.0181510  0.9548  0.34057

(Intercept)                           .
Edad_t                                *
Anios_de_contrato_t
team_num_t
X_Porcentaje_On_base_plus_slugging_2_t   *
X_Porcentaje_On_base_plus_slugging_2_t_1
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years"

t test of coefficients:

                                         Estimate  Std. Error t value
(Intercept)                           0.06838681  0.13565817  0.5041
Edad_t                               -0.00371040  0.00362710 -1.0230
Anios_de_contrato_t                   0.00048664  0.02686852  0.0181
team_num_t                            0.00308247  0.00198960  1.5493
X_Porcentaje_On_base_plus_slugging_2_t   -0.02477077  0.03286874 -0.7536
X_Porcentaje_On_base_plus_slugging_2_t_1  0.00234311  0.02453717  0.0955
                                      Pr(>|t|)
(Intercept)                             0.6155
Edad_t                                  0.3092
Anios_de_contrato_t                     0.9856
team_num_t                              0.1250
X_Porcentaje_On_base_plus_slugging_2_t     0.4531
X_Porcentaje_On_base_plus_slugging_2_t_1   0.9241

[1] "Test"

    Hausman Test

data:  formula
chisq = 11.515, df = 5, p-value = 0.04207
alternative hypothesis: one model is inconsistent

[1] "First two years"

t test of coefficients:

                           Estimate  Std. Error t value Pr(>|t|)
(Intercept)              0.30232327  0.15470149  1.9542  0.05175 .
Edad_t                  -0.01072314  0.00483320 -2.2186  0.02737 *
Anios_de_contrato_t     -0.00388515  0.00973040 -0.3993  0.69001
```

```
team_num_t                0.00061313  0.00113579  0.5398  0.58978
X_Porcentaje_on_base_t   -0.04470377  0.03665127 -1.2197  0.22368
X_Porcentaje_on_base_t_1  0.02294832  0.03561703  0.6443  0.51994
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years"

t test of coefficients:

                          Estimate Std. Error t value Pr(>|t|)
(Intercept)               0.0818900  0.1272504  0.6435   0.5216
Edad_t                   -0.0039586  0.0031959 -1.2387   0.2188
Anios_de_contrato_t       0.0024471  0.0271205  0.0902   0.9283
team_num_t                0.0027073  0.0019520  1.3870   0.1690
X_Porcentaje_on_base_t   -0.0775607  0.0531740 -1.4586   0.1483
X_Porcentaje_on_base_t_1  0.0415942  0.0461152  0.9020   0.3696

[1] "Test"

    Hausman Test

data:  formula
chisq = 18.536, df = 5, p-value = 0.002345
alternative hypothesis: one model is inconsistent

[1] "First two years"

t test of coefficients:

                            Estimate  Std. Error t value Pr(>|t|)
(Intercept)                0.28918773  0.15087207  1.9168  0.05636 .
Edad_t                    -0.01037902  0.00472822 -2.1951  0.02904 *
Anios_de_contrato_t       -0.00366093  0.00951904 -0.3846  0.70086
team_num_t                 0.00046207  0.00109248  0.4230  0.67268
X_Porcentaje_on_base_2_t  -0.06093972  0.03823522 -1.5938  0.11219
X_Porcentaje_on_base_2_t_1 0.02394015  0.03694036  0.6481  0.51751
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years"

t test of coefficients:

                            Estimate  Std. Error t value Pr(>|t|)
(Intercept)                0.03741362  0.13881392  0.2695   0.7882
Edad_t                    -0.00286543  0.00351604 -0.8150   0.4173
Anios_de_contrato_t        0.00046358  0.02651302  0.0175   0.9861
team_num_t                 0.00331134  0.00202245  1.6373   0.1052
X_Porcentaje_on_base_2_t  -0.08504227  0.07208600 -1.1797   0.2414
X_Porcentaje_on_base_2_t_1 -0.01830338  0.04193248 -0.4365   0.6636

[1] "Test"
```

```
    Hausman Test

data:  formula
chisq = 20.184, df = 5, p-value = 0.001154
alternative hypothesis: one model is inconsistent

[1] "First two years"

t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
(Intercept)          0.31634378  0.14505258  2.1809  0.03009 *
Edad_t              -0.01135265  0.00461255 -2.4613  0.01450 *
Anios_de_contrato_t -0.00048132  0.00986264 -0.0488  0.96111
team_num_t           0.00073130  0.00105239  0.6949  0.48774
X_Runs_batted_in_t  -0.00605259  0.00262587 -2.3050  0.02196 *
X_Runs_batted_in_t_1 0.00094812  0.00241121  0.3932  0.69448
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years"

t test of coefficients:

                      Estimate Std. Error t value Pr(>|t|)
(Intercept)          0.1703360  0.1419949  1.1996   0.2336
Edad_t              -0.0057854  0.0038653 -1.4968   0.1381
Anios_de_contrato_t -0.0128000  0.0286612 -0.4466   0.6563
team_num_t           0.0026426  0.0019818  1.3334   0.1859
X_Runs_batted_in_t   0.0079366  0.0048786  1.6268   0.1074
X_Runs_batted_in_t_1 0.0034340  0.0047955  0.7161   0.4759

[1] "Test"

    Hausman Test

data:  formula
chisq = 85.854, df = 5, p-value < 2.2e-16
alternative hypothesis: one model is inconsistent

[1] "First two years"

t test of coefficients:

                      Estimate  Std. Error t value Pr(>|t|)
(Intercept)          3.0982e-01  1.4592e-01  2.1232  0.03468 *
Edad_t              -1.0758e-02  4.5752e-03 -2.3513  0.01946 *
Anios_de_contrato_t -6.1774e-03  9.6828e-03 -0.6380  0.52405
team_num_t           9.3989e-05  1.1015e-03  0.0853  0.93206
X_Triples_t         -1.8993e-02  1.2810e-02 -1.4826  0.13938
X_Triples_t_1        2.0595e-02  8.1569e-03  2.5249  0.01217 *
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
[1] "Remaining years"

t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
(Intercept)          0.06916899  0.13771173  0.5023   0.6168
Edad_t              -0.00380961  0.00312500 -1.2191   0.2261
Anios_de_contrato_t -0.00077724  0.02803263 -0.0277   0.9779
team_num_t           0.00314647  0.00238553  1.3190   0.1907
X_Triples_t         -0.00232887  0.04067589 -0.0573   0.9545
X_Triples_t_1       -0.00082021  0.04017898 -0.0204   0.9838

[1] "Test"

    Hausman Test

data:  formula
chisq = 14.274, df = 5, p-value = 0.01396
alternative hypothesis: one model is inconsistent

[1] "First two years"

t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
(Intercept)          0.30816783  0.14934341  2.0635  0.04006 *
Edad_t              -0.01097404  0.00468418 -2.3428  0.01989 *
Anios_de_contrato_t -0.00370276  0.00980100 -0.3778  0.70589
team_num_t           0.00045251  0.00107554  0.4207  0.67430
X_Triples_2_t       -0.00437951  0.00583587 -0.7504  0.45366
X_Triples_2_t_1      0.00089294  0.00101355  0.8810  0.37913
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years"

t test of coefficients:

                        Estimate Std. Error t value Pr(>|t|)
(Intercept)           0.0967328  0.1344780  0.7193  0.47389
Edad_t               -0.0046118  0.0036579 -1.2608  0.21080
Anios_de_contrato_t   0.0020857  0.0240599  0.0867  0.93112
team_num_t            0.0038358  0.0020453  1.8755  0.06412 .
X_Triples_2_t         0.0238109  0.0244576  0.9736  0.33301
X_Triples_2_t_1       0.0137121  0.0158782  0.8636  0.39022
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Test"

    Hausman Test

data:  formula
chisq = 26.818, df = 5, p-value = 6.189e-05
```

```
alternative hypothesis: one model is inconsistent

[1] "First two years"

t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
(Intercept)          0.37207262  0.14542401  2.5585 0.011079 *
Edad_t              -0.01235171  0.00452315 -2.7308 0.006751 **
Anios_de_contrato_t -0.00779076  0.00979659 -0.7953 0.427192
team_num_t           0.00061654  0.00107343  0.5744 0.566218
X_WAR_t              0.01990356  0.01055225  1.8862 0.060384 .
X_WAR_t_1            0.02808942  0.01059157  2.6521 0.008492 **
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years"

t test of coefficients:

                      Estimate Std. Error t value Pr(>|t|)
(Intercept)          0.2242695  0.1094238  2.0495 0.043455 *
Edad_t              -0.0069861  0.0029707 -2.3516 0.020977 *
Anios_de_contrato_t -0.0220169  0.0263060 -0.8370 0.404940
team_num_t           0.0031784  0.0018988  1.6739 0.097790 .
X_WAR_t              0.0611496  0.0208039  2.9393 0.004223 **
X_WAR_t_1            0.0123763  0.0234185  0.5285 0.598524
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Test"

    Hausman Test

data:  formula
chisq = 28.192, df = 5, p-value = 3.339e-05
alternative hypothesis: one model is inconsistent

[1] "First two years"

t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
(Intercept)          0.35258571  0.14322677  2.4617 0.014477 *
Edad_t              -0.01201630  0.00448379 -2.6799 0.007834 **
Anios_de_contrato_t -0.00072880  0.00980848 -0.0743 0.940826
team_num_t           0.00022896  0.00109831  0.2085 0.835028
X_WAR_2_t            0.00787258  0.00567263  1.3878 0.166381
X_WAR_2_t_1          0.01120367  0.00629310  1.7803 0.076193 .
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years"
```

```
t test of coefficients:

                      Estimate Std. Error t value Pr(>|t|)
(Intercept)          0.1253285  0.1236539  1.0135  0.31364
Edad_t              -0.0039160  0.0030775 -1.2725  0.20663
Anios_de_contrato_t -0.0224424  0.0248070 -0.9047  0.36816
team_num_t           0.0036112  0.0020755  1.7399  0.08545 .
X_WAR_2_t            0.0538542  0.0261271  2.0612  0.04230 *
X_WAR_2_t_1          0.0080703  0.0040447  1.9953  0.04918 *
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Test"

    Hausman Test

data:  formula
chisq = 43.473, df = 5, p-value = 2.963e-08
alternative hypothesis: one model is inconsistent
```

Starting pitcher

```r
# loop over the variables in var_hitter_list
for (i in 1:length(stat_fielder_t_1)){
  # run linear regression with grouped errors by country and robust errors
  base_vars_s  <- paste(vars_ms, stat_fielder_t[[i]],
                        sep = '+')
  formula <- paste(base_vars_s,
                   stat_fielder_t_1[[i]],
                   sep = " + ")

  print("First two years:")
  s_m_pooled_i <- plm(formula, data = starting_first_two,
                      model = "pooling",
                      index = c("id", "Anio_ref"))

  my_lm_cluster_i <- coeftest(s_m_pooled_i,
                              vcov = vcovHC(s_m_pooled_i,
                                            type = "HC1",
                                            cluster = "group"))
  print(my_lm_cluster_i)

  print("Remaining years:")
  s_m_pooled_f <- plm(formula, data = starting_remaining,
                      model = "pooling",
                      index = c("id", "Anio_ref"))

  my_lm_cluster_f <- coeftest(s_m_pooled_f,
                              vcov = vcovHC(s_m_pooled_f,
                                            type = "HC1",
                                            cluster = "group"))
  print(my_lm_cluster_f)
```

```
  print("Wu-Haussman test:")
  print(phtest(s_m_pooled_i,s_m_pooled_f))
}
```

```
[1] "First two years:"

t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
(Intercept)          2.8700e-01  2.7206e-01  1.0549   0.2940
Edad_t              -9.5022e-03  8.4705e-03 -1.1218   0.2646
Anios_de_contrato_t -5.1416e-03  2.0713e-02 -0.2482   0.8045
team_num_t           3.4229e-03  2.1789e-03  1.5709   0.1193
X_Bateos_2_t        -2.7050e-04  1.8511e-04 -1.4612   0.1470
X_Bateos_2_t_1      -5.5642e-05  1.4467e-04 -0.3846   0.7013

[1] "Remaining years:"

t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
(Intercept)          0.24506764  0.17847002  1.3732   0.1806
Edad_t              -0.01071122  0.00850852 -1.2589   0.2185
Anios_de_contrato_t -0.04344803  0.02714451 -1.6006   0.1207
team_num_t           0.00709261  0.00666537  1.0641   0.2964
X_Bateos_2_t         0.00029518  0.00026846  1.0995   0.2809
X_Bateos_2_t_1      -0.00034180  0.00028532 -1.1979   0.2410

[1] "Wu-Haussman test:"

    Hausman Test

data:  formula
chisq = 5.3622, df = 5, p-value = 0.3733
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
(Intercept)          0.35756475  0.26448113  1.3519   0.1794
Edad_t              -0.01123367  0.00839260 -1.3385   0.1837
Anios_de_contrato_t -0.01466934  0.02016518 -0.7275   0.4686
team_num_t           0.00330336  0.00230232  1.4348   0.1544
X_Bateos_t          -0.00162418  0.00322588 -0.5035   0.6157
X_Bateos_t_1         0.00027733  0.00209133  0.1326   0.8948

[1] "Remaining years:"

t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
```

```
(Intercept)          0.25884051  0.16321100  1.5859   0.1240
Edad_t              -0.01008568  0.00775768 -1.3001   0.2042
Anios_de_contrato_t -0.04081608  0.03070478 -1.3293   0.1945
team_num_t           0.00524180  0.00630233  0.8317   0.4126
X_Bateos_t           0.00086418  0.00259494  0.3330   0.7416
X_Bateos_t_1        -0.00160787  0.00441174 -0.3645   0.7183

[1] "Wu-Haussman test:"

    Hausman Test

data:  formula
chisq = 1.9892, df = 5, p-value = 0.8506
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                            Estimate  Std. Error t value Pr(>|t|)
(Intercept)               3.7803e-01  2.7771e-01  1.3612   0.1764
Edad_t                   -1.2109e-02  8.5668e-03 -1.4135   0.1606
Anios_de_contrato_t      -1.6226e-02  1.9589e-02 -0.8283   0.4094
team_num_t                3.7115e-03  2.2694e-03  1.6354   0.1050
X_Carreras_ganadas_2_t    8.7976e-06  3.9772e-04  0.0221   0.9824
X_Carreras_ganadas_2_t_1 -2.7851e-04  2.3990e-04 -1.1609   0.2484

[1] "Remaining years:"

t test of coefficients:

                            Estimate  Std. Error t value Pr(>|t|)
(Intercept)               0.24757770  0.18041774  1.3722  0.18088
Edad_t                   -0.01123425  0.00862307 -1.3028  0.20325
Anios_de_contrato_t      -0.03456701  0.03073905 -1.1245  0.27034
team_num_t                0.00743269  0.00671475  1.1069  0.27775
X_Carreras_ganadas_2_t    0.00094620  0.00042645  2.2188  0.03478 *
X_Carreras_ganadas_2_t_1 -0.00049648  0.00056196 -0.8835  0.38451
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Wu-Haussman test:"

    Hausman Test

data:  formula
chisq = 4.2456, df = 5, p-value = 0.5146
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                         Estimate  Std. Error t value Pr(>|t|)
```

```
(Intercept)             0.32371231  0.26371602  1.2275   0.2225
Edad_t                 -0.01006413  0.00827407 -1.2163   0.2267
Anios_de_contrato_t    -0.01094201  0.02003156 -0.5462   0.5861
team_num_t              0.00324539  0.00220397  1.4725   0.1440
X_Carreras_ganadas_t   -0.00515865  0.00319668 -1.6138   0.1097
X_Carreras_ganadas_t_1 -0.00047697  0.00246844 -0.1932   0.8472

[1] "Remaining years:"

t test of coefficients:

                        Estimate Std. Error t value Pr(>|t|)
(Intercept)             0.2525330  0.1802734  1.4008   0.1722
Edad_t                 -0.0100882  0.0083611 -1.2066   0.2377
Anios_de_contrato_t    -0.0370176  0.0307167 -1.2051   0.2382
team_num_t              0.0051114  0.0062714  0.8150   0.4219
X_Carreras_ganadas_t    0.0050281  0.0031391  1.6018   0.1204
X_Carreras_ganadas_t_1 -0.0024455  0.0061097 -0.4003   0.6920

[1] "Wu-Haussman test:"

    Hausman Test

data:  formula
chisq = 8.3969, df = 5, p-value = 0.1357
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                      Estimate Std. Error t value Pr(>|t|)
(Intercept)          0.3109878  0.2458543  1.2649  0.20878
Edad_t              -0.0100277  0.0077598 -1.2923  0.19918
Anios_de_contrato_t -0.0194643  0.0190659 -1.0209  0.30972
team_num_t           0.0032197  0.0022675  1.4200  0.15867
X_ERA_t             -0.0178296  0.0116631 -1.5287  0.12943
X_ERA_t_1           -0.0276995  0.0117426 -2.3589  0.02024 *
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                      Estimate Std. Error t value Pr(>|t|)
(Intercept)          0.2222896  0.1639536  1.3558   0.1860
Edad_t              -0.0099037  0.0071280 -1.3894   0.1757
Anios_de_contrato_t -0.0406506  0.0325337 -1.2495   0.2218
team_num_t           0.0068966  0.0063571  1.0849   0.2872
X_ERA_t             -0.0170586  0.0174091 -0.9799   0.3355
X_ERA_t_1           -0.0038484  0.0160073 -0.2404   0.8118

[1] "Wu-Haussman test:"
```

```
    Hausman Test

data:  formula
chisq = 3.526, df = 5, p-value = 0.6195
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                      Estimate Std. Error t value Pr(>|t|)
(Intercept)          0.3420787  0.2630701  1.3003   0.1964
Edad_t              -0.0107122  0.0082662 -1.2959   0.1979
Anios_de_contrato_t -0.0119069  0.0199617 -0.5965   0.5522
team_num_t           0.0034751  0.0022419  1.5501   0.1242
X_Carreras_t        -0.0038676  0.0033474 -1.1554   0.2506
X_Carreras_t_1      -0.0010640  0.0025845 -0.4117   0.6814

[1] "Remaining years:"

t test of coefficients:

                      Estimate Std. Error t value Pr(>|t|)
(Intercept)          0.2546994  0.1776313  1.4339   0.1627
Edad_t              -0.0102919  0.0081083 -1.2693   0.2148
Anios_de_contrato_t -0.0370621  0.0309779 -1.1964   0.2416
team_num_t           0.0053639  0.0060238  0.8904   0.3808
X_Carreras_t         0.0050315  0.0032169  1.5641   0.1290
X_Carreras_t_1      -0.0023200  0.0057803 -0.4014   0.6912

[1] "Wu-Haussman test:"

    Hausman Test

data:  formula
chisq = 7.7693, df = 5, p-value = 0.1694
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                        Estimate  Std. Error t value Pr(>|t|)
(Intercept)          3.6120e-01  2.6481e-01  1.3640  0.17557
Edad_t              -1.0968e-02  8.5098e-03 -1.2888  0.20037
Anios_de_contrato_t -2.1539e-02  1.8783e-02 -1.1467  0.25418
team_num_t           3.0952e-03  2.2334e-03  1.3859  0.16880
X_Comando_2_t        7.1962e-03  9.4561e-03  0.7610  0.44841
X_Comando_2_t_1     -8.3582e-06  4.1078e-06 -2.0347  0.04447 *
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"
```

```
t test of coefficients:

                      Estimate Std. Error t value Pr(>|t|)
(Intercept)          0.0998183  0.1777046  0.5617 0.578783
Edad_t              -0.0050429  0.0072536 -0.6952 0.492648
Anios_de_contrato_t -0.0620103  0.0328279 -1.8890 0.069297 .
team_num_t           0.0045198  0.0053485  0.8451 0.405237
X_Comando_2_t       -0.0638854  0.0198964 -3.2109 0.003312 **
X_Comando_2_t_1      0.0267105  0.0170556  1.5661 0.128563
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Wu-Haussman test:"

    Hausman Test

data:  formula
chisq = 15.214, df = 5, p-value = 0.009487
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
(Intercept)          0.36127171  0.26301884  1.3736   0.1726
Edad_t              -0.01122234  0.00851124 -1.3185   0.1903
Anios_de_contrato_t -0.01836422  0.01947405 -0.9430   0.3479
team_num_t           0.00310724  0.00235631  1.3187   0.1902
X_Comando_t          0.00604963  0.01866001  0.3242   0.7464
X_Comando_t_1       -0.00097940  0.00052463 -1.8668   0.0648 .
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                      Estimate Std. Error t value Pr(>|t|)
(Intercept)          0.1188744  0.2239091  0.5309   0.5997
Edad_t              -0.0071638  0.0080700 -0.8877   0.3823
Anios_de_contrato_t -0.0229956  0.0310355 -0.7409   0.4649
team_num_t           0.0044333  0.0068493  0.6473   0.5227
X_Comando_t         -0.0097219  0.0456972 -0.2127   0.8331
X_Comando_t_1       -0.0372180  0.0461817 -0.8059   0.4271

[1] "Wu-Haussman test:"

    Hausman Test

data:  formula
chisq = 3.4502, df = 5, p-value = 0.6309
alternative hypothesis: one model is inconsistent
```

```
[1] "First two years:"

t test of coefficients:

                      Estimate Std. Error t value  Pr(>|t|)
(Intercept)          0.3845436  0.2536226  1.5162   0.13256
Edad_t              -0.0137685  0.0077753 -1.7708   0.07958 .
Anios_de_contrato_t -0.0144392  0.0193903 -0.7447   0.45819
team_num_t           0.0039754  0.0020008  1.9869   0.04961 *
X_Control_2_t       -0.1457517  0.0811549 -1.7960   0.07546 .
X_Control_2_t_1     -0.1417980  0.0348448 -4.0694 9.311e-05 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                      Estimate Std. Error t value Pr(>|t|)
(Intercept)          0.2401011  0.1593083  1.5071  0.14297
Edad_t              -0.0115478  0.0072510 -1.5926  0.12248
Anios_de_contrato_t -0.0363650  0.0334394 -1.0875  0.28609
team_num_t           0.0086593  0.0072026  1.2023  0.23933
X_Control_2_t        0.3252313  0.1835700  1.7717  0.08733 .
X_Control_2_t_1     -0.3956826  0.3101286 -1.2759  0.21249
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Wu-Haussman test:"

    Hausman Test

data:  formula
chisq = 14.551, df = 5, p-value = 0.01246
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                      Estimate Std. Error t value Pr(>|t|)
(Intercept)          0.3425496  0.2390511  1.4330 0.154929
Edad_t              -0.0106132  0.0073004 -1.4538 0.149078
Anios_de_contrato_t -0.0218050  0.0203734 -1.0703 0.287024
team_num_t           0.0024380  0.0020893  1.1669 0.245976
X_Control_t          0.0592158  0.0549202  1.0782 0.283480
X_Control_t_1       -0.1090724  0.0404579 -2.6959 0.008212 **
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:
```

```
                      Estimate Std. Error t value Pr(>|t|)
(Intercept)          0.2147681  0.2028675  1.0587 0.298802
Edad_t              -0.0113061  0.0071720 -1.5764 0.126161
Anios_de_contrato_t -0.0315799  0.0331134 -0.9537 0.348402
team_num_t           0.0100935  0.0063879  1.5801 0.125317
X_Control_t          0.1943127  0.0614534  3.1620 0.003749 **
X_Control_t_1       -0.2052493  0.0826865 -2.4823 0.019321 *
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Wu-Haussman test:"

    Hausman Test

data:  formula
chisq = 12, df = 5, p-value = 0.03479
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                      Estimate Std. Error t value Pr(>|t|)
(Intercept)          0.3121725  0.2449260  1.2746 0.205362
Edad_t              -0.0085098  0.0076236 -1.1163 0.266936
Anios_de_contrato_t -0.0215719  0.0190553 -1.1321 0.260260
team_num_t           0.0027516  0.0019719  1.3954 0.165940
X_Dominio_2_t        0.0270780  0.0457841  0.5914 0.555541
X_Dominio_2_t_1      0.0841709  0.0309297  2.7214 0.007646 **
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                      Estimate Std. Error t value Pr(>|t|)
(Intercept)          0.1053775  0.1488725  0.7078   0.4849
Edad_t              -0.0075183  0.0046884 -1.6036   0.1200
Anios_de_contrato_t -0.0324852  0.0305797 -1.0623   0.2972
team_num_t           0.0083579  0.0073294  1.1403   0.2638
X_Dominio_2_t       -0.0689065  0.0650370 -1.0595   0.2984
X_Dominio_2_t_1      0.0723046  0.0695769  1.0392   0.3076

[1] "Wu-Haussman test:"

    Hausman Test

data:  formula
chisq = 5.7603, df = 5, p-value = 0.3302
alternative hypothesis: one model is inconsistent

[1] "First two years:"
```

```
t test of coefficients:

                      Estimate Std. Error t value Pr(>|t|)
(Intercept)          0.2660304  0.2459368  1.0817 0.281935
Edad_t              -0.0068633  0.0076810 -0.8935 0.373673
Anios_de_contrato_t -0.0209829  0.0187701 -1.1179 0.266241
team_num_t           0.0023338  0.0020911  1.1161 0.267007
X_Dominio_t          0.0074817  0.0328299  0.2279 0.820186
X_Dominio_t_1        0.0900548  0.0286905  3.1388 0.002218 **
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                      Estimate Std. Error t value Pr(>|t|)
(Intercept)          0.2273119  0.1608647  1.4131   0.1687
Edad_t              -0.0097930  0.0066193 -1.4794   0.1502
Anios_de_contrato_t -0.0383652  0.0284673 -1.3477   0.1886
team_num_t           0.0066644  0.0067549  0.9866   0.3323
X_Dominio_t         -0.0433258  0.1168704 -0.3707   0.7136
X_Dominio_t_1        0.0581360  0.1089741  0.5335   0.5979

[1] "Wu-Haussman test:"

    Hausman Test

data:  formula
chisq = 0.70579, df = 5, p-value = 0.9826
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                         Estimate  Std. Error t value Pr(>|t|)
(Intercept)             2.8411e-01  2.7108e-01  1.0481   0.2971
Edad_t                 -9.6592e-03  8.3555e-03 -1.1560   0.2504
Anios_de_contrato_t    -6.4909e-03  2.0975e-02 -0.3095   0.7576
team_num_t              3.5265e-03  2.1707e-03  1.6246   0.1073
X_Inning_pitched_2_t   -2.7214e-04  1.7909e-04 -1.5196   0.1317
X_Inning_pitched_2_t_1  6.6549e-05  1.2454e-04  0.5343   0.5943

[1] "Remaining years:"

t test of coefficients:

                         Estimate  Std. Error t value Pr(>|t|)
(Intercept)             0.26292284  0.19155425  1.3726   0.1808
Edad_t                 -0.01134186  0.00886877 -1.2789   0.2114
Anios_de_contrato_t    -0.03914017  0.03826813 -1.0228   0.3152
team_num_t              0.00744410  0.00676984  1.0996   0.2809
```

```
X_Inning_pitched_2_t    0.00031012  0.00028244  1.0980   0.2816
X_Inning_pitched_2_t_1 -0.00010829  0.00035320 -0.3066   0.7614

[1] "Wu-Haussman test:"

    Hausman Test

data:  formula
chisq = 5.2359, df = 5, p-value = 0.3878
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
(Intercept)           0.34790273  0.27849210  1.2492   0.2144
Edad_t               -0.01120603  0.00858943 -1.3046   0.1950
Anios_de_contrato_t  -0.01432717  0.02094771 -0.6839   0.4956
team_num_t            0.00344752  0.00218109  1.5806   0.1171
X_Inning_pitched_t   -0.00158432  0.00219486 -0.7218   0.4720
X_Inning_pitched_t_1  0.00076806  0.00203825  0.3768   0.7071

[1] "Remaining years:"

t test of coefficients:

                      Estimate Std. Error t value Pr(>|t|)
(Intercept)           0.2567539  0.1588624  1.6162   0.1173
Edad_t               -0.0100548  0.0073229 -1.3731   0.1806
Anios_de_contrato_t  -0.0371838  0.0304678 -1.2204   0.2325
team_num_t            0.0049790  0.0058914  0.8451   0.4052
X_Inning_pitched_t    0.0020510  0.0025117  0.8166   0.4211
X_Inning_pitched_t_1 -0.0037076  0.0041913 -0.8846   0.3839

[1] "Wu-Haussman test:"

    Hausman Test

data:  formula
chisq = 6.246, df = 5, p-value = 0.283
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
(Intercept)           0.34330108  0.25666116  1.3376  0.18401
Edad_t               -0.01060707  0.00805915 -1.3162  0.19107
Anios_de_contrato_t -0.01739701  0.01729305 -1.0060  0.31679
team_num_t            0.00292657  0.00209494  1.3970  0.16546
X_Losses_2_t         -0.00417773  0.00217864 -1.9176  0.05796 .
X_Losses_2_t_1        0.00092831  0.00188984  0.4912  0.62433
```

```
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                      Estimate Std. Error t value Pr(>|t|)
(Intercept)          0.2956222  0.1936657  1.5265   0.1381
Edad_t              -0.0117559  0.0082560 -1.4239   0.1655
Anios_de_contrato_t -0.0400027  0.0267759 -1.4940   0.1464
team_num_t           0.0070254  0.0057691  1.2178   0.2335
X_Losses_2_t         0.0088556  0.0062219  1.4233   0.1657
X_Losses_2_t_1      -0.0035174  0.0048725 -0.7219   0.4764

[1] "Wu-Haussman test:"

    Hausman Test

data:  formula
chisq = 8.1094, df = 5, p-value = 0.1503
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                      Estimate Std. Error t value Pr(>|t|)
(Intercept)          0.4185101  0.2752613  1.5204 0.131502
Edad_t              -0.0133141  0.0085094 -1.5646 0.120764
Anios_de_contrato_t -0.0176682  0.0197342 -0.8953 0.372731
team_num_t           0.0036838  0.0022588  1.6309 0.105997
X_Saves_2_t          0.2407646  0.1540063  1.5633 0.121069
X_Saves_2_t_1        0.0378239  0.0140393  2.6941 0.008253 **
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                      Estimate Std. Error t value Pr(>|t|)
(Intercept)          0.1979642  0.2851109  0.6943   0.4932
Edad_t              -0.0091439  0.0096265 -0.9499   0.3503
Anios_de_contrato_t -0.0353951  0.0338311 -1.0462   0.3044
team_num_t           0.0062945  0.0063606  0.9896   0.3308
X_Saves_2_t         -0.0499886  0.1291587 -0.3870   0.7017
X_Saves_2_t_1       -0.2178503  0.5125806 -0.4250   0.6741

[1] "Wu-Haussman test:"

    Hausman Test

data:  formula
```

```
chisq = 6.7347, df = 5, p-value = 0.2411
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                      Estimate Std. Error t value Pr(>|t|)
(Intercept)          0.4245852  0.2715588  1.5635  0.12103
Edad_t              -0.0135067  0.0084020 -1.6075  0.11103
Anios_de_contrato_t -0.0176935  0.0197102 -0.8977  0.37147
team_num_t           0.0037844  0.0022498  1.6821  0.09562 .
X_Saves_t            0.1207412  0.1022728  1.1806  0.24052
X_Saves_t_1          0.0966776  0.0435298  2.2209  0.02857 *
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                      Estimate Std. Error t value Pr(>|t|)
(Intercept)          0.1759483  0.2932423  0.6000   0.5533
Edad_t              -0.0086455  0.0096748 -0.8936   0.3791
Anios_de_contrato_t -0.0340626  0.0342357 -0.9949   0.3283
team_num_t           0.0063772  0.0063610  1.0025   0.3247
X_Saves_t           -0.0353169  0.0859117 -0.4111   0.6841
X_Saves_t_1         -0.1179294  0.2117992 -0.5568   0.5821

[1] "Wu-Haussman test:"

    Hausman Test

data:  formula
chisq = 3.6711, df = 5, p-value = 0.5977
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
(Intercept)          0.38314618  0.25021241  1.5313   0.1288
Edad_t              -0.01224097  0.00780162 -1.5690   0.1197
Anios_de_contrato_t -0.02033472  0.01790085 -1.1360   0.2586
team_num_t           0.00350877  0.00218498  1.6059   0.1114
X_Strike_outs_2_t   -0.00020183  0.00013785 -1.4641   0.1462
X_Strike_outs_2_t_1  0.00040162  0.00019627  2.0462   0.0433 *
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:
```

```
                       Estimate  Std. Error t value Pr(>|t|)
(Intercept)          2.4598e-01  1.9002e-01  1.2945   0.2061
Edad_t              -1.0276e-02  8.5162e-03 -1.2067   0.2376
Anios_de_contrato_t -4.5431e-02  4.0304e-02 -1.1272   0.2692
team_num_t           7.0936e-03  6.8747e-03  1.0318   0.3110
X_Strike_outs_2_t    3.0483e-04  2.5737e-04  1.1844   0.2462
X_Strike_outs_2_t_1  8.8342e-05  3.4235e-04  0.2580   0.7983

[1] "Wu-Haussman test:"

    Hausman Test

data:  formula
chisq = 5.469, df = 5, p-value = 0.3614
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
(Intercept)          3.8608e-01  2.6452e-01  1.4596   0.1475
Edad_t              -1.2304e-02  8.2137e-03 -1.4979   0.1372
Anios_de_contrato_t -2.0909e-02  2.0165e-02 -1.0369   0.3022
team_num_t           3.5946e-03  2.2998e-03  1.5630   0.1212
X_Strike_outs_t     -8.6573e-06  1.9662e-03 -0.0044   0.9965
X_Strike_outs_t_1    1.3601e-03  2.3782e-03  0.5719   0.5687

[1] "Remaining years:"

t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
(Intercept)          0.26487846  0.16965637  1.5613   0.1297
Edad_t              -0.01067003  0.00794304 -1.3433   0.1900
Anios_de_contrato_t -0.03995241  0.03924234 -1.0181   0.3173
team_num_t           0.00591650  0.00650791  0.9091   0.3710
X_Strike_outs_t      0.00081453  0.00299080  0.2723   0.7874
X_Strike_outs_t_1   -0.00040035  0.00423823 -0.0945   0.9254

[1] "Wu-Haussman test:"

    Hausman Test

data:  formula
chisq = 2.0286, df = 5, p-value = 0.8452
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
```

```
(Intercept)          0.43993460  0.25965658  1.6943  0.09326 .
Edad_t              -0.01334032  0.00806978 -1.6531  0.10138
Anios_de_contrato_t -0.02183295  0.01926176 -1.1335  0.25967
team_num_t           0.00277953  0.00227072  1.2241  0.22374
X_WAR_2_t            0.00027018  0.00563602  0.0479  0.96186
X_WAR_2_t_1          0.01064501  0.00502023  2.1204  0.03640 *
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                     Estimate Std. Error t value Pr(>|t|)
(Intercept)          0.1495296  0.1413088  1.0582  0.29902
Edad_t              -0.0093254  0.0071873 -1.2975  0.20505
Anios_de_contrato_t  0.0140768  0.0502983  0.2799  0.78164
team_num_t           0.0065544  0.0069463  0.9436  0.35346
X_WAR_2_t            0.0276989  0.0144129  1.9218  0.06486 .
X_WAR_2_t_1         -0.0154431  0.0081031 -1.9058  0.06699 .
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Wu-Haussman test:"

    Hausman Test

data:  formula
chisq = 25.4, df = 5, p-value = 0.0001166
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                     Estimate Std. Error t value Pr(>|t|)
(Intercept)          0.2492606  0.2404703  1.0366 0.302395
Edad_t              -0.0085538  0.0074068 -1.1549 0.250844
Anios_de_contrato_t -0.0203693  0.0211715 -0.9621 0.338271
team_num_t           0.0030743  0.0022470  1.3682 0.174262
X_WHIP_2_t          -0.0155421  0.0192075 -0.8092 0.420300
X_WHIP_2_t_1        -0.0540349  0.0165251 -3.2699 0.001468 **
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                     Estimate Std. Error t value Pr(>|t|)
(Intercept)          0.1940267  0.1493237  1.2994   0.2044
Edad_t              -0.0090588  0.0064391 -1.4068   0.1705
Anios_de_contrato_t -0.0375536  0.0335175 -1.1204   0.2721
team_num_t           0.0066606  0.0083649  0.7963   0.4326
```

```
X_WHIP_2_t           0.0166529  0.0272495  0.6111   0.5460
X_WHIP_2_t_1        -0.0425480  0.0417654 -1.0187   0.3170

[1] "Wu-Haussman test:"

    Hausman Test

data:  formula
chisq = 4.6179, df = 5, p-value = 0.4643
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                      Estimate Std. Error t value Pr(>|t|)
(Intercept)          0.3562805  0.2406199  1.4807  0.14177
Edad_t              -0.0112944  0.0074794 -1.5101  0.13412
Anios_de_contrato_t -0.0257566  0.0209654 -1.2285  0.22207
team_num_t           0.0036450  0.0020686  1.7620  0.08106 .
X_WHIP_t            -0.0114641  0.0181012 -0.6333  0.52794
X_WHIP_t_1          -0.0506375  0.0177836 -2.8474  0.00533 **
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                      Estimate Std. Error t value Pr(>|t|)
(Intercept)          0.2305513  0.1636400  1.4089   0.1699
Edad_t              -0.0101316  0.0071516 -1.4167   0.1676
Anios_de_contrato_t -0.0421933  0.0306032 -1.3787   0.1789
team_num_t           0.0074763  0.0078837  0.9483   0.3511
X_WHIP_t            -0.0121683  0.0333407 -0.3650   0.7179
X_WHIP_t_1          -0.0347182  0.0317709 -1.0928   0.2838

[1] "Wu-Haussman test:"

    Hausman Test

data:  formula
chisq = 2.2259, df = 5, p-value = 0.8171
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
(Intercept)          3.7901e-01  2.6361e-01  1.4378   0.1536
Edad_t              -1.2171e-02  8.2776e-03 -1.4704   0.1445
Anios_de_contrato_t -1.6200e-02  1.9285e-02 -0.8400   0.4029
team_num_t           3.6310e-03  2.2674e-03  1.6014   0.1124
```

```
X_Walks_2_t         -3.6354e-04  4.7899e-04 -0.7590   0.4496
X_Walks_2_t_1        5.2934e-05  4.6664e-04  0.1134   0.9099

[1] "Remaining years:"

t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
(Intercept)          0.23485965  0.18750014  1.2526   0.2207
Edad_t              -0.01006421  0.00822222 -1.2240   0.2311
Anios_de_contrato_t -0.04242335  0.03423245 -1.2393   0.2255
team_num_t           0.00764847  0.00631735  1.2107   0.2361
X_Walks_2_t          0.00127982  0.00080762  1.5847   0.1243
X_Walks_2_t_1        0.00042009  0.00069887  0.6011   0.5526

[1] "Wu-Haussman test:"

    Hausman Test

data:  formula
chisq = 4.2365, df = 5, p-value = 0.5159
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
(Intercept)          0.39946294  0.28258827  1.4136   0.1605
Edad_t              -0.01261794  0.00866479 -1.4562   0.1484
Anios_de_contrato_t -0.01735528  0.02056791 -0.8438   0.4008
team_num_t           0.00354513  0.00226580  1.5646   0.1208
X_Walks_t           -0.00021116  0.00469537 -0.0450   0.9642
X_Walks_t_1         -0.00249438  0.00444571 -0.5611   0.5760

[1] "Remaining years:"

t test of coefficients:

                       Estimate Std. Error t value Pr(>|t|)
(Intercept)          0.2769330  0.1800891  1.5378  0.13533
Edad_t              -0.0115725  0.0078929 -1.4662  0.15374
Anios_de_contrato_t -0.0540353  0.0421120 -1.2831  0.20997
team_num_t           0.0080545  0.0057687  1.3963  0.17361
X_Walks_t            0.0094141  0.0054377  1.7313  0.09441 .
X_Walks_t_1          0.0031620  0.0073146  0.4323  0.66884
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Wu-Haussman test:"

    Hausman Test

data:  formula
```

```
chisq = 4.8494, df = 5, p-value = 0.4345
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
(Intercept)          0.29489142  0.28051251  1.0513  0.29562
Edad_t              -0.00996618  0.00862314 -1.1557  0.25048
Anios_de_contrato_t -0.00670600  0.02137735 -0.3137  0.75439
team_num_t           0.00371036  0.00214342  1.7310  0.08647 .
X_Wins_t            -0.01252106  0.00858055 -1.4592  0.14757
X_Wins_t_1           0.00079702  0.00823950  0.0967  0.92313
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                       Estimate Std. Error t value Pr(>|t|)
(Intercept)          0.2684682  0.1807025  1.4857   0.1485
Edad_t              -0.0107746  0.0085463 -1.2607   0.2178
Anios_de_contrato_t -0.0432803  0.0367862 -1.1765   0.2493
team_num_t           0.0061292  0.0068060  0.9005   0.3755
X_Wins_t             0.0114629  0.0110883  1.0338   0.3101
X_Wins_t_1          -0.0056089  0.0163424 -0.3432   0.7340

[1] "Wu-Haussman test:"

    Hausman Test

data:  formula
chisq = 5.4521, df = 5, p-value = 0.3632
alternative hypothesis: one model is inconsistent
```

Efectos fijos

Bateadores

```
# loop over the variables in var_hitter_list
for (i in 1:length(stat_hitter_t_1)){
  # run linear regression with grouped errors by country and robust errors
  base_vars_h  <- paste(vars_fe, stat_hitter_t[[i]],
                        sep = '+')
  formula <- paste(base_vars_h,
                   stat_hitter_t_1[[i]],
                   sep = " + ")

  print("FIrst two years:")
  h_m_fix_ef_i <- plm(formula, data = hitter_first_two,
```

```
                      model = "within",
                      index = c("id", "Anio_ref"))

  my_lm_cluster_i <- coeftest(h_m_fix_ef_i,
                              vcov = vcovHC(h_m_fix_ef_i,
                                            type = "HC1",
                                            cluster = "group"))
  print(my_lm_cluster_i)

  print("Remaining years:")
  h_m_fix_ef_f <- plm(formula, data = hitter_remaining,
                      model = "within",
                      index = c("id", "Anio_ref"))

  my_lm_cluster_f <- coeftest(h_m_fix_ef_f,
                              vcov = vcovHC(h_m_fix_ef_f,
                                            type = "HC1",
                                            cluster = "group"))
  print(my_lm_cluster_f)

  print("Test:")
  print(phtest(h_m_fix_ef_i,h_m_fix_ef_f))
}
```

```
[1] "FIrst two years:"

t test of coefficients:

                      Estimate  Std. Error t value Pr(>|t|)
Edad_t               0.01085210  0.01275683  0.8507   0.3965
Anios_de_contrato_t -0.01926958  0.01183855 -1.6277   0.1060
team_num_t           0.00113269  0.00104013  1.0890   0.2782
X_At_bats_t          0.00076573  0.00099089  0.7728   0.4411
X_At_bats_t_1        0.00083397  0.00111096  0.7507   0.4542

[1] "Remaining years:"

t test of coefficients:

                      Estimate Std. Error t value  Pr(>|t|)
Edad_t              -0.0061771  0.0022714 -2.7195  0.009467 **
Anios_de_contrato_t -0.0538952  0.0056508 -9.5376 4.522e-12 ***
team_num_t           0.0041073  0.0029077  1.4125  0.165157
X_At_bats_t          0.0033884  0.0027023  1.2539  0.216807
X_At_bats_t_1        0.0015177  0.0019596  0.7745  0.442962
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Test:"

    Hausman Test

data:  formula
```

```
chisq = 1.5754, df = 5, p-value = 0.9042
alternative hypothesis: one model is inconsistent

[1] "FIrst two years:"

t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
Edad_t                6.5176e-03  1.1524e-02  0.5656   0.5727
Anios_de_contrato_t -1.8267e-02  1.2335e-02 -1.4808   0.1411
team_num_t            1.1068e-03  1.1016e-03  1.0047   0.3169
X_Bateos_2_t         -1.1909e-04  1.3425e-04 -0.8871   0.3767
X_Bateos_2_t_1        2.1914e-05  8.0046e-05  0.2738   0.7847

[1] "Remaining years:"

t test of coefficients:

                       Estimate  Std. Error t value  Pr(>|t|)
Edad_t               -7.1621e-03  2.3544e-03 -3.0420   0.00404 **
Anios_de_contrato_t -5.2005e-02  5.5234e-03 -9.4154 6.567e-12 ***
team_num_t            4.4210e-03  2.6643e-03  1.6594   0.10449
X_Bateos_2_t          5.0535e-04  4.6651e-04  1.0833   0.28487
X_Bateos_2_t_1       -4.1416e-05  6.0839e-04 -0.0681   0.94605
---
Signif. codes:  0 ’***’ 0.001 ’**’ 0.01 ’*’ 0.05 ’.’ 0.1 ’ ’ 1

[1] "Test:"

    Hausman Test

data:  formula
chisq = 2.5791, df = 5, p-value = 0.7645
alternative hypothesis: one model is inconsistent

[1] "FIrst two years:"

t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
Edad_t                0.00769492  0.01309665  0.5875   0.5579
Anios_de_contrato_t -0.01917402  0.01224564 -1.5658   0.1199
team_num_t            0.00112475  0.00103572  1.0860   0.2795
X_Bateos_t           -0.00021502  0.00124761 -0.1723   0.8634
X_Bateos_t_1          0.00089591  0.00186460  0.4805   0.6317

[1] "Remaining years:"

t test of coefficients:

                        Estimate Std. Error t value  Pr(>|t|)
Edad_t               -0.0068213  0.0019624 -3.4759  0.001196 **
Anios_de_contrato_t -0.0546364  0.0062602 -8.7276 5.537e-11 ***
team_num_t            0.0046123  0.0022962  2.0087  0.051030 .
```

```
X_Bateos_t           0.0049094  0.0051047  0.9617  0.341683
X_Bateos_t_1         0.0020265  0.0049268  0.4113  0.682926
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Test:"

    Hausman Test

data:  formula
chisq = 2.3761, df = 5, p-value = 0.795
alternative hypothesis: one model is inconsistent

[1] "FIrst two years:"

t test of coefficients:

                       Estimate Std. Error t value Pr(>|t|)
Edad_t                 0.0065041  0.0114368  0.5687  0.57055
Anios_de_contrato_t   -0.0206511  0.0127842 -1.6154  0.10870
team_num_t             0.0019730  0.0011079  1.7808  0.07731 .
X_Bateos_promedio_t    0.0499903  0.0270188  1.8502  0.06659 .
X_Bateos_promedio_t_1  0.0711151  0.0353618  2.0111  0.04642 *
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                       Estimate Std. Error  t value  Pr(>|t|)
Edad_t                -0.0072268  0.0013824  -5.2278 5.066e-06 ***
Anios_de_contrato_t   -0.0488923  0.0042269 -11.5670 1.222e-14 ***
team_num_t             0.0049191  0.0022065   2.2293    0.0312 *
X_Bateos_promedio_t   -0.0404609  0.0655607  -0.6172    0.5405
X_Bateos_promedio_t_1  0.0586468  0.0285614   2.0534    0.0463 *
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Test:"

    Hausman Test

data:  formula
chisq = 7.3955, df = 5, p-value = 0.1928
alternative hypothesis: one model is inconsistent

[1] "FIrst two years:"

t test of coefficients:

                         Estimate Std. Error t value Pr(>|t|)
Edad_t                  0.0069857  0.0112622  0.6203   0.5362
Anios_de_contrato_t    -0.0177184  0.0117087 -1.5133   0.1327
```

```
team_num_t               0.0010647  0.0010756  0.9899   0.3241
X_Bateos_promedio_2_t   -0.0203830  0.0702868 -0.2900   0.7723
X_Bateos_promedio_2_t_1  0.0411169  0.0323768  1.2699   0.2064

[1] "Remaining years:"

t test of coefficients:

                          Estimate Std. Error t value  Pr(>|t|)
Edad_t                  -0.0065528  0.0017909 -3.6590 0.0007007 ***
Anios_de_contrato_t     -0.0490806  0.0096875 -5.0664 8.579e-06 ***
team_num_t               0.0049377  0.0018500  2.6691 0.0107660 *
X_Bateos_promedio_2_t   -0.0281172  0.1113632 -0.2525 0.8019004
X_Bateos_promedio_2_t_1  0.0638705  0.0309458  2.0639 0.0452366 *
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Test:"

    Hausman Test

data:  formula
chisq = 0.77608, df = 5, p-value = 0.9785
alternative hypothesis: one model is inconsistent

[1] "FIrst two years:"

t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
Edad_t               0.00736978  0.01360984  0.5415   0.5891
Anios_de_contrato_t -0.01997187  0.01243181 -1.6065   0.1106
team_num_t           0.00097675  0.00102962  0.9487   0.3446
X_Home_runs_t        0.00305716  0.00607316  0.5034   0.6156
X_Home_runs_t_1      0.00186447  0.00466767  0.3994   0.6902

[1] "Remaining years:"

t test of coefficients:

                        Estimate Std. Error t value  Pr(>|t|)
Edad_t               -0.0067542  0.0016830 -4.0131 0.0002417 ***
Anios_de_contrato_t -0.0581530  0.0069811 -8.3300 1.946e-10 ***
team_num_t           0.0043575  0.0021128  2.0624 0.0453908 *
X_Home_runs_t        0.0241512  0.0094934  2.5440 0.0147269 *
X_Home_runs_t_1      0.0158679  0.0136097  1.1659 0.2502239
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Test:"

    Hausman Test

data:  formula
```

```
chisq = 5.0269, df = 5, p-value = 0.4126
alternative hypothesis: one model is inconsistent

[1] "FIrst two years:"

t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
Edad_t               0.00870964  0.01210481  0.7195   0.4731
Anios_de_contrato_t -0.01815836  0.01406736 -1.2908   0.1991
team_num_t           0.00113326  0.00105830  1.0708   0.2863
X_Home_runs_2_t     -0.00047063  0.00109103 -0.4314   0.6669
X_Home_runs_2_t_1    0.00081816  0.00095369  0.8579   0.3926

[1] "Remaining years:"

t test of coefficients:

                      Estimate Std. Error t value  Pr(>|t|)
Edad_t              -0.0072779  0.0016876 -4.3125 9.569e-05 ***
Anios_de_contrato_t -0.0515826  0.0083106 -6.2069 2.001e-07 ***
team_num_t           0.0054254  0.0020270  2.6766   0.01056 *
X_Home_runs_2_t      0.0057640  0.0033738  1.7084   0.09493 .
X_Home_runs_2_t_1    0.0065624  0.0042741  1.5354   0.13219
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Test:"

    Hausman Test

data:  formula
chisq = 3.0863, df = 5, p-value = 0.6867
alternative hypothesis: one model is inconsistent

[1] "FIrst two years:"

t test of coefficients:

                         Estimate Std. Error t value Pr(>|t|)
Edad_t                  0.0113113  0.0128882  0.8776   0.3818
Anios_de_contrato_t    -0.0193416  0.0118193 -1.6364   0.1042
team_num_t              0.0011585  0.0010479  1.1055   0.2710
X_Juegos_iniciados_t    0.0017839  0.0019468  0.9163   0.3612
X_Juegos_iniciados_t_1  0.0016693  0.0020368  0.8195   0.4140

[1] "Remaining years:"

t test of coefficients:

                        Estimate Std. Error t value  Pr(>|t|)
Edad_t                -0.0060432  0.0019156 -3.1547  0.002967 **
Anios_de_contrato_t   -0.0575710  0.0078353 -7.3476 4.645e-09 ***
team_num_t             0.0048217  0.0026330  1.8312  0.074168 .
```

```
X_Juegos_iniciados_t    0.0058445  0.0066141  0.8836  0.381923
X_Juegos_iniciados_t_1  0.0041391  0.0043852  0.9439  0.350626
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Test:"

    Hausman Test

data:  formula
chisq = 0.2255, df = 5, p-value = 0.9988
alternative hypothesis: one model is inconsistent

[1] "FIrst two years:"

t test of coefficients:

                                      Estimate Std. Error t value Pr(>|t|)
Edad_t                                0.0071578  0.0113666  0.6297  0.53000
Anios_de_contrato_t                  -0.0229829  0.0129745 -1.7714  0.07888 .
team_num_t                            0.0015471  0.0010557  1.4655  0.14524
X_Porcentaje_On_base_plus_slugging_t  0.0183822  0.0129198  1.4228  0.15723
X_Porcentaje_On_base_plus_slugging_t_1  0.0566358  0.0313944  1.8040  0.07358 .
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                                      Estimate Std. Error  t value  Pr(>|t|)
Edad_t                               -0.0068714  0.0016038  -4.2844 0.0001045
Anios_de_contrato_t                  -0.0504347  0.0035655 -14.1452 < 2.2e-16
team_num_t                            0.0054020  0.0019747   2.7355 0.0090850
X_Porcentaje_On_base_plus_slugging_t  0.0070696  0.0443403   0.1594 0.8740861
X_Porcentaje_On_base_plus_slugging_t_1 -0.0297127  0.0120993  -2.4557 0.0182787

Edad_t                               ***
Anios_de_contrato_t                  ***
team_num_t                           **
X_Porcentaje_On_base_plus_slugging_t
X_Porcentaje_On_base_plus_slugging_t_1 *
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Test:"

    Hausman Test

data:  formula
chisq = 42.17, df = 5, p-value = 5.443e-08
alternative hypothesis: one model is inconsistent

[1] "FIrst two years:"
```

```
t test of coefficients:

                                        Estimate  Std. Error t value
Edad_t                                0.00653833  0.01137889  0.5746
Anios_de_contrato_t                  -0.01705958  0.01220047 -1.3983
team_num_t                            0.00092737  0.00101592  0.9128
X_Porcentaje_On_base_plus_slugging_2_t  -0.01568707  0.03054817 -0.5135
X_Porcentaje_On_base_plus_slugging_2_t_1  0.01660688  0.01430663  1.1608
                                       Pr(>|t|)
Edad_t                                   0.5666
Anios_de_contrato_t                      0.1644
team_num_t                               0.3630
X_Porcentaje_On_base_plus_slugging_2_t     0.6085
X_Porcentaje_On_base_plus_slugging_2_t_1   0.2479

[1] "Remaining years:"

t test of coefficients:

                                        Estimate Std. Error t value
Edad_t                                -0.0072557  0.0015260 -4.7549
Anios_de_contrato_t                   -0.0489519  0.0088279 -5.5452
team_num_t                             0.0050024  0.0017629  2.8375
X_Porcentaje_On_base_plus_slugging_2_t   -0.0136979  0.0525383 -0.2607
X_Porcentaje_On_base_plus_slugging_2_t_1  0.0185039  0.0162667  1.1375
                                        Pr(>|t|)
Edad_t                                2.350e-05 ***
Anios_de_contrato_t                   1.787e-06 ***
team_num_t                             0.006971 **
X_Porcentaje_On_base_plus_slugging_2_t    0.795581
X_Porcentaje_On_base_plus_slugging_2_t_1  0.261764
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Test:"

    Hausman Test

data:  formula
chisq = 0.18998, df = 5, p-value = 0.9992
alternative hypothesis: one model is inconsistent

[1] "FIrst two years:"

t test of coefficients:

                           Estimate  Std. Error t value Pr(>|t|)
Edad_t                   0.00810853  0.01125323  0.7206  0.47250
Anios_de_contrato_t     -0.02332577  0.01262713 -1.8473  0.06702 .
team_num_t               0.00156920  0.00098563  1.5921  0.11383
X_Porcentaje_on_base_t    0.06063254  0.05003981  1.2117  0.22786
X_Porcentaje_on_base_t_1  0.09891093  0.04368450  2.2642  0.02524 *
---
```

```
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                          Estimate Std. Error t value  Pr(>|t|)
Edad_t                   -0.0069906  0.0011144 -6.2727 1.609e-07 ***
Anios_de_contrato_t      -0.0500779  0.0060298 -8.3051 2.107e-10 ***
team_num_t                0.0049944  0.0017467  2.8593  0.006584 **
X_Porcentaje_on_base_t   -0.0219686  0.0796496 -0.2758  0.784042
X_Porcentaje_on_base_t_1  0.0121768  0.0425289  0.2863  0.776041
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Test:"

    Hausman Test

data:  formula
chisq = 24.867, df = 5, p-value = 0.0001478
alternative hypothesis: one model is inconsistent

[1] "FIrst two years:"

t test of coefficients:

                            Estimate Std. Error t value Pr(>|t|)
Edad_t                     0.0093657  0.0113027  0.8286  0.40886
Anios_de_contrato_t       -0.0215180  0.0135503 -1.5880  0.11475
team_num_t                 0.0021767  0.0011741  1.8540  0.06604 .
X_Porcentaje_on_base_2_t   0.1583094  0.0754722  2.0976  0.03791 *
X_Porcentaje_on_base_2_t_1 0.0239370  0.0330092  0.7252  0.46968
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                            Estimate Std. Error t value  Pr(>|t|)
Edad_t                     -0.0062158  0.0020040 -3.1017  0.003433 **
Anios_de_contrato_t        -0.0494899  0.0060845 -8.1337 3.643e-10 ***
team_num_t                  0.0050542  0.0018919  2.6715  0.010698 *
X_Porcentaje_on_base_2_t   -0.0581268  0.0905666 -0.6418  0.524482
X_Porcentaje_on_base_2_t_1  0.0793163  0.0456661  1.7369  0.089739 .
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Test:"

    Hausman Test

data:  formula
```

```
chisq = 16.947, df = 5, p-value = 0.004601
alternative hypothesis: one model is inconsistent

[1] "FIrst two years:"

t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
Edad_t                0.00826290  0.01198635  0.6894   0.4918
Anios_de_contrato_t  -0.01796502  0.01235164 -1.4545   0.1483
team_num_t            0.00099354  0.00109381  0.9083   0.3654
X_Runs_batted_in_t   -0.00050641  0.00210475 -0.2406   0.8102
X_Runs_batted_in_t_1  0.00257853  0.00199247  1.2941   0.1979

[1] "Remaining years:"

t test of coefficients:

                       Estimate Std. Error t value  Pr(>|t|)
Edad_t               -0.0065060  0.0016628 -3.9127 0.0003281 ***
Anios_de_contrato_t  -0.0639936  0.0103444 -6.1863 2.142e-07 ***
team_num_t            0.0049049  0.0030188  1.6248 0.1116827
X_Runs_batted_in_t    0.0059317  0.0075660  0.7840 0.4374387
X_Runs_batted_in_t_1  0.0057225  0.0059122  0.9679 0.3386329
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Test:"

    Hausman Test

data:  formula
chisq = 2.2705, df = 5, p-value = 0.8106
alternative hypothesis: one model is inconsistent

[1] "FIrst two years:"

t test of coefficients:

                      Estimate Std. Error t value Pr(>|t|)
Edad_t               0.0064253  0.0120445  0.5335   0.5946
Anios_de_contrato_t -0.0179654  0.0123143 -1.4589   0.1470
team_num_t           0.0010629  0.0010749  0.9888   0.3246
X_Triples_t          0.0009743  0.0188512  0.0517   0.9589
X_Triples_t_1        0.0050622  0.0186038  0.2721   0.7860

[1] "Remaining years:"

t test of coefficients:

                      Estimate Std. Error t value  Pr(>|t|)
Edad_t               -0.0095720  0.0032110 -2.9810  0.004764 **
Anios_de_contrato_t -0.0663976  0.0123780 -5.3641 3.241e-06 ***
team_num_t           0.0027657  0.0015927  1.7364  0.089818 .
```

```
X_Triples_t         -0.0302100  0.0349322 -0.8648  0.392051
X_Triples_t_1        0.0488009  0.0240656  2.0278  0.048953 *
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Test:"

    Hausman Test

data:  formula
chisq = 9.6581, df = 5, p-value = 0.08552
alternative hypothesis: one model is inconsistent

[1] "FIrst two years:"

t test of coefficients:

                      Estimate Std. Error t value Pr(>|t|)
Edad_t               0.0064708  0.0120917  0.5351   0.5935
Anios_de_contrato_t -0.0173641  0.0121441 -1.4298   0.1552
team_num_t           0.0011127  0.0010719  1.0381   0.3012
X_Triples_2_t        0.0022922  0.0055760  0.4111   0.6817
X_Triples_2_t_1      0.0037993  0.0070515  0.5388   0.5910

[1] "Remaining years:"

t test of coefficients:

                       Estimate  Std. Error t value  Pr(>|t|)
Edad_t              -0.00984641  0.00186891 -5.2685 4.434e-06 ***
Anios_de_contrato_t  0.00086173  0.01425215  0.0605    0.9521
team_num_t           0.00503669  0.00096429  5.2232 5.143e-06 ***
X_Triples_2_t        0.09655190  0.02005371  4.8147 1.939e-05 ***
X_Triples_2_t_1      0.03044178  0.00426720  7.1339 9.359e-09 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Test:"

    Hausman Test

data:  formula
chisq = 43.387, df = 5, p-value = 3.085e-08
alternative hypothesis: one model is inconsistent

[1] "FIrst two years:"

t test of coefficients:

                      Estimate Std. Error t value Pr(>|t|)
Edad_t               0.0032737  0.0107933  0.3033  0.76215
Anios_de_contrato_t -0.0241583  0.0132027 -1.8298  0.06961 .
team_num_t           0.0011902  0.0010145  1.1732  0.24289
X_WAR_t              0.0202092  0.0103946  1.9442  0.05406 .
```

```
X_WAR_t_1            0.0085343  0.0129989  0.6565  0.51266
---
Signif. codes:  0 ’***’ 0.001 ’**’ 0.01 ’*’ 0.05 ’.’ 0.1 ’ ’ 1

[1] "Remaining years:"

t test of coefficients:

                      Estimate Std. Error t value  Pr(>|t|)
Edad_t              -0.0083968  0.0011707 -7.1728 8.237e-09 ***
Anios_de_contrato_t -0.0598277  0.0069111 -8.6567 6.920e-11 ***
team_num_t           0.0058438  0.0017590  3.3223  0.001857 **
X_WAR_t              0.0484740  0.0139297  3.4799  0.001183 **
X_WAR_t_1           -0.0044059  0.0155238 -0.2838  0.777947
---
Signif. codes:  0 ’***’ 0.001 ’**’ 0.01 ’*’ 0.05 ’.’ 0.1 ’ ’ 1

[1] "Test:"

    Hausman Test

data:  formula
chisq = 4.1343, df = 5, p-value = 0.5302
alternative hypothesis: one model is inconsistent

[1] "FIrst two years:"

t test of coefficients:

                      Estimate Std. Error t value Pr(>|t|)
Edad_t               0.0052106  0.0099118  0.5257   0.6000
Anios_de_contrato_t -0.0196568  0.0147682 -1.3310   0.1855
team_num_t           0.0010460  0.0010962  0.9542   0.3418
X_WAR_2_t            0.0035656  0.0068616  0.5196   0.6042
X_WAR_2_t_1          0.0081163  0.0087898  0.9234   0.3575

[1] "Remaining years:"

t test of coefficients:

                      Estimate Std. Error t value  Pr(>|t|)
Edad_t              -0.0072651  0.0028342 -2.5634  0.014036 *
Anios_de_contrato_t -0.0633684  0.0080538 -7.8682 8.557e-10 ***
team_num_t           0.0048844  0.0021972  2.2230  0.031651 *
X_WAR_2_t            0.0507261  0.0184401  2.7509  0.008734 **
X_WAR_2_t_1         -0.0382331  0.0209460 -1.8253  0.075070 .
---
Signif. codes:  0 ’***’ 0.001 ’**’ 0.01 ’*’ 0.05 ’.’ 0.1 ’ ’ 1

[1] "Test:"

    Hausman Test

data:  formula
```

```
chisq = 11.99, df = 5, p-value = 0.03493
alternative hypothesis: one model is inconsistent
```

Starting pitcher

```
# loop over the variables in var_hitter_list
for (i in 1:length(stat_fielder_t_1)){
  # run linear regression with grouped errors by country and robust errors
  base_vars_s  <- paste(vars_fe, stat_fielder_t[[i]],
                        sep = '+')
  formula <- paste(base_vars_s,
                   stat_fielder_t_1[[i]],
                   sep = " + ")

  print("First two years:")
  s_m_fix_ef_i <- plm(formula, data = starting_first_two,
                      model = "within",
                      index = c("id", "Anio_ref"))

  my_lm_cluster_i <- coeftest(s_m_fix_ef_i,
                              vcov = vcovHC(s_m_fix_ef_i,
                                            type = "HC1",
                                            cluster = "group"))
  print(my_lm_cluster_i)

  print("Remaining years:")
  s_m_fix_ef_f <- plm(formula, data = starting_remaining,
                      model = "within",
                      index = c("id", "Anio_ref"))

  my_lm_cluster_f <- coeftest(s_m_fix_ef_f,
                              vcov = vcovHC(s_m_fix_ef_f,
                                            type = "HC1",
                                            cluster = "group"))
  print(my_lm_cluster_f)

  print("Test:")
  print(phtest(s_m_fix_ef_i,s_m_fix_ef_f))
}
```

```
[1] "First two years:"

t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
Edad_t              -3.9309e-03  2.2108e-02 -0.1778  0.85961
Anios_de_contrato_t  7.4626e-04  7.9620e-03  0.0937  0.92571
team_num_t           1.9394e-03  1.0598e-03  1.8299  0.07334 .
X_Bateos_2_t        -3.9965e-05  1.2141e-04 -0.3292  0.74342
X_Bateos_2_t_1       1.0082e-06  1.2309e-04  0.0082  0.99350
---
Signif. codes:  0 ’***’ 0.001 ’**’ 0.01 ’*’ 0.05 ’.’ 0.1 ’ ’ 1
```

```
[1] "Remaining years:"

t test of coefficients:

                      Estimate  Std. Error t value Pr(>|t|)
Edad_t               0.10815350  0.04161363  2.5990  0.02327 *
Anios_de_contrato_t  0.13965819  0.05611564  2.4888  0.02850 *
team_num_t           0.00251750  0.00420883  0.5981  0.56086
X_Bateos_2_t         0.00021275  0.00016662  1.2769  0.22580
X_Bateos_2_t_1      -0.00014767  0.00016629 -0.8880  0.39198
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Test:"

    Hausman Test

data:  formula
chisq = 1.5334, df = 5, p-value = 0.9092
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                      Estimate  Std. Error t value Pr(>|t|)
Edad_t              -0.00519214  0.01686372 -0.3079  0.75947
Anios_de_contrato_t -0.02010688  0.01110259 -1.8110  0.07627 .
team_num_t           0.00289588  0.00139917  2.0697  0.04377 *
X_Bateos_t           0.00575078  0.00296877  1.9371  0.05851 .
X_Bateos_t_1        -0.00013738  0.00155795 -0.0882  0.93009
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                     Estimate Std. Error t value Pr(>|t|)
Edad_t              0.0899411  0.0404328  2.2245 0.046068 *
Anios_de_contrato_t 0.1164616  0.0584362  1.9930 0.069507 .
team_num_t          0.0060914  0.0030076  2.0254 0.065663 .
X_Bateos_t          0.0023560  0.0013698  1.7200 0.111095
X_Bateos_t_1        0.0046256  0.0011524  4.0140 0.001718 **
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Test:"

    Hausman Test

data:  formula
chisq = 3.0464, df = 5, p-value = 0.6928
```

```
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                          Estimate  Std. Error t value Pr(>|t|)
Edad_t                  -0.00156220  0.02028282 -0.0770  0.93892
Anios_de_contrato_t     -0.00114373  0.00821026 -0.1393  0.88978
team_num_t               0.00198340  0.00106171  1.8681  0.06773 .
X_Carreras_ganadas_2_t  -0.00016747  0.00019988 -0.8378  0.40619
X_Carreras_ganadas_2_t_1  0.00015200  0.00020923  0.7265  0.47100
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                           Estimate  Std. Error t value Pr(>|t|)
Edad_t                   0.10669785  0.04597618  2.3207  0.03872 *
Anios_de_contrato_t      0.14306819  0.06191528  2.3107  0.03943 *
team_num_t               0.00207442  0.00465753  0.4454  0.66397
X_Carreras_ganadas_2_t   0.00047547  0.00033739  1.4093  0.18414
X_Carreras_ganadas_2_t_1 -0.00027580  0.00036935 -0.7467  0.46962
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Test:"

    Hausman Test

data:  formula
chisq = 61.753, df = 5, p-value = 5.275e-12
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                         Estimate  Std. Error t value Pr(>|t|)
Edad_t                  0.00182061  0.02050322  0.0888   0.9296
Anios_de_contrato_t    -0.00225087  0.00842306 -0.2672   0.7904
team_num_t              0.00154940  0.00108484  1.4282   0.1596
X_Carreras_ganadas_t    0.00091299  0.00196880  0.4637   0.6449
X_Carreras_ganadas_t_1  0.00349721  0.00208894  1.6742   0.1005

[1] "Remaining years:"

t test of coefficients:

                        Estimate Std. Error t value Pr(>|t|)
Edad_t                 0.1021075  0.0500920  2.0384  0.06417 .
Anios_de_contrato_t    0.1364507  0.0687923  1.9835  0.07067 .
```

```
team_num_t             0.0049277  0.0042568  1.1576  0.26954
X_Carreras_ganadas_t   0.0023612  0.0025984  0.9087  0.38140
X_Carreras_ganadas_t_1 0.0050062  0.0036983  1.3537  0.20079
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Test:"

    Hausman Test

data:  formula
chisq = 3.936, df = 5, p-value = 0.5587
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                      Estimate Std. Error t value Pr(>|t|)
Edad_t              -0.0019723  0.0171241 -0.1152  0.90878
Anios_de_contrato_t  0.0084636  0.0102158  0.8285  0.41142
team_num_t           0.0012465  0.0011088  1.1242  0.26640
X_ERA_t              0.0204660  0.0111707  1.8321  0.07301 .
X_ERA_t_1           -0.0120897  0.0094026 -1.2858  0.20456
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                      Estimate Std. Error t value Pr(>|t|)
Edad_t               0.1265084  0.0359913  3.5150 0.004263 **
Anios_de_contrato_t  0.1601742  0.0503137  3.1835 0.007870 **
team_num_t           0.0043731  0.0022522  1.9417 0.076018 .
X_ERA_t             -0.0249684  0.0130268 -1.9167 0.079395 .
X_ERA_t_1            0.0042584  0.0041763  1.0196 0.328012
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Test:"

    Hausman Test

data:  formula
chisq = 23.981, df = 5, p-value = 0.000219
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                      Estimate Std. Error t value Pr(>|t|)
Edad_t               0.0026922  0.0195093  0.1380   0.8908
```

```
Anios_de_contrato_t -0.0081282  0.0101622 -0.7999   0.4277
team_num_t           0.0017903  0.0011233  1.5937   0.1174
X_Carreras_t         0.0031456  0.0020392  1.5425   0.1294
X_Carreras_t_1       0.0034193  0.0020532  1.6654   0.1022

[1] "Remaining years:"

t test of coefficients:

                     Estimate Std. Error t value Pr(>|t|)
Edad_t              0.0948795  0.0505490  1.8770  0.08504 .
Anios_de_contrato_t 0.1240433  0.0680554  1.8227  0.09335 .
team_num_t          0.0026234  0.0039921  0.6571  0.52349
X_Carreras_t        0.0020747  0.0021318  0.9732  0.34966
X_Carreras_t_1      0.0019695  0.0041412  0.4756  0.64291
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Test:"

    Hausman Test

data:  formula
chisq = 5.0658, df = 5, p-value = 0.4079
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
Edad_t              -5.4959e-03  2.2148e-02 -0.2481  0.80506
Anios_de_contrato_t -8.3084e-05  7.5595e-03 -0.0110  0.99128
team_num_t           2.2943e-03  1.1769e-03  1.9495  0.05697 .
X_Comando_2_t       -3.3842e-03  6.9457e-03 -0.4872  0.62827
X_Comando_2_t_1      2.1171e-06  2.8585e-06  0.7406  0.46245
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                     Estimate Std. Error t value Pr(>|t|)
Edad_t              0.1027362  0.0574572  1.7880  0.09903 .
Anios_de_contrato_t 0.1122396  0.0908005  1.2361  0.24007
team_num_t          0.0031764  0.0037990  0.8361  0.41943
X_Comando_2_t       -0.0156315  0.0228484 -0.6841  0.50688
X_Comando_2_t_1      0.0108659  0.0108060  1.0055  0.33448
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Test:"
```

```
    Hausman Test

data:  formula
chisq = 5.1623, df = 5, p-value = 0.3964
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
Edad_t              -0.00139242  0.02207948 -0.0631   0.9500
Anios_de_contrato_t -0.00666729  0.00616610 -1.0813   0.2849
team_num_t           0.00170102  0.00123618  1.3760   0.1751
X_Comando_t          0.01675275  0.02808459  0.5965   0.5536
X_Comando_t_1        0.00030972  0.00025800  1.2005   0.2357

[1] "Remaining years:"

t test of coefficients:

                      Estimate  Std. Error t value Pr(>|t|)
Edad_t               0.11486873  0.04181886  2.7468  0.01771 *
Anios_de_contrato_t  0.14356493  0.05442652  2.6378  0.02166 *
team_num_t           0.00355510  0.00624652  0.5691  0.57976
X_Comando_t         -0.03570048  0.01457841 -2.4489  0.03066 *
X_Comando_t_1        0.00089091  0.04558300  0.0195  0.98473
---
Signif. codes:  0 ’***’ 0.001 ’**’ 0.01 ’*’ 0.05 ’.’ 0.1 ’ ’ 1

[1] "Test:"

    Hausman Test

data:  formula
chisq = 6.733, df = 5, p-value = 0.2413
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                      Estimate Std. Error t value Pr(>|t|)
Edad_t              -0.0030324  0.0196351 -0.1544  0.87790
Anios_de_contrato_t  0.0014295  0.0097087  0.1472  0.88355
team_num_t           0.0023583  0.0011122  2.1204  0.03906 *
X_Control_2_t       -0.0727305  0.0614896 -1.1828  0.24259
X_Control_2_t_1     -0.0436746  0.0230442 -1.8953  0.06397 .
---
Signif. codes:  0 ’***’ 0.001 ’**’ 0.01 ’*’ 0.05 ’.’ 0.1 ’ ’ 1

[1] "Remaining years:"

t test of coefficients:
```

```
                     Estimate Std. Error  t value  Pr(>|t|)
Edad_t               0.1017068  0.0271801   3.7420 0.0028119 **
Anios_de_contrato_t  0.1340844  0.0393846   3.4045 0.0052262 **
team_num_t           0.0052182  0.0027529   1.8955 0.0823626 .
X_Control_2_t        0.2665906  0.0572568   4.6561 0.0005546 ***
X_Control_2_t_1     -0.4566227  0.0410470 -11.1244  1.12e-07 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Test:"

    Hausman Test

data:  formula
chisq = 569.39, df = 5, p-value < 2.2e-16
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
Edad_t              -0.00058648  0.01750797 -0.0335  0.97341
Anios_de_contrato_t -0.00282521  0.00980674 -0.2881  0.77449
team_num_t           0.00214507  0.00108612  1.9750  0.05392 .
X_Control_t         -0.01769364  0.04050636 -0.4368  0.66417
X_Control_t_1       -0.06535029  0.04926847 -1.3264  0.19085
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                     Estimate Std. Error t value  Pr(>|t|)
Edad_t               0.0581387  0.0229668  2.5314  0.026350 *
Anios_de_contrato_t  0.0905063  0.0307469  2.9436  0.012290 *
team_num_t           0.0095284  0.0030399  3.1344  0.008621 **
X_Control_t         -0.0144748  0.0466647 -0.3102  0.761739
X_Control_t_1       -0.2595032  0.0437455 -5.9321 6.902e-05 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Test:"

    Hausman Test

data:  formula
chisq = 0.67473, df = 5, p-value = 0.9843
alternative hypothesis: one model is inconsistent

[1] "First two years:"
```

```
t test of coefficients:

                      Estimate Std. Error t value Pr(>|t|)
Edad_t               -0.0034780  0.0181805 -0.1913  0.84908
Anios_de_contrato_t  0.0041404  0.0096472  0.4292  0.66967
team_num_t           0.0025939  0.0013655  1.8996  0.06339 .
X_Dominio_2_t       -0.0201561  0.0372374 -0.5413  0.59076
X_Dominio_2_t_1      0.0282012  0.0148512  1.8989  0.06347 .
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                       Estimate  Std. Error  t value  Pr(>|t|)
Edad_t               0.01617020  0.01679816   0.9626   0.35474
Anios_de_contrato_t  0.00926354  0.02189206   0.4231   0.67967
team_num_t          -0.00082783  0.00148231  -0.5585   0.58679
X_Dominio_2_t        0.01299648  0.00718642   1.8085   0.09564 .
X_Dominio_2_t_1     -0.13518872  0.01106973 -12.2125 3.976e-08 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Test:"

    Hausman Test

data:  formula
chisq = 146.83, df = 5, p-value < 2.2e-16
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                      Estimate Std. Error t value Pr(>|t|)
Edad_t               -0.0045126  0.0192850 -0.2340  0.81597
Anios_de_contrato_t -0.0014610  0.0102332 -0.1428  0.88706
team_num_t           0.0021406  0.0012435  1.7214  0.09148 .
X_Dominio_t          0.0024601  0.0162843  0.1511  0.88054
X_Dominio_t_1        0.0169576  0.0201438  0.8418  0.40397
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                       Estimate  Std. Error t value  Pr(>|t|)
Edad_t               -0.01474616  0.00509724 -2.8930  0.013501 *
Anios_de_contrato_t -0.02008282  0.00673200 -2.9832  0.011418 *
team_num_t           0.00166902  0.00090309  1.8481  0.089369 .
X_Dominio_t         -0.06433797  0.01961102 -3.2807  0.006572 **
```

```
X_Dominio_t_1       -0.12168723  0.01347455 -9.0309 1.065e-06 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Test:"

    Hausman Test

data:  formula
chisq = 17.189, df = 5, p-value = 0.004155
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                         Estimate  Std. Error t value Pr(>|t|)
Edad_t                 -2.5887e-03  2.0655e-02 -0.1253  0.90077
Anios_de_contrato_t     6.2317e-04  8.3473e-03  0.0747  0.94079
team_num_t              2.0047e-03  1.0775e-03  1.8605  0.06882 .
X_Inning_pitched_2_t   -5.1394e-05  1.0459e-04 -0.4914  0.62535
X_Inning_pitched_2_t_1  5.1415e-05  1.1433e-04  0.4497  0.65489
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                        Estimate Std. Error t value Pr(>|t|)
Edad_t                0.10692009 0.05068721  2.1094  0.05659 .
Anios_de_contrato_t   0.12347670 0.07011279  1.7611  0.10365
team_num_t            0.00485320 0.00381735  1.2714  0.22769
X_Inning_pitched_2_t  0.00020812 0.00013542  1.5368  0.15029
X_Inning_pitched_2_t_1 0.00016391 0.00014962  1.0955  0.29478
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Test:"

    Hausman Test

data:  formula
chisq = 2.8544, df = 5, p-value = 0.7224
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
Edad_t               -0.00019827  0.01913106 -0.0104  0.99177
Anios_de_contrato_t   0.00151865  0.01100914  0.1379  0.89085
team_num_t            0.00214150  0.00109045  1.9639  0.05523 .
```

```
X_Inning_pitched_t   -0.00062855  0.00131084 -0.4795  0.63372
X_Inning_pitched_t_1  0.00241406  0.00141856  1.7018  0.09514 .
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                      Estimate Std. Error t value Pr(>|t|)
Edad_t               0.1228531  0.0565617  2.1720  0.05061 .
Anios_de_contrato_t  0.1496925  0.0761086  1.9668  0.07276 .
team_num_t           0.0048783  0.0042963  1.1355  0.27835
X_Inning_pitched_t   0.0023865  0.0011131  2.1441  0.05320 .
X_Inning_pitched_t_1 0.0025773  0.0015971  1.6137  0.13256
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Test:"

    Hausman Test

data:  formula
chisq = 66.645, df = 5, p-value = 5.106e-13
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
Edad_t              -0.00269711  0.01981983 -0.1361  0.89231
Anios_de_contrato_t -0.00062525  0.00939585 -0.0665  0.94721
team_num_t           0.00215900  0.00108521  1.9895  0.05224 .
X_Losses_2_t         0.00099054  0.00112267  0.8823  0.38192
X_Losses_2_t_1       0.00035639  0.00125195  0.2847  0.77710
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
Edad_t               0.11116120  0.05181250  2.1455  0.05307 .
Anios_de_contrato_t  0.14262292  0.07453681  1.9135  0.07984 .
team_num_t           0.00251046  0.00378382  0.6635  0.51957
X_Losses_2_t         0.00054811  0.00376627  0.1455  0.88671
X_Losses_2_t_1      -0.00209087  0.00442569 -0.4724  0.64509
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Test:"
```

```
    Hausman Test

data:  formula
chisq = 11.931, df = 5, p-value = 0.03574
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
Edad_t              -0.00429667  0.01966381 -0.2185  0.82794
Anios_de_contrato_t -0.00079581  0.00884885 -0.0899  0.92871
team_num_t           0.00219829  0.00114798  1.9149  0.06135 .
X_Saves_2_t          0.30106038  0.00544129 55.3288  < 2e-16 ***
X_Saves_2_t_1        0.01397887  0.01807287  0.7735  0.44296
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                     Estimate Std. Error t value  Pr(>|t|)
Edad_t              0.1050581  0.0468112  2.2443  0.044452 *
Anios_de_contrato_t 0.1321916  0.0648975  2.0369  0.064338 .
team_num_t          0.0019514  0.0028729  0.6792  0.509885
X_Saves_2_t         0.0672595  0.0033512 20.0705 1.339e-10 ***
X_Saves_2_t_1       0.2355337  0.0556533  4.2322  0.001164 **
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Test:"

    Hausman Test

data:  formula
chisq = 15.505, df = 5, p-value = 0.00841
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                       Estimate  Std. Error t value  Pr(>|t|)
Edad_t              -0.00412418  0.01998451 -0.2064   0.83736
Anios_de_contrato_t -0.00083126  0.00886983 -0.0937   0.92572
team_num_t           0.00215811  0.00114588  1.8834   0.06559 .
X_Saves_t            0.19066845  0.02134825  8.9313 7.464e-12 ***
X_Saves_t_1          0.01672501  0.03890673  0.4299   0.66917
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"
```

```
t test of coefficients:

                     Estimate Std. Error t value  Pr(>|t|)
Edad_t              0.1042710  0.0473861  2.2005   0.04810 *
Anios_de_contrato_t 0.1310634  0.0656455  1.9965   0.06907 .
team_num_t          0.0018814  0.0029130  0.6459   0.53052
X_Saves_t           0.0419781  0.0049245  8.5243 1.952e-06 ***
X_Saves_t_1         0.0658935  0.0448744  1.4684   0.16772
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Test:"

    Hausman Test

data:  formula
chisq = 17.197, df = 5, p-value = 0.00414
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
Edad_t              -1.3894e-03  1.8969e-02 -0.0732  0.94191
Anios_de_contrato_t  5.9092e-03  1.1885e-02  0.4972  0.62128
team_num_t           2.0619e-03  1.0316e-03  1.9987  0.05121 .
X_Strike_outs_2_t   -9.7220e-05  6.8651e-05 -1.4161  0.16306
X_Strike_outs_2_t_1 -3.5883e-05  1.2766e-04 -0.2811  0.77983
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                     Estimate Std. Error t value Pr(>|t|)
Edad_t              0.10838344 0.05273135  2.0554  0.06228 .
Anios_de_contrato_t 0.12721641 0.07413476  1.7160  0.11184
team_num_t          0.00432242 0.00343805  1.2572  0.23259
X_Strike_outs_2_t   0.00022265 0.00012183  1.8276  0.09257 .
X_Strike_outs_2_t_1 0.00015932 0.00010210  1.5605  0.14462
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Test:"

    Hausman Test

data:  formula
chisq = 17.555, df = 5, p-value = 0.00356
alternative hypothesis: one model is inconsistent
```

```
[1] "First two years:"

t test of coefficients:

                      Estimate Std. Error t value Pr(>|t|)
Edad_t              -0.0029788  0.0191112 -0.1559  0.87678
Anios_de_contrato_t -0.0087386  0.0122627 -0.7126  0.47947
team_num_t           0.0024396  0.0012518  1.9488  0.05705 .
X_Strike_outs_t      0.0015216  0.0013505  1.1267  0.26536
X_Strike_outs_t_1    0.0022655  0.0014572  1.5547  0.12645
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                      Estimate Std. Error t value Pr(>|t|)
Edad_t              0.12107603 0.05616024  2.1559  0.05209 .
Anios_de_contrato_t 0.13766446 0.07321252  1.8803  0.08455 .
team_num_t          0.00534182 0.00425621  1.2551  0.23335
X_Strike_outs_t     0.00248679 0.00092903  2.6768  0.02016 *
X_Strike_outs_t_1   0.00285245 0.00109618  2.6022  0.02313 *
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Test:"

    Hausman Test

data:  formula
chisq = 5.6217, df = 5, p-value = 0.3448
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                      Estimate Std. Error t value Pr(>|t|)
Edad_t              -0.0027500  0.0190677 -0.1442   0.8859
Anios_de_contrato_t  0.0014060  0.0103083  0.1364   0.8921
team_num_t           0.0021698  0.0011047  1.9641   0.0552 .
X_WAR_2_t           -0.0027869  0.0026353 -1.0575   0.2955
X_WAR_2_t_1         -0.0012710  0.0023414 -0.5428   0.5897
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                       Estimate  Std. Error t value  Pr(>|t|)
Edad_t               0.10053299  0.05129159  1.9600 0.0736287 .
Anios_de_contrato_t  0.14776511  0.08467021  1.7452 0.1064815
```

```
team_num_t           0.00073354  0.00242965  0.3019 0.7678868
X_WAR_2_t            0.04601652  0.00967787  4.7548 0.0004682 ***
X_WAR_2_t_1         -0.00887697  0.00387942 -2.2882 0.0410635 *
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Test:"

    Hausman Test

data:  formula
chisq = 13.086, df = 5, p-value = 0.02259
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                      Estimate Std. Error t value Pr(>|t|)
Edad_t               0.0065210  0.0181033  0.3602  0.72024
Anios_de_contrato_t  0.0079806  0.0098865  0.8072  0.42344
team_num_t           0.0019813  0.0011370  1.7426  0.08767 .
X_WHIP_2_t           0.0127789  0.0150110  0.8513  0.39874
X_WHIP_2_t_1        -0.0303827  0.0157399 -1.9303  0.05937 .
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                      Estimate Std. Error t value Pr(>|t|)
Edad_t               0.1198397  0.0353578  3.3893 0.005375 **
Anios_de_contrato_t  0.1531156  0.0477372  3.2075 0.007528 **
team_num_t           0.0036227  0.0031629  1.1454 0.274375
X_WHIP_2_t          -0.0052428  0.0482358 -0.1087 0.915245
X_WHIP_2_t_1        -0.0135992  0.0224233 -0.6065 0.555498
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Test:"

    Hausman Test

data:  formula
chisq = 9.2912, df = 5, p-value = 0.098
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                      Estimate Std. Error t value Pr(>|t|)
Edad_t               0.0027183  0.0180776  0.1504  0.88109
```

```
Anios_de_contrato_t  0.0034337  0.0079633  0.4312  0.66822
team_num_t           0.0018407  0.0011656  1.5792  0.12072
X_WHIP_t             0.0049603  0.0209288  0.2370  0.81364
X_WHIP_t_1          -0.0469906  0.0247700 -1.8971  0.06372 .
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                     Estimate Std. Error t value Pr(>|t|)
Edad_t               0.1114238  0.0369907  3.0122  0.01082 *
Anios_de_contrato_t  0.1402670  0.0520833  2.6931  0.01956 *
team_num_t           0.0026475  0.0028630  0.9247  0.37332
X_WHIP_t            -0.0051195  0.0396212 -0.1292  0.89933
X_WHIP_t_1          -0.0047093  0.0160699 -0.2930  0.77449
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Test:"

    Hausman Test

data:  formula
chisq = 14.55, df = 5, p-value = 0.01247
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
Edad_t               0.00026036  0.01794732  0.0145  0.98848
Anios_de_contrato_t -0.00091543  0.00908532 -0.1008  0.92015
team_num_t           0.00158008  0.00083385  1.8949  0.06401 .
X_Walks_2_t          0.00057358  0.00038128  1.5044  0.13891
X_Walks_2_t_1        0.00050504  0.00034736  1.4539  0.15234
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
Edad_t               0.09917616  0.05107590  1.9417  0.07601 .
Anios_de_contrato_t  0.12573861  0.07032799  1.7879  0.09905 .
team_num_t           0.00184608  0.00604267  0.3055  0.76521
X_Walks_2_t          0.00047044  0.00132261  0.3557  0.72824
X_Walks_2_t_1       -0.00024248  0.00113556 -0.2135  0.83450
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
[1] "Test:"

    Hausman Test

data:  formula
chisq = 17.659, df = 5, p-value = 0.003405
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                     Estimate Std. Error t value Pr(>|t|)
Edad_t              0.0028340  0.0193843  0.1462  0.88436
Anios_de_contrato_t 0.0014204  0.0119999  0.1184  0.90626
team_num_t          0.0014666  0.0011223  1.3068  0.19737
X_Walks_t           0.0048443  0.0032872  1.4737  0.14696
X_Walks_t_1         0.0059169  0.0030935  1.9127  0.06164 .
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                     Estimate Std. Error t value Pr(>|t|)
Edad_t              0.0944747  0.0486194  1.9431 0.075827 .
Anios_de_contrato_t 0.1039598  0.0660490  1.5740 0.141475
team_num_t          0.0066720  0.0037837  1.7634 0.103259
X_Walks_t           0.0018972  0.0038921  0.4874 0.634729
X_Walks_t_1         0.0086595  0.0020387  4.2475 0.001132 **
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Test:"

    Hausman Test

data:  formula
chisq = 22.669, df = 5, p-value = 0.0003904
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
Edad_t              -0.00251259  0.01986704 -0.1265  0.89988
Anios_de_contrato_t  0.00267724  0.01237909  0.2163  0.82967
team_num_t           0.00211117  0.00112475  1.8770  0.06648 .
X_Wins_t            -0.00381068  0.00648892 -0.5873  0.55973
X_Wins_t_1           0.00067196  0.00487952  0.1377  0.89103
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
[1] "Remaining years:"

t test of coefficients:

                     Estimate Std. Error t value Pr(>|t|)
Edad_t              0.1232421  0.0576084  2.1393 0.053657 .
Anios_de_contrato_t 0.1411987  0.0752565  1.8762 0.085149 .
team_num_t          0.0047617  0.0043126  1.1041 0.291180
X_Wins_t            0.0087277  0.0022352  3.9046 0.002093 **
X_Wins_t_1          0.0082421  0.0071513  1.1525 0.271547
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Test:"

    Hausman Test

data:  formula
chisq = 8.3385, df = 5, p-value = 0.1385
alternative hypothesis: one model is inconsistent
```

Efectos aleatorios

Bateadores

```
# loop over the variables in var_hitter_list
for (i in 1:length(stat_hitter_t_1)){
  # run linear regression with grouped errors by country and robust errors
  base_vars_h  <- paste(vars_ms, stat_hitter_t[[i]],
                        sep = '+')
  formula <- paste(base_vars_h,
                   stat_hitter_t_1[[i]],
                   sep = " + ")

  print("First two years:")
  h_m_random_i <- plm(formula, data = hitter_first_two,
                      model = "random",
                      index = c("id", "Anio_ref"))

  my_lm_cluster_i <- coeftest(h_m_random_i,
                              vcov = vcovHC(h_m_random_i,
                                            type = "HC1",
                                            cluster = "group"))
  print(my_lm_cluster_i)

  print("Remaining years:")
  h_m_random_f <- plm(formula, data = hitter_remaining,
                      model = "random",
                      index = c("id", "Anio_ref"))

  my_lm_cluster_f <- coeftest(h_m_random_f,
```

```
                              vcov = vcovHC(h_m_random_f,
                                            type = "HC1",
                                            cluster = "group"))
  print(my_lm_cluster_f)

  print("Test:")
  print(phtest(h_m_random_i,h_m_random_f))
}
```

```
[1] "First two years:"

t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
(Intercept)          0.23298165  0.15218253  1.5309   0.1270
Edad_t              -0.00813961  0.00514685 -1.5815   0.1150
Anios_de_contrato_t -0.01206878  0.01080499 -1.1170   0.2650
team_num_t           0.00067624  0.00091388  0.7400   0.4600
X_At_bats_t         -0.00042638  0.00080174 -0.5318   0.5953
X_At_bats_t_1       -0.00020215  0.00085886 -0.2354   0.8141

[1] "Remaining years:"

t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
(Intercept)          0.25050200  0.11562682  2.1665  0.03304 *
Edad_t              -0.00818253  0.00304220 -2.6897  0.00859 **
Anios_de_contrato_t -0.01492353  0.02511172 -0.5943  0.55388
team_num_t           0.00331201  0.00190457  1.7390  0.08562 .
X_At_bats_t          0.00343564  0.00193223  1.7781  0.07893 .
X_At_bats_t_1        0.00033756  0.00166119  0.2032  0.83946
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Test:"

    Hausman Test

data:  formula
chisq = 11.713, df = 5, p-value = 0.03893
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
(Intercept)          2.0874e-01  1.4596e-01  1.4300   0.1539
Edad_t              -7.4153e-03  4.9172e-03 -1.5080   0.1328
Anios_de_contrato_t -1.1520e-02  1.0859e-02 -1.0609   0.2897
team_num_t           5.9238e-04  9.1027e-04  0.6508   0.5158
X_Bateos_2_t        -1.9080e-04  1.2966e-04 -1.4715   0.1424
```

```
X_Bateos_2_t_1       9.0507e-05  8.2322e-05  1.0994   0.2726

[1] "Remaining years:"

t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
(Intercept)          0.27844012  0.10705623  2.6009 0.010945 *
Edad_t              -0.00892127  0.00267959 -3.3293 0.001283 **
Anios_de_contrato_t -0.01481318  0.02354263 -0.6292 0.530881
team_num_t           0.00309104  0.00182718  1.6917 0.094323 .
X_Bateos_2_t         0.00080453  0.00038413  2.0944 0.039167 *
X_Bateos_2_t_1      -0.00036280  0.00034080 -1.0645 0.290061
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Test:"

    Hausman Test

data:  formula
chisq = 10.299, df = 5, p-value = 0.06719
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
(Intercept)          0.22586645  0.14642803  1.5425  0.12417
Edad_t              -0.00797190  0.00499472 -1.5961  0.11169
Anios_de_contrato_t -0.01171523  0.01088329 -1.0764  0.28273
team_num_t           0.00076325  0.00087588  0.8714  0.38433
X_Bateos_t          -0.00217031  0.00125416 -1.7305  0.08473 .
X_Bateos_t_1         0.00011938  0.00123219  0.0969  0.92290
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
(Intercept)          0.25091187  0.11158718  2.2486 0.027096 *
Edad_t              -0.00815732  0.00281099 -2.9019 0.004709 **
Anios_de_contrato_t -0.01610060  0.02645528 -0.6086 0.544396
team_num_t           0.00348081  0.00173743  2.0034 0.048281 *
X_Bateos_t           0.00554250  0.00370158  1.4973 0.137969
X_Bateos_t_1         0.00071739  0.00369151  0.1943 0.846372
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Test:"
```

```
    Hausman Test

data:  formula
chisq = 10.047, df = 5, p-value = 0.07392
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                         Estimate  Std. Error t value Pr(>|t|)
(Intercept)            0.19959126  0.15026720  1.3282  0.18526
Edad_t                -0.00743447  0.00506452 -1.4680  0.14333
Anios_de_contrato_t   -0.01282847  0.01055348 -1.2156  0.22525
team_num_t             0.00083052  0.00091388  0.9088  0.36431
X_Bateos_promedio_t   -0.01259034  0.02230496 -0.5645  0.57293
X_Bateos_promedio_t_1  0.04419900  0.02574526  1.7168  0.08721 .
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                         Estimate Std. Error t value Pr(>|t|)
(Intercept)            0.2356676  0.1033183  2.2810 0.025021 *
Edad_t                -0.0082029  0.0027076 -3.0296 0.003233 **
Anios_de_contrato_t   -0.0094759  0.0264610 -0.3581 0.721140
team_num_t             0.0036072  0.0018723  1.9267 0.057324 .
X_Bateos_promedio_t   -0.0449181  0.0560044 -0.8020 0.424737
X_Bateos_promedio_t_1  0.0508528  0.0395132  1.2870 0.201554
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Test:"

    Hausman Test

data:  formula
chisq = 3.1669, df = 5, p-value = 0.6743
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                           Estimate  Std. Error t value Pr(>|t|)
(Intercept)              0.19395369  0.15121231  1.2827   0.2008
Edad_t                  -0.00698411  0.00509814 -1.3699   0.1719
Anios_de_contrato_t     -0.01216901  0.01040435 -1.1696   0.2432
team_num_t               0.00057337  0.00088821  0.6455   0.5191
X_Bateos_promedio_2_t   -0.04677970  0.03727052 -1.2551   0.2106
X_Bateos_promedio_2_t_1  0.03977767  0.02564118  1.5513   0.1220
```

```
[1] "Remaining years:"

t test of coefficients:

                          Estimate Std. Error t value Pr(>|t|)
(Intercept)              0.1953177  0.1114268  1.7529  0.08319 .
Edad_t                  -0.0069866  0.0026377 -2.6488  0.00961 **
Anios_de_contrato_t     -0.0067409  0.0276005 -0.2442  0.80763
team_num_t               0.0035982  0.0019426  1.8522  0.06742 .
X_Bateos_promedio_2_t   -0.0829857  0.0880234 -0.9428  0.34844
X_Bateos_promedio_2_t_1 -0.0056861  0.0342203 -0.1662  0.86842
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Test:"

    Hausman Test

data:  formula
chisq = 0.09251, df = 5, p-value = 0.9999
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                        Estimate  Std. Error t value Pr(>|t|)
(Intercept)          0.21650421  0.14983908  1.4449   0.1497
Edad_t              -0.00756270  0.00510894 -1.4803   0.1400
Anios_de_contrato_t -0.01335935  0.01079912 -1.2371   0.2172
team_num_t           0.00060141  0.00088033  0.6832   0.4951
X_Home_runs_t        0.00107807  0.00487178  0.2213   0.8250
X_Home_runs_t_1      0.00068088  0.00314656  0.2164   0.8289

[1] "Remaining years:"

t test of coefficients:

                         Estimate Std. Error t value Pr(>|t|)
(Intercept)          0.2482476  0.1133277  2.1905 0.031192 *
Edad_t              -0.0073901  0.0026480 -2.7908 0.006476 **
Anios_de_contrato_t -0.0254458  0.0248770 -1.0229 0.309241
team_num_t           0.0033454  0.0018744  1.7848 0.077815 .
X_Home_runs_t        0.0213344  0.0098833  2.1586 0.033665 *
X_Home_runs_t_1      0.0162391  0.0073647  2.2050 0.030123 *
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Test:"

    Hausman Test

data:  formula
chisq = 12.381, df = 5, p-value = 0.02993
```

```
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
(Intercept)          0.20709968  0.14436921  1.4345   0.1526
Edad_t              -0.00732079  0.00497698 -1.4709   0.1425
Anios_de_contrato_t -0.01279084  0.01192645 -1.0725   0.2845
team_num_t           0.00065570  0.00089956  0.7289   0.4667
X_Home_runs_2_t     -0.00044148  0.00091705 -0.4814   0.6306
X_Home_runs_2_t_1    0.00044396  0.00067863  0.6542   0.5136

[1] "Remaining years:"

t test of coefficients:

                      Estimate Std. Error t value Pr(>|t|)
(Intercept)          0.1973482  0.1182266  1.6692  0.09871 .
Edad_t              -0.0072232  0.0029096 -2.4825  0.01499 *
Anios_de_contrato_t -0.0168761  0.0282322 -0.5978  0.55157
team_num_t           0.0039060  0.0019118  2.0431  0.04410 *
X_Home_runs_2_t     -0.0020279  0.0051413 -0.3944  0.69424
X_Home_runs_2_t_1   -0.0020387  0.0017745 -1.1489  0.25380
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Test:"

    Hausman Test

data:  formula
chisq = 2.9793, df = 5, p-value = 0.7032
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                         Estimate  Std. Error t value Pr(>|t|)
(Intercept)            0.23446318  0.15269634  1.5355   0.1259
Edad_t                -0.00819320  0.00517467 -1.5833   0.1146
Anios_de_contrato_t   -0.01213999  0.01080593 -1.1235   0.2623
team_num_t             0.00066360  0.00091514  0.7251   0.4690
X_Juegos_iniciados_t  -0.00103273  0.00148343 -0.6962   0.4869
X_Juegos_iniciados_t_1 -0.00029708  0.00161726 -0.1837   0.8544

[1] "Remaining years:"

t test of coefficients:

                         Estimate  Std. Error t value Pr(>|t|)
(Intercept)            0.24345493  0.11907898  2.0445 0.043964 *
```

```
Edad_t                 -0.00787881  0.00287394 -2.7415 0.007439 **
Anios_de_contrato_t    -0.01619025  0.02724055 -0.5943 0.553842
team_num_t              0.00354737  0.00190092  1.8661 0.065431 .
X_Juegos_iniciados_t    0.00495134  0.00407877  1.2139 0.228097
X_Juegos_iniciados_t_1  0.00080901  0.00365323  0.2215 0.825266
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Test:"

    Hausman Test

data:  formula
chisq = 7.749, df = 5, p-value = 0.1706
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                                      Estimate  Std. Error t value Pr(>|t|)
(Intercept)                           0.20674545  0.15160192  1.3637   0.1738
Edad_t                               -0.00749602  0.00504404 -1.4861   0.1385
Anios_de_contrato_t                  -0.01388757  0.01082147 -1.2833   0.2005
team_num_t                            0.00074447  0.00089566  0.8312   0.4066
X_Porcentaje_On_base_plus_slugging_t -0.01537803  0.01295373 -1.1872   0.2363
X_Porcentaje_On_base_plus_slugging_t_1  0.02366300  0.02173902  1.0885   0.2774

[1] "Remaining years:"

t test of coefficients:

                                      Estimate  Std. Error t value Pr(>|t|)
(Intercept)                           0.22663996  0.10799491  2.0986 0.038783
Edad_t                               -0.00765892  0.00289467 -2.6459 0.009687
Anios_de_contrato_t                  -0.01006025  0.02649465 -0.3797 0.705098
team_num_t                            0.00397962  0.00166609  2.3886 0.019101
X_Porcentaje_On_base_plus_slugging_t -0.00061341  0.04085726 -0.0150 0.988056
X_Porcentaje_On_base_plus_slugging_t_1 -0.02762097  0.02320985 -1.1901 0.237300

(Intercept)                          *
Edad_t                               **
Anios_de_contrato_t
team_num_t                           *
X_Porcentaje_On_base_plus_slugging_t
X_Porcentaje_On_base_plus_slugging_t_1
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Test:"

    Hausman Test

data:  formula
```

```
chisq = 6.6296, df = 5, p-value = 0.2497
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                                       Estimate  Std. Error t value
(Intercept)                            0.18015608  0.14627278  1.2316
Edad_t                                -0.00656388  0.00495635 -1.3243
Anios_de_contrato_t                   -0.01038429  0.01035528 -1.0028
team_num_t                             0.00039920  0.00087392  0.4568
X_Porcentaje_On_base_plus_slugging_2_t -0.03090681  0.01675290 -1.8449
X_Porcentaje_On_base_plus_slugging_2_t_1  0.01879531  0.01249307  1.5045
                                      Pr(>|t|)
(Intercept)                            0.21919
Edad_t                                 0.18655
Anios_de_contrato_t                    0.31689
team_num_t                             0.64820
X_Porcentaje_On_base_plus_slugging_2_t    0.06619 .
X_Porcentaje_On_base_plus_slugging_2_t_1  0.13368
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                                        Estimate Std. Error t value Pr(>|t|)
(Intercept)                            0.2304173  0.1086349  2.1210 0.036798
Edad_t                                -0.0078257  0.0028766 -2.7204 0.007888
Anios_de_contrato_t                   -0.0088390  0.0272496 -0.3244 0.746444
team_num_t                             0.0035814  0.0018307  1.9563 0.053670
X_Porcentaje_On_base_plus_slugging_2_t -0.0297954  0.0390121 -0.7637 0.447109
X_Porcentaje_On_base_plus_slugging_2_t_1  0.0062828  0.0204440  0.3073 0.759346

(Intercept)                            *
Edad_t                                 **
Anios_de_contrato_t
team_num_t                             .
X_Porcentaje_On_base_plus_slugging_2_t
X_Porcentaje_On_base_plus_slugging_2_t_1
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Test:"

    Hausman Test

data:  formula
chisq = 2.4575, df = 5, p-value = 0.7829
alternative hypothesis: one model is inconsistent

[1] "First two years:"
```

```
t test of coefficients:

                           Estimate  Std. Error t value Pr(>|t|)
(Intercept)               0.20236622  0.15054290  1.3442   0.1800
Edad_t                   -0.00743461  0.00503614 -1.4763   0.1411
Anios_de_contrato_t      -0.01447512  0.01078147 -1.3426   0.1806
team_num_t                0.00076208  0.00087652  0.8694   0.3854
X_Porcentaje_on_base_t   -0.01205993  0.03264452 -0.3694   0.7121
X_Porcentaje_on_base_t_1  0.04307916  0.03031819  1.4209   0.1565

[1] "Remaining years:"

t test of coefficients:

                           Estimate Std. Error t value Pr(>|t|)
(Intercept)               0.2362143  0.1081901  2.1833 0.031736 *
Edad_t                   -0.0080416  0.0028164 -2.8553 0.005388 **
Anios_de_contrato_t      -0.0071849  0.0269498 -0.2666 0.790413
team_num_t                0.0033704  0.0017528  1.9229 0.057808 .
X_Porcentaje_on_base_t   -0.0583678  0.0599116 -0.9742 0.332674
X_Porcentaje_on_base_t_1  0.0362063  0.0398787  0.9079 0.366462
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Test:"

    Hausman Test

data:  formula
chisq = 5.8881, df = 5, p-value = 0.3173
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                             Estimate  Std. Error t value Pr(>|t|)
(Intercept)                 0.20697302  0.14829998  1.3956   0.1640
Edad_t                     -0.00739562  0.00502007 -1.4732   0.1419
Anios_de_contrato_t        -0.01316244  0.01074052 -1.2255   0.2215
team_num_t                  0.00066985  0.00091060  0.7356   0.4626
X_Porcentaje_on_base_2_t   -0.00713576  0.03926458 -0.1817   0.8559
X_Porcentaje_on_base_2_t_1  0.03476448  0.02761710  1.2588   0.2092

[1] "Remaining years:"

t test of coefficients:

                             Estimate  Std. Error t value Pr(>|t|)
(Intercept)                 1.9788e-01  1.1245e-01  1.7597 0.082022 .
Edad_t                     -6.9966e-03  2.6264e-03 -2.6640 0.009218 **
Anios_de_contrato_t        -9.4402e-03  2.6667e-02 -0.3540 0.724205
team_num_t                  3.8562e-03  1.8938e-03  2.0363 0.044801 *
```

```
X_Porcentaje_on_base_2_t   -7.6211e-02  7.5279e-02 -1.0124 0.314191
X_Porcentaje_on_base_2_t_1  1.2753e-05  4.1556e-02  0.0003 0.999756
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Test:"

    Hausman Test

data:  formula
chisq = 2.8848, df = 5, p-value = 0.7177
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
(Intercept)          0.21483978  0.14710882  1.4604   0.1454
Edad_t              -0.00765543  0.00502615 -1.5231   0.1289
Anios_de_contrato_t -0.01091281  0.01089617 -1.0015   0.3175
team_num_t           0.00079001  0.00091411  0.8642   0.3883
X_Runs_batted_in_t  -0.00307049  0.00180209 -1.7038   0.0896 .
X_Runs_batted_in_t_1 0.00142636  0.00171407  0.8321   0.4061
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                      Estimate Std. Error t value Pr(>|t|)
(Intercept)          0.2668596  0.1116997  2.3891 0.019077 *
Edad_t              -0.0080923  0.0028090 -2.8808 0.005006 **
Anios_de_contrato_t -0.0236671  0.0284562 -0.8317 0.407878
team_num_t           0.0031976  0.0020604  1.5520 0.124345
X_Runs_batted_in_t   0.0080202  0.0049401  1.6235 0.108144
X_Runs_batted_in_t_1 0.0039048  0.0047095  0.8291 0.409319
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Test:"

    Hausman Test

data:  formula
chisq = 10.464, df = 5, p-value = 0.0631
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                      Estimate  Std. Error t value Pr(>|t|)
```

```
(Intercept)          0.21000686  0.14657253  1.4328   0.1531
Edad_t              -0.00734867  0.00495372 -1.4835   0.1392
Anios_de_contrato_t -0.01242060  0.01043153 -1.1907   0.2349
team_num_t           0.00043664  0.00092884  0.4701   0.6387
X_Triples_t         -0.00750583  0.01087465 -0.6902   0.4907
X_Triples_t_1        0.01553773  0.00895467  1.7352   0.0839 .
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                     Estimate Std. Error t value Pr(>|t|)
(Intercept)          0.2512234  0.1233389  2.0369 0.044740 *
Edad_t              -0.0081782  0.0027117 -3.0159 0.003368 **
Anios_de_contrato_t -0.0149924  0.0273491 -0.5482 0.584984
team_num_t           0.0035394  0.0020601  1.7181 0.089377 .
X_Triples_t         -0.0053220  0.0403132 -0.1320 0.895280
X_Triples_t_1        0.0109455  0.0349144  0.3135 0.754664
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Test:"

    Hausman Test

data:  formula
chisq = 2.126, df = 5, p-value = 0.8315
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
(Intercept)          0.21065261  0.14921438  1.4117   0.1592
Edad_t              -0.00743279  0.00503890 -1.4751   0.1414
Anios_de_contrato_t -0.01255542  0.01060511 -1.1839   0.2375
team_num_t           0.00062495  0.00088858  0.7033   0.4825
X_Triples_2_t       -0.00033286  0.00424605 -0.0784   0.9376
X_Triples_2_t_1      0.00111222  0.00133640  0.8323   0.4060

[1] "Remaining years:"

t test of coefficients:

                     Estimate Std. Error t value Pr(>|t|)
(Intercept)          0.2473945  0.0830216  2.9799 0.003748 **
Edad_t              -0.0083607  0.0020501 -4.0782 0.000101 ***
Anios_de_contrato_t -0.0051562  0.0196652 -0.2622 0.793793
team_num_t           0.0042857  0.0014748  2.9059 0.004655 **
X_Triples_2_t        0.0388295  0.0311036  1.2484 0.215276
X_Triples_2_t_1      0.0195293  0.0100708  1.9392 0.055755 .
```

```
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Test:"

    Hausman Test

data:  formula
chisq = 13.049, df = 5, p-value = 0.02292
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
(Intercept)          0.27988134  0.13937756  2.0081 0.045669 *
Edad_t              -0.00908894  0.00470776 -1.9306 0.054616 .
Anios_de_contrato_t -0.01696385  0.01068681 -1.5874 0.113646
team_num_t           0.00079385  0.00086411  0.9187 0.359107
X_WAR_t              0.02089586  0.00787592  2.6531 0.008466 **
X_WAR_t_1            0.01875031  0.00922125  2.0334 0.043030 *
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                        Estimate Std. Error t value  Pr(>|t|)
(Intercept)           0.3940975  0.1001990  3.9331 0.0001693 ***
Edad_t               -0.0116171  0.0024215 -4.7976 6.692e-06 ***
Anios_de_contrato_t -0.0314891  0.0241166 -1.3057 0.1951355
team_num_t            0.0041474  0.0017360  2.3891 0.0190753 *
X_WAR_t               0.0603608  0.0155416  3.8838 0.0002013 ***
X_WAR_t_1             0.0145506  0.0199859  0.7280 0.4685664
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Test:"

    Hausman Test

data:  formula
chisq = 7.1932, df = 5, p-value = 0.2067
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
(Intercept)          0.25661151  0.13458928  1.9066  0.05767 .
Edad_t              -0.00856865  0.00455832 -1.8798  0.06126 .
```

```
Anios_de_contrato_t -0.01262751  0.01118863 -1.1286  0.26011
team_num_t           0.00053418  0.00090818  0.5882  0.55692
X_WAR_2_t            0.00561430  0.00510592  1.0996  0.27254
X_WAR_2_t_1          0.00832851  0.00579709  1.4367  0.15201
---
Signif. codes:  0 ’***’ 0.001 ’**’ 0.01 ’*’ 0.05 ’.’ 0.1 ’ ’ 1

[1] "Remaining years:"

t test of coefficients:

                      Estimate Std. Error t value Pr(>|t|)
(Intercept)          0.2192234  0.0963280  2.2758 0.025343 *
Edad_t              -0.0062897  0.0024598 -2.5570 0.012312 *
Anios_de_contrato_t -0.0306556  0.0219250 -1.3982 0.165647
team_num_t           0.0042529  0.0019270  2.2070 0.029977 *
X_WAR_2_t            0.0595168  0.0208206  2.8586 0.005338 **
X_WAR_2_t_1          0.0077843  0.0044673  1.7425 0.084996 .
---
Signif. codes:  0 ’***’ 0.001 ’**’ 0.01 ’*’ 0.05 ’.’ 0.1 ’ ’ 1

[1] "Test:"

    Hausman Test

data:  formula
chisq = 11.987, df = 5, p-value = 0.03497
alternative hypothesis: one model is inconsistent
```

Starting pitcher

```r
# loop over the variables in var_hitter_list
for (i in 1:length(stat_fielder_t_1)){
  # run linear regression with grouped errors by country and robust errors
  base_vars_s  <- paste(vars_ms, stat_fielder_t[[i]],
                        sep = '+')
  formula <- paste(base_vars_s,
                   stat_fielder_t_1[[i]],
                   sep = " + ")

  print("First two years:")
  s_m_random_i <- plm(formula, data = starting_first_two,
                      model = "random",
                      index = c("id", "Anio_ref"))

  my_lm_cluster_i <- coeftest(s_m_random_i,
                              vcov = vcovHC(s_m_random_i,
                                            type = "HC1",
                                            cluster = "group"))
  print(my_lm_cluster_i)

  print("Remaining years:")
```

```
  s_m_random_f <- plm(formula, data = starting_remaining,
                      model = "random",
                      index = c("id", "Anio_ref"))

  my_lm_cluster_f <- coeftest(s_m_random_f,
                              vcov = vcovHC(s_m_random_f,
                                            type = "HC1",
                                            cluster = "group"))
  print(my_lm_cluster_f)

  print("Wu-Haussman test:")
  print(phtest(s_m_random_i,s_m_random_f))
}
```

```
[1] "First two years:"

t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
(Intercept)          2.9083e-01  2.9130e-01  0.9984  0.32046
Edad_t              -9.4321e-03  8.9449e-03 -1.0545  0.29416
Anios_de_contrato_t -1.8822e-03  1.1976e-02 -0.1572  0.87542
team_num_t           2.4923e-03  1.3581e-03  1.8352  0.06939 .
X_Bateos_2_t        -1.7937e-04  1.1344e-04 -1.5811  0.11694
X_Bateos_2_t_1      -5.7782e-05  8.7447e-05 -0.6608  0.51025
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
(Intercept)          0.12740417  0.33971980  0.3750   0.7105
Edad_t              -0.00539820  0.01143295 -0.4722   0.6405
Anios_de_contrato_t -0.02250401  0.01393610 -1.6148   0.1176
team_num_t           0.00116744  0.00379314  0.3078   0.7605
X_Bateos_2_t         0.00024459  0.00014532  1.6832   0.1035
X_Bateos_2_t_1      -0.00016185  0.00021667 -0.7470   0.4613

[1] "Wu-Haussman test:"

    Hausman Test

data:  formula
chisq = 10.023, df = 5, p-value = 0.07458
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
```

```
(Intercept)          0.35364857  0.27480445  1.2869  0.20104
Edad_t              -0.01148074  0.00845273 -1.3582  0.17739
Anios_de_contrato_t -0.01683587  0.01170903 -1.4379  0.15354
team_num_t           0.00310017  0.00141394  2.1926  0.03061 *
X_Bateos_t           0.00261964  0.00271599  0.9645  0.33706
X_Bateos_t_1        -0.00049773  0.00125054 -0.3980  0.69145
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                      Estimate  Std. Error t value Pr(>|t|)
(Intercept)          0.06438421  0.39804880  0.1617  0.87266
Edad_t              -0.00482332  0.01231116 -0.3918  0.69818
Anios_de_contrato_t -0.01826224  0.01314557 -1.3892  0.17571
team_num_t           0.00287600  0.00261471  1.0999  0.28073
X_Bateos_t           0.00207631  0.00092793  2.2376  0.03339 *
X_Bateos_t_1         0.00329216  0.00255068  1.2907  0.20737
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Wu-Haussman test:"

    Hausman Test

data:  formula
chisq = 8.1801, df = 5, p-value = 0.1466
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                           Estimate  Std. Error t value Pr(>|t|)
(Intercept)               3.0772e-01  2.9628e-01  1.0386   0.3014
Edad_t                   -9.9109e-03  9.0856e-03 -1.0908   0.2779
Anios_de_contrato_t      -9.6532e-03  1.0458e-02 -0.9230   0.3582
team_num_t                2.8401e-03  1.3023e-03  2.1808   0.0315 *
X_Carreras_ganadas_2_t   -9.9975e-05  2.5219e-04 -0.3964   0.6926
X_Carreras_ganadas_2_t_1 -4.5532e-05  1.4221e-04 -0.3202   0.7495
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                           Estimate  Std. Error t value Pr(>|t|)
(Intercept)               0.09803705  0.31241136  0.3138  0.75599
Edad_t                   -0.00490251  0.01078129 -0.4547  0.65281
Anios_de_contrato_t      -0.01447539  0.01370706 -1.0561  0.29997
team_num_t                0.00118864  0.00374800  0.3171  0.75349
```

```
X_Carreras_ganadas_2_t    0.00065153  0.00027202  2.3951  0.02355 *
X_Carreras_ganadas_2_t_1 -0.00027952  0.00044189 -0.6326  0.53215
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Wu-Haussman test:"

    Hausman Test

data:  formula
chisq = 6.7425, df = 5, p-value = 0.2405
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                        Estimate Std. Error t value Pr(>|t|)
(Intercept)             0.2945590  0.2876937  1.0239  0.30832
Edad_t                 -0.0093311  0.0088271 -1.0571  0.29297
Anios_de_contrato_t    -0.0074116  0.0110420 -0.6712  0.50359
team_num_t              0.0024180  0.0013562  1.7829  0.07758 .
X_Carreras_ganadas_t   -0.0025166  0.0020175 -1.2474  0.21511
X_Carreras_ganadas_t_1  0.0010512  0.0016381  0.6417  0.52250
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                        Estimate Std. Error t value Pr(>|t|)
(Intercept)             0.0592131  0.3728933  0.1588 0.874971
Edad_t                 -0.0043059  0.0120318 -0.3579 0.723120
Anios_de_contrato_t    -0.0130981  0.0127109 -1.0305 0.311612
team_num_t              0.0016913  0.0028044  0.6031 0.551310
X_Carreras_ganadas_t    0.0041426  0.0013379  3.0964 0.004419 **
X_Carreras_ganadas_t_1  0.0027565  0.0032579  0.8461 0.404680
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Wu-Haussman test:"

    Hausman Test

data:  formula
chisq = 22.724, df = 5, p-value = 0.0003812
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                      Estimate  Std. Error t value Pr(>|t|)
```

```
(Intercept)          0.25581687  0.27364801  0.9348  0.35208
Edad_t              -0.00837841  0.00843276 -0.9936  0.32279
Anios_de_contrato_t -0.01042876  0.01228667 -0.8488  0.39799
team_num_t           0.00233478  0.00136409  1.7116  0.09001 .
X_ERA_t              0.00036333  0.01063994  0.0341  0.97283
X_ERA_t_1           -0.02288914  0.00973114 -2.3522  0.02059 *
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                      Estimate  Std. Error t value Pr(>|t|)
(Intercept)          0.10079587  0.37238150  0.2707  0.78862
Edad_t              -0.00391903  0.01167551 -0.3357  0.73963
Anios_de_contrato_t -0.02136716  0.01225012 -1.7442  0.09209 .
team_num_t           0.00011134  0.00286350  0.0389  0.96926
X_ERA_t             -0.00421680  0.01049804 -0.4017  0.69097
X_ERA_t_1            0.00441346  0.00669325  0.6594  0.51503
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Wu-Haussman test:"

    Hausman Test

data:  formula
chisq = 8.6474, df = 5, p-value = 0.124
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                      Estimate  Std. Error t value Pr(>|t|)
(Intercept)          0.30973190  0.28859931  1.0732   0.2857
Edad_t              -0.00988061  0.00888427 -1.1121   0.2687
Anios_de_contrato_t -0.00991217  0.01150203 -0.8618   0.3908
team_num_t           0.00258943  0.00132951  1.9477   0.0542 .
X_Carreras_t        -0.00073019  0.00211440 -0.3453   0.7305
X_Carreras_t_1       0.00070457  0.00154466  0.4561   0.6493
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                      Estimate Std. Error t value Pr(>|t|)
(Intercept)          0.0907326  0.3742646  0.2424  0.81021
Edad_t              -0.0053599  0.0117412 -0.4565  0.65155
Anios_de_contrato_t -0.0132547  0.0137391 -0.9647  0.34293
team_num_t           0.0018148  0.0023134  0.7845  0.43936
```

```
X_Carreras_t         0.0034827  0.0014339  2.4288  0.02182 *
X_Carreras_t_1       0.0034042  0.0031231  1.0900  0.28500
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Wu-Haussman test:"

    Hausman Test

data:  formula
chisq = 22.589, df = 5, p-value = 0.0004045
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
(Intercept)          3.0967e-01  2.9802e-01  1.0391  0.30121
Edad_t              -9.8631e-03  9.3372e-03 -1.0563  0.29332
Anios_de_contrato_t -1.0772e-02  1.0073e-02 -1.0694  0.28742
team_num_t           2.6863e-03  1.3405e-03  2.0039  0.04773 *
X_Comando_2_t        9.1699e-04  4.7547e-03  0.1929  0.84745
X_Comando_2_t_1     -1.5011e-06  2.5563e-06 -0.5872  0.55835
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                      Estimate Std. Error t value Pr(>|t|)
(Intercept)          0.1394588  0.3010114  0.4633  0.64673
Edad_t              -0.0048781  0.0091294 -0.5343  0.59734
Anios_de_contrato_t -0.0556902  0.0369071 -1.5089  0.14252
team_num_t           0.0016856  0.0031696  0.5318  0.59905
X_Comando_2_t       -0.0441736  0.0235026 -1.8795  0.07062 .
X_Comando_2_t_1      0.0239730  0.0187397  1.2793  0.21130
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Wu-Haussman test:"

    Hausman Test

data:  formula
chisq = 7.0527, df = 5, p-value = 0.2168
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
```

```
(Intercept)          0.30577117  0.29646684  1.0314  0.30480
Edad_t              -0.00933345  0.00953568 -0.9788  0.33000
Anios_de_contrato_t -0.01326127  0.01042254 -1.2724  0.20614
team_num_t           0.00243065  0.00133152  1.8255  0.07086 .
X_Comando_t          0.01028637  0.01632036  0.6303  0.52992
X_Comando_t_1       -0.00013645  0.00030370 -0.4493  0.65418
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                      Estimate  Std. Error t value Pr(>|t|)
(Intercept)         -0.00859750  0.33003269 -0.0261   0.9794
Edad_t              -0.00089979  0.01034380 -0.0870   0.9313
Anios_de_contrato_t -0.01476843  0.01379750 -1.0704   0.2936
team_num_t          -0.00110996  0.00407155 -0.2726   0.7872
X_Comando_t         -0.01794355  0.03022546 -0.5937   0.5575
X_Comando_t_1       -0.01993542  0.03882359 -0.5135   0.6116

[1] "Wu-Haussman test:"

    Hausman Test

data:  formula
chisq = 2.4307, df = 5, p-value = 0.7869
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                       Estimate Std. Error t value  Pr(>|t|)
(Intercept)          0.2996347  0.2822868  1.0615   0.29099
Edad_t              -0.0107365  0.0086403 -1.2426   0.21686
Anios_de_contrato_t -0.0080032  0.0107205 -0.7465   0.45706
team_num_t           0.0032351  0.0012566  2.5744   0.01148 *
X_Control_2_t       -0.1140091  0.0536673 -2.1244   0.03606 *
X_Control_2_t_1     -0.0858535  0.0185561 -4.6267 1.095e-05 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                       Estimate  Std. Error t value  Pr(>|t|)
(Intercept)          0.20172764  0.27985098  0.7208 0.4769840
Edad_t              -0.00664142  0.00905624 -0.7334 0.4694391
Anios_de_contrato_t -0.02423370  0.01324426 -1.8298 0.0779542 .
team_num_t          -0.00047543  0.00314334 -0.1513 0.8808626
X_Control_2_t        0.38501932  0.08901013  4.3256 0.0001746 ***
X_Control_2_t_1     -0.37449441  0.08448690 -4.4326 0.0001305 ***
```

```
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Wu-Haussman test:"

    Hausman Test

data:  formula
chisq = 34.08, df = 5, p-value = 2.295e-06
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                      Estimate Std. Error t value Pr(>|t|)
(Intercept)          0.2738591  0.2698926  1.0147  0.31265
Edad_t              -0.0087678  0.0081895 -1.0706  0.28687
Anios_de_contrato_t -0.0140278  0.0122271 -1.1473  0.25396
team_num_t           0.0023317  0.0012449  1.8729  0.06394 .
X_Control_t          0.0280528  0.0395274  0.7097  0.47951
X_Control_t_1       -0.0773272  0.0392677 -1.9692  0.05164 .
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                      Estimate Std. Error t value Pr(>|t|)
(Intercept)          0.0139744  0.2991649  0.0467 0.963075
Edad_t              -0.0052242  0.0085915 -0.6081 0.548045
Anios_de_contrato_t -0.0054768  0.0177302 -0.3089 0.759688
team_num_t           0.0069816  0.0030145  2.3160 0.028102 *
X_Control_t          0.1000056  0.0664446  1.5051 0.143497
X_Control_t_1       -0.2320199  0.0813652 -2.8516 0.008082 **
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Wu-Haussman test:"

    Hausman Test

data:  formula
chisq = 3.9098, df = 5, p-value = 0.5625
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                      Estimate Std. Error t value Pr(>|t|)
(Intercept)          0.2850303  0.2686372  1.0610 0.291185
Edad_t              -0.0086735  0.0083422 -1.0397 0.300935
```

```
Anios_de_contrato_t -0.0105805  0.0121131 -0.8735 0.384455
team_num_t           0.0027653  0.0013055  2.1182 0.036586 *
X_Dominio_2_t        0.0063265  0.0336840  0.1878 0.851391
X_Dominio_2_t_1      0.0555042  0.0189118  2.9349 0.004123 **
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                     Estimate Std. Error t value Pr(>|t|)
(Intercept)          0.3138030  0.3561357  0.8811   0.3857
Edad_t              -0.0113793  0.0103392 -1.1006   0.2804
Anios_de_contrato_t -0.0269684  0.0196776 -1.3705   0.1814
team_num_t           0.0012797  0.0034021  0.3761   0.7096
X_Dominio_2_t       -0.0218932  0.0389106 -0.5627   0.5781
X_Dominio_2_t_1     -0.0752095  0.0532496 -1.4124   0.1689

[1] "Wu-Haussman test:"

    Hausman Test

data:  formula
chisq = 624.66, df = 5, p-value < 2.2e-16
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                     Estimate Std. Error t value Pr(>|t|)
(Intercept)          0.2886205  0.2704852  1.0670  0.28847
Edad_t              -0.0083057  0.0083008 -1.0006  0.31939
Anios_de_contrato_t -0.0132617  0.0113222 -1.1713  0.24421
team_num_t           0.0024821  0.0013545  1.8325  0.06980 .
X_Dominio_t          0.0106743  0.0217725  0.4903  0.62500
X_Dominio_t_1        0.0619521  0.0221332  2.7991  0.00613 **
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                     Estimate Std. Error t value Pr(>|t|)
(Intercept)          0.5501591  0.4558525  1.2069   0.2376
Edad_t              -0.0200203  0.0139802 -1.4320   0.1632
Anios_de_contrato_t -0.0284814  0.0177290 -1.6065   0.1194
team_num_t           0.0035977  0.0044639  0.8059   0.4271
X_Dominio_t         -0.0887822  0.0984350 -0.9019   0.3748
X_Dominio_t_1       -0.0587268  0.0803713 -0.7307   0.4710

[1] "Wu-Haussman test:"
```

```
    Hausman Test

data:  formula
chisq = 43.099, df = 5, p-value = 3.528e-08
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                          Estimate  Std. Error t value Pr(>|t|)
(Intercept)             2.6370e-01  2.9654e-01  0.8893  0.37596
Edad_t                 -8.7866e-03  9.0705e-03 -0.9687  0.33499
Anios_de_contrato_t    -2.9603e-03  1.1241e-02 -0.2633  0.79281
team_num_t              2.6322e-03  1.3107e-03  2.0082  0.04727 *
X_Inning_pitched_2_t   -1.7538e-04  1.1148e-04 -1.5731  0.11879
X_Inning_pitched_2_t_1  3.4326e-05  8.1238e-05  0.4225  0.67352
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                          Estimate  Std. Error t value Pr(>|t|)
(Intercept)             8.8215e-02  3.6078e-01  0.2445  0.80862
Edad_t                 -4.6300e-03  1.2033e-02 -0.3848  0.70330
Anios_de_contrato_t    -2.6382e-02  2.4210e-02 -1.0897  0.28513
team_num_t              2.2830e-03  4.0065e-03  0.5698  0.57334
X_Inning_pitched_2_t    2.7178e-04  1.0942e-04  2.4838  0.01925 *
X_Inning_pitched_2_t_1  6.7461e-05  2.2510e-04  0.2997  0.76663
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Wu-Haussman test:"

    Hausman Test

data:  formula
chisq = 17.181, df = 5, p-value = 0.004169
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                       Estimate Std. Error t value Pr(>|t|)
(Intercept)           0.2801264  0.2986658  0.9379   0.3505
Edad_t               -0.0092552  0.0090920 -1.0179   0.3111
Anios_de_contrato_t  -0.0083810  0.0117787 -0.7115   0.4784
team_num_t            0.0027496  0.0012773  2.1527   0.0337 *
X_Inning_pitched_t   -0.0010388  0.0013650 -0.7610   0.4484
X_Inning_pitched_t_1  0.0014123  0.0013094  1.0786   0.2833
```

```
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
(Intercept)           0.09926841  0.34488802  0.2878   0.7756
Edad_t               -0.00396953  0.01140523 -0.3480   0.7304
Anios_de_contrato_t  -0.02358224  0.01528283 -1.5431   0.1340
team_num_t            0.00021710  0.00357431  0.0607   0.9520
X_Inning_pitched_t    0.00150449  0.00154832  0.9717   0.3395
X_Inning_pitched_t_1 -0.00033826  0.00271260 -0.1247   0.9017

[1] "Wu-Haussman test:"

    Hausman Test

data:  formula
chisq = 4.6392, df = 5, p-value = 0.4615
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                      Estimate  Std. Error t value Pr(>|t|)
(Intercept)          0.30913998  0.28884589  1.0703  0.28703
Edad_t              -0.00976473  0.00888990 -1.0984  0.27461
Anios_de_contrato_t -0.01035618  0.00934177 -1.1086  0.27021
team_num_t           0.00252870  0.00131994  1.9158  0.05819 .
X_Losses_2_t        -0.00202746  0.00159794 -1.2688  0.20740
X_Losses_2_t_1       0.00026492  0.00102408  0.2587  0.79639
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                      Estimate Std. Error t value Pr(>|t|)
(Intercept)          0.1139629  0.3599278  0.3166  0.75388
Edad_t              -0.0051291  0.0113987 -0.4500  0.65619
Anios_de_contrato_t -0.0214904  0.0131935 -1.6289  0.11454
team_num_t           0.0021511  0.0030711  0.7004  0.48945
X_Losses_2_t         0.0063299  0.0032715  1.9349  0.06317 .
X_Losses_2_t_1      -0.0017368  0.0042244 -0.4111  0.68411
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Wu-Haussman test:"

    Hausman Test
```

```
data:  formula
chisq = 4.9287, df = 5, p-value = 0.4246
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                      Estimate Std. Error t value  Pr(>|t|)
(Intercept)          0.3527717  0.2965025  1.1898  0.236896
Edad_t              -0.0113015  0.0091120 -1.2403  0.217715
Anios_de_contrato_t -0.0104298  0.0100387 -1.0390  0.301277
team_num_t           0.0029421  0.0013290  2.2138  0.029072 *
X_Saves_2_t          0.2605714  0.0622718  4.1844 6.069e-05 ***
X_Saves_2_t_1        0.0272880  0.0096343  2.8324  0.005568 **
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
(Intercept)          0.17666813  0.37749212  0.4680  0.64340
Edad_t              -0.00582767  0.01189405 -0.4900  0.62798
Anios_de_contrato_t -0.02428047  0.01441867 -1.6840  0.10331
team_num_t          -0.00018194  0.00330028 -0.0551  0.95643
X_Saves_2_t          0.05632582  0.01901614  2.9620  0.00617 **
X_Saves_2_t_1        0.21180097  0.08062959  2.6268  0.01382 *
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Wu-Haussman test:"

    Hausman Test

data:  formula
chisq = 2.1524, df = 5, p-value = 0.8277
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                      Estimate Std. Error t value Pr(>|t|)
(Intercept)          0.3578862  0.2965757  1.2067 0.230328
Edad_t              -0.0114523  0.0091198 -1.2558 0.212067
Anios_de_contrato_t -0.0105381  0.0100629 -1.0472 0.297472
team_num_t           0.0029989  0.0013342  2.2477 0.026747 *
X_Saves_t            0.1419114  0.0430833  3.2939 0.001359 **
X_Saves_t_1          0.0572260  0.0218769  2.6158 0.010252 *
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
[1] "Remaining years:"

t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
(Intercept)          0.17710863  0.37857397  0.4678  0.64353
Edad_t              -0.00583329  0.01188865 -0.4907  0.62749
Anios_de_contrato_t -0.02433332  0.01452227 -1.6756  0.10495
team_num_t          -0.00017984  0.00331267 -0.0543  0.95709
X_Saves_t            0.03574245  0.01328930  2.6896  0.01192 *
X_Saves_t_1          0.06355804  0.04272786  1.4875  0.14806
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Wu-Haussman test:"

    Hausman Test

data:  formula
chisq = 2.3385, df = 5, p-value = 0.8006
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
(Intercept)          3.0815e-01  2.7791e-01  1.1088  0.27012
Edad_t              -1.0263e-02  8.4985e-03 -1.2076  0.22999
Anios_de_contrato_t -8.5812e-03  1.1331e-02 -0.7573  0.45062
team_num_t           3.1019e-03  1.3858e-03  2.2384  0.02737 *
X_Strike_outs_2_t   -1.3116e-04  7.5829e-05 -1.7296  0.08672 .
X_Strike_outs_2_t_1  1.8263e-04  1.5244e-04  1.1980  0.23368
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
(Intercept)          2.5928e-02  3.7924e-01  0.0684 0.945977
Edad_t              -2.2800e-03  1.2353e-02 -0.1846 0.854904
Anios_de_contrato_t -2.6497e-02  1.9989e-02 -1.3256 0.195698
team_num_t           1.7390e-03  4.4338e-03  0.3922 0.697868
X_Strike_outs_2_t    3.0730e-04  9.0193e-05  3.4071 0.002005 **
X_Strike_outs_2_t_1  1.0990e-04  1.7715e-04  0.6204 0.540007
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Wu-Haussman test:"

    Hausman Test
```

```
data:  formula
chisq = 13.204, df = 5, p-value = 0.02154
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
(Intercept)          0.32407410  0.29384432  1.1029  0.27268
Edad_t              -0.01039453  0.00892141 -1.1651  0.24669
Anios_de_contrato_t -0.01658637  0.01141536 -1.4530  0.14930
team_num_t           0.00294581  0.00138952  2.1200  0.03643 *
X_Strike_outs_t      0.00099554  0.00122142  0.8151  0.41693
X_Strike_outs_t_1    0.00163376  0.00139704  1.1694  0.24495
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                      Estimate Std. Error t value Pr(>|t|)
(Intercept)          0.0438290  0.3511302  0.1248   0.9016
Edad_t              -0.0024182  0.0115219 -0.2099   0.8353
Anios_de_contrato_t -0.0265022  0.0204885 -1.2935   0.2064
team_num_t           0.0006483  0.0040662  0.1594   0.8745
X_Strike_outs_t      0.0013166  0.0017085  0.7706   0.4474
X_Strike_outs_t_1    0.0013398  0.0022729  0.5895   0.5603

[1] "Wu-Haussman test:"

    Hausman Test

data:  formula
chisq = 3.188, df = 5, p-value = 0.671
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                      Estimate Std. Error t value Pr(>|t|)
(Intercept)          0.3298908  0.2901909  1.1368  0.25828
Edad_t              -0.0103067  0.0088411 -1.1658  0.24643
Anios_de_contrato_t -0.0122476  0.0109647 -1.1170  0.26662
team_num_t           0.0024286  0.0013249  1.8330  0.06972 .
X_WAR_2_t           -0.0011867  0.0029573 -0.4013  0.68907
X_WAR_2_t_1          0.0044328  0.0035720  1.2410  0.21746
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"
```

```
t test of coefficients:

                      Estimate Std. Error t value Pr(>|t|)
(Intercept)          0.2020072  0.2822417  0.7157  0.48009
Edad_t              -0.0075064  0.0096288 -0.7796  0.44218
Anios_de_contrato_t -0.0068457  0.0336801 -0.2033  0.84041
team_num_t           0.0013960  0.0040064  0.3485  0.73011
X_WAR_2_t            0.0291187  0.0167201  1.7415  0.09257 .
X_WAR_2_t_1         -0.0071061  0.0059722 -1.1899  0.24409
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Wu-Haussman test:"

    Hausman Test

data:  formula
chisq = 2.1496, df = 5, p-value = 0.8281
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                      Estimate Std. Error t value Pr(>|t|)
(Intercept)          0.1692696  0.2718154  0.6227 0.534847
Edad_t              -0.0061084  0.0082655 -0.7390 0.461589
Anios_de_contrato_t -0.0108249  0.0129729 -0.8344 0.405995
team_num_t           0.0026342  0.0013601  1.9368 0.055531 .
X_WHIP_2_t          -0.0056578  0.0149373 -0.3788 0.705644
X_WHIP_2_t_1        -0.0410124  0.0131864 -3.1102 0.002424 **
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                      Estimate Std. Error t value Pr(>|t|)
(Intercept)          0.2439387  0.2772025  0.8800   0.3863
Edad_t              -0.0071153  0.0086531 -0.8223   0.4179
Anios_de_contrato_t -0.0255727  0.0184183 -1.3884   0.1760
team_num_t          -0.0018443  0.0057679 -0.3198   0.7515
X_WHIP_2_t           0.0375564  0.0329820  1.1387   0.2645
X_WHIP_2_t_1         0.0020684  0.0292772  0.0706   0.9442

[1] "Wu-Haussman test:"

    Hausman Test

data:  formula
chisq = 4.7346, df = 5, p-value = 0.4491
alternative hypothesis: one model is inconsistent
```

```
[1] "First two years:"

t test of coefficients:

                      Estimate Std. Error t value Pr(>|t|)
(Intercept)          0.2496877  0.2725991  0.9160  0.36185
Edad_t              -0.0081178  0.0083590 -0.9711  0.33377
Anios_de_contrato_t -0.0135307  0.0121148 -1.1169  0.26667
team_num_t           0.0026537  0.0012423  2.1360  0.03507 *
X_WHIP_t            -0.0042767  0.0167159 -0.2558  0.79859
X_WHIP_t_1          -0.0466298  0.0182003 -2.5620  0.01187 *
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
(Intercept)          0.19209383  0.30481456  0.6302   0.5337
Edad_t              -0.00623510  0.00970530 -0.6424   0.5258
Anios_de_contrato_t -0.02143366  0.01544239 -1.3880   0.1761
team_num_t          -0.00069996  0.00534624 -0.1309   0.8968
X_WHIP_t             0.02331513  0.03418317  0.6821   0.5008
X_WHIP_t_1          -0.00067714  0.02617002 -0.0259   0.9795

[1] "Wu-Haussman test:"

    Hausman Test

data:  formula
chisq = 5.7543, df = 5, p-value = 0.3309
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
(Intercept)          2.9035e-01  2.8799e-01  1.0082  0.31574
Edad_t              -9.2638e-03  8.8114e-03 -1.0513  0.29559
Anios_de_contrato_t -1.0299e-02  1.0315e-02 -0.9985  0.32042
team_num_t           2.5958e-03  1.2665e-03  2.0496  0.04297 *
X_Walks_2_t          5.3333e-05  3.4607e-04  0.1541  0.87783
X_Walks_2_t_1        2.3489e-04  2.7725e-04  0.8472  0.39885
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
```

```
(Intercept)          0.02736483  0.29946918  0.0914  0.92784
Edad_t              -0.00266864  0.01004142 -0.2658  0.79237
Anios_de_contrato_t -0.01905403  0.01326205 -1.4367  0.16187
team_num_t           0.00220348  0.00457660  0.4815  0.63393
X_Walks_2_t          0.00121276  0.00069617  1.7421  0.09248 .
X_Walks_2_t_1        0.00024402  0.00083717  0.2915  0.77284
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Wu-Haussman test:"

    Hausman Test

data:  formula
chisq = 6.3346, df = 5, p-value = 0.275
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                     Estimate Std. Error t value Pr(>|t|)
(Intercept)          0.3128821  0.3070285  1.0191  0.31058
Edad_t              -0.0100138  0.0092950 -1.0773  0.28388
Anios_de_contrato_t -0.0112778  0.0119382 -0.9447  0.34706
team_num_t           0.0025797  0.0013319  1.9369  0.05553 .
X_Walks_t            0.0014346  0.0030296  0.4735  0.63685
X_Walks_t_1          0.0007159  0.0027118  0.2640  0.79231
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                     Estimate Std. Error t value Pr(>|t|)
(Intercept)          0.0458236  0.3687754  0.1243   0.9020
Edad_t              -0.0039092  0.0113033 -0.3458   0.7320
Anios_de_contrato_t -0.0356431  0.0210844 -1.6905   0.1020
team_num_t           0.0042560  0.0032260  1.3193   0.1978
X_Walks_t            0.0044426  0.0029826  1.4895   0.1475
X_Walks_t_1          0.0077066  0.0047958  1.6070   0.1193

[1] "Wu-Haussman test:"

    Hausman Test

data:  formula
chisq = 6.3998, df = 5, p-value = 0.2692
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:
```

```
                       Estimate  Std. Error t value Pr(>|t|)
(Intercept)          0.25676445  0.30070791  0.8539  0.39518
Edad_t              -0.00861842  0.00917457 -0.9394  0.34975
Anios_de_contrato_t -0.00328412  0.01181812 -0.2779  0.78166
team_num_t           0.00291231  0.00130886  2.2251  0.02828 *
X_Wins_t            -0.00781871  0.00549331 -1.4233  0.15770
X_Wins_t_1          -0.00013077  0.00494841 -0.0264  0.97897
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
(Intercept)          0.09584652  0.33984480  0.2820   0.7800
Edad_t              -0.00379896  0.01130634 -0.3360   0.7394
Anios_de_contrato_t -0.02759813  0.02231473 -1.2368   0.2264
team_num_t           0.00058679  0.00442380  0.1326   0.8954
X_Wins_t             0.00541825  0.00700594  0.7734   0.4458
X_Wins_t_1           0.00261104  0.01016652  0.2568   0.7992

[1] "Wu-Haussman test:"

    Hausman Test

data:  formula
chisq = 9.2149, df = 5, p-value = 0.1008
alternative hypothesis: one model is inconsistent
```

First Differences

Bateadores

Se obtendrán las estimaciones de las variables referentes a estadísticas deportivas sin controles

```r
# loop over the variables in var_hitter_list
for (i in 1:length(stat_hitter_t_1)){
  # run linear regression with grouped errors by country and robust errors
  base_vars_h  <- paste(vars_fe, stat_hitter_t[[i]],
                        sep = '+')
  formula <- paste(base_vars_h,
                   stat_hitter_t_1[[i]],
                   sep = " + ")

  print("First two years:")
  h_m_first_d_i <- plm(formula, data = hitter_first_two,
                       model = "fd",
                       index = c("id", "Anio_ref"))

  my_lm_cluster_i <- coeftest(h_m_first_d_i,
                              vcov = vcovHC(h_m_first_d_i,
```

```
                                          type = "HC1",
                                          cluster = "group"))
  print(my_lm_cluster_i)

  print("Remaining years:")
  h_m_first_d_f <- plm(formula, data = hitter_remaining,
                       model = "fd",
                       index = c("id", "Anio_ref"))

  my_lm_cluster_f <- coeftest(h_m_first_d_f,
                              vcov = vcovHC(h_m_first_d_f,
                                          type = "HC1",
                                          cluster = "group"))
  print(my_lm_cluster_f)

  print("Test:")
  print(phtest(h_m_first_d_i,h_m_first_d_f))
}
```

```
[1] "First two years:"

t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
Edad_t               0.01085210  0.00902044  1.2031  0.23117
Anios_de_contrato_t -0.01926958  0.00837112 -2.3019  0.02296 *
team_num_t           0.00113269  0.00073548  1.5401  0.12601
X_At_bats_t          0.00076573  0.00070067  1.0929  0.27650
X_At_bats_t_1        0.00083397  0.00078556  1.0616  0.29041
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                       Estimate  Std. Error  t value  Pr(>|t|)
Edad_t              -0.01615752  0.00042813 -37.7395 < 2.2e-16 ***
Anios_de_contrato_t -0.06150799  0.00287739 -21.3763 < 2.2e-16 ***
team_num_t           0.00555387  0.00082742   6.7123 3.755e-08 ***
X_At_bats_t          0.00278173  0.00106063   2.6227   0.01210 *
X_At_bats_t_1        0.00191770  0.00104379   1.8372   0.07326 .
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Test:"

    Hausman Test

data:  formula
chisq = 4.4892, df = 5, p-value = 0.4813
alternative hypothesis: one model is inconsistent
```

```
[1] "First two years:"

t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
Edad_t                6.5176e-03  8.1489e-03  0.7998  0.42530
Anios_de_contrato_t -1.8267e-02  8.7224e-03 -2.0942  0.03821 *
team_num_t            1.1068e-03  7.7897e-04  1.4209  0.15778
X_Bateos_2_t         -1.1909e-04  9.4927e-05 -1.2546  0.21192
X_Bateos_2_t_1        2.1914e-05  5.6601e-05  0.3872  0.69928
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                       Estimate  Std. Error  t value  Pr(>|t|)
Edad_t               -0.01526342  0.00075550 -20.2031 < 2.2e-16 ***
Anios_de_contrato_t -0.08216680  0.00424413 -19.3601 < 2.2e-16 ***
team_num_t            0.00505975  0.00127273   3.9755 0.0002711 ***
X_Bateos_2_t          0.00050076  0.00031855   1.5720 0.1234575
X_Bateos_2_t_1        0.00013790  0.00026893   0.5128 0.6107950
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Test:"

    Hausman Test

data:  formula
chisq = 1.652, df = 5, p-value = 0.8949
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
Edad_t                0.00769492  0.00926073  0.8309  0.40757
Anios_de_contrato_t -0.01917402  0.00865897 -2.2144  0.02857 *
team_num_t            0.00112475  0.00073236  1.5358  0.12706
X_Bateos_t           -0.00021502  0.00088219 -0.2437  0.80783
X_Bateos_t_1          0.00089591  0.00131847  0.6795  0.49805
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                       Estimate  Std. Error  t value  Pr(>|t|)
Edad_t               -0.01572237  0.00025386 -61.9320 < 2.2e-16 ***
Anios_de_contrato_t -0.07661249  0.01107696  -6.9164 1.914e-08 ***
```

```
team_num_t           0.00525292  0.00071474   7.3494 4.618e-09 ***
X_Bateos_t           0.00398114  0.00253821   1.5685    0.1243
X_Bateos_t_1         0.00151700  0.00352014   0.4309    0.6687
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Test:"

    Hausman Test

data:  formula
chisq = 1.2242, df = 5, p-value = 0.9425
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                         Estimate  Std. Error t value Pr(>|t|)
Edad_t                 0.00650413  0.00808701  0.8043 0.422733
Anios_de_contrato_t   -0.02065106  0.00903980 -2.2845 0.023991 *
team_num_t             0.00197296  0.00078339  2.5185 0.013019 *
X_Bateos_promedio_t    0.04999031  0.01910520  2.6166 0.009950 **
X_Bateos_promedio_t_1  0.07111514  0.02500458  2.8441 0.005187 **
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                         Estimate  Std. Error  t value  Pr(>|t|)
Edad_t                -0.01501417  0.00042990 -34.9248 < 2.2e-16 ***
Anios_de_contrato_t   -0.07494802  0.00706598 -10.6069 1.877e-13 ***
team_num_t             0.00607521  0.00060744  10.0014 1.117e-12 ***
X_Bateos_promedio_t   -0.01423477  0.02486980  -0.5724    0.5701
X_Bateos_promedio_t_1 -0.03947991  0.00585567  -6.7422 3.402e-08 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Test:"

    Hausman Test

data:  formula
chisq = 0.28455, df = 5, p-value = 0.9979
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                           Estimate  Std. Error t value Pr(>|t|)
Edad_t                   0.00698565  0.00796356  0.8772  0.38202
```

```
Anios_de_contrato_t     -0.01771837  0.00827927 -2.1401  0.03424 *
team_num_t               0.00106471  0.00076055  1.3999  0.16395
X_Bateos_promedio_2_t   -0.02038300  0.04970031 -0.4101  0.68240
X_Bateos_promedio_2_t_1  0.04111685  0.02289387  1.7960  0.07486 .
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                           Estimate  Std. Error  t value  Pr(>|t|)
Edad_t                  -0.01452679  0.00068547 -21.1925 < 2.2e-16 ***
Anios_de_contrato_t     -0.07121486  0.01190977  -5.9795 4.251e-07 ***
team_num_t               0.00549515  0.00059489   9.2372 1.135e-11 ***
X_Bateos_promedio_2_t   -0.08355292  0.07069947  -1.1818    0.2439
X_Bateos_promedio_2_t_1  0.01300503  0.02409262   0.5398    0.5922
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Test:"

    Hausman Test

data:  formula
chisq = 5.4046, df = 5, p-value = 0.3685
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
Edad_t                0.00736978  0.00962361  0.7658  0.44520
Anios_de_contrato_t -0.01997187  0.00879062 -2.2720  0.02476 *
team_num_t            0.00097675  0.00072805  1.3416  0.18210
X_Home_runs_t         0.00305716  0.00429437  0.7119  0.47782
X_Home_runs_t_1       0.00186447  0.00330054  0.5649  0.57313
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                       Estimate  Std. Error  t value  Pr(>|t|)
Edad_t                -0.01534548  0.00059794 -25.6638 < 2.2e-16 ***
Anios_de_contrato_t -0.08083383  0.01048544  -7.7091 1.431e-09 ***
team_num_t            0.00477288  0.00089392   5.3393 3.516e-06 ***
X_Home_runs_t         0.03030838  0.00626943   4.8343 1.820e-05 ***
X_Home_runs_t_1       0.01921603  0.00849991   2.2607   0.02902 *
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
[1] "Test:"

    Hausman Test

data:  formula
chisq = 9.1154, df = 5, p-value = 0.1045
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
Edad_t                0.00870964  0.00855939  1.0176  0.31081
Anios_de_contrato_t -0.01815836  0.00994712 -1.8255  0.07026 .
team_num_t            0.00113326  0.00074833  1.5144  0.13240
X_Home_runs_2_t      -0.00047063  0.00077147 -0.6100  0.54292
X_Home_runs_2_t_1     0.00081816  0.00067436  1.2132  0.22728
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                       Estimate  Std. Error  t value  Pr(>|t|)
Edad_t               -0.01616293  0.00042985 -37.6009 < 2.2e-16 ***
Anios_de_contrato_t -0.06916720  0.00969046  -7.1377 9.244e-09 ***
team_num_t            0.00630580  0.00065624   9.6090 3.641e-12 ***
X_Home_runs_2_t       0.00742849  0.00310125   2.3953   0.02114 *
X_Home_runs_2_t_1     0.00704333  0.00279201   2.5227   0.01552 *
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Test:"

    Hausman Test

data:  formula
chisq = 5.0022, df = 5, p-value = 0.4156
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                         Estimate  Std. Error t value Pr(>|t|)
Edad_t                  0.01131126  0.00911332  1.2412  0.21681
Anios_de_contrato_t    -0.01934158  0.00835749 -2.3143  0.02225 *
team_num_t              0.00115851  0.00074101  1.5634  0.12042
X_Juegos_iniciados_t    0.00178394  0.00137663  1.2959  0.19735
X_Juegos_iniciados_t_1  0.00166927  0.00144025  1.1590  0.24861
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
[1] "Remaining years:"

t test of coefficients:

                          Estimate  Std. Error  t value  Pr(>|t|)
Edad_t                 -0.01466193  0.00038255 -38.3265 < 2.2e-16 ***
Anios_de_contrato_t    -0.08146817  0.01019404  -7.9917 5.746e-10 ***
team_num_t              0.00584798  0.00089071   6.5656 6.100e-08 ***
X_Juegos_iniciados_t    0.00770244  0.00446288   1.7259   0.09172 .
X_Juegos_iniciados_t_1  0.00487915  0.00284973   1.7121   0.09425 .
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Test:"

    Hausman Test

data:  formula
chisq = 0.25077, df = 5, p-value = 0.9985
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                                       Estimate  Std. Error t value Pr(>|t|)
Edad_t                                 0.00715783  0.00803737  0.8906  0.37483
Anios_de_contrato_t                   -0.02298291  0.00917435 -2.5051  0.01350
team_num_t                             0.00154713  0.00074651  2.0725  0.04023
X_Porcentaje_On_base_plus_slugging_t   0.01838224  0.00913571  2.0121  0.04631
X_Porcentaje_On_base_plus_slugging_t_1 0.05663583  0.02219916  2.5513  0.01191

Edad_t
Anios_de_contrato_t                   *
team_num_t                            *
X_Porcentaje_On_base_plus_slugging_t  *
X_Porcentaje_On_base_plus_slugging_t_1 *
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                                       Estimate  Std. Error  t value
Edad_t                                -0.01491134  0.00050830 -29.3359
Anios_de_contrato_t                   -0.07800973  0.00686903 -11.3567
team_num_t                             0.00589233  0.00046036  12.7994
X_Porcentaje_On_base_plus_slugging_t   0.01721920  0.01566039   1.0995
X_Porcentaje_On_base_plus_slugging_t_1 -0.05739369  0.00810184  -7.0840
                                       Pr(>|t|)
Edad_t                                < 2.2e-16 ***
Anios_de_contrato_t                   2.200e-14 ***
```

```
team_num_t                              4.361e-16 ***
X_Porcentaje_On_base_plus_slugging_t       0.2778
X_Porcentaje_On_base_plus_slugging_t_1  1.102e-08 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Test:"

    Hausman Test

data:  formula
chisq = 0.70247, df = 5, p-value = 0.9828
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                                        Estimate  Std. Error t value
Edad_t                                 0.00653833  0.00804609  0.8126
Anios_de_contrato_t                   -0.01705958  0.00862703 -1.9775
team_num_t                             0.00092737  0.00071836  1.2910
X_Porcentaje_On_base_plus_slugging_2_t -0.01568707  0.02160082 -0.7262
X_Porcentaje_On_base_plus_slugging_2_t_1  0.01660688  0.01011632  1.6416
                                       Pr(>|t|)
Edad_t                                  0.41795
Anios_de_contrato_t                     0.05014 .
team_num_t                              0.19905
X_Porcentaje_On_base_plus_slugging_2_t  0.46903
X_Porcentaje_On_base_plus_slugging_2_t_1  0.10313
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                                        Estimate  Std. Error  t value
Edad_t                                -0.01522529  0.00078674 -19.3523
Anios_de_contrato_t                   -0.06869827  0.01548595  -4.4362
team_num_t                             0.00537245  0.00060976   8.8108
X_Porcentaje_On_base_plus_slugging_2_t -0.02705595  0.02478119  -1.0918
X_Porcentaje_On_base_plus_slugging_2_t_1 -0.02189597  0.00548438  -3.9924
                                        Pr(>|t|)
Edad_t                                < 2.2e-16 ***
Anios_de_contrato_t                   6.486e-05 ***
team_num_t                            4.266e-11 ***
X_Porcentaje_On_base_plus_slugging_2_t  0.2811474
X_Porcentaje_On_base_plus_slugging_2_t_1 0.0002575 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Test:"
```

```
    Hausman Test

data:  formula
chisq = 10.747, df = 5, p-value = 0.05663
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                           Estimate  Std. Error t value Pr(>|t|)
Edad_t                    0.00810853  0.00795724  1.0190 0.310119
Anios_de_contrato_t      -0.02332577  0.00892873 -2.6124 0.010065 *
team_num_t                0.00156920  0.00069694  2.2515 0.026055 *
X_Porcentaje_on_base_t    0.06063254  0.03538349  1.7136 0.089026 .
X_Porcentaje_on_base_t_1  0.09891093  0.03088961  3.2021 0.001721 **
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                           Estimate  Std. Error  t value  Pr(>|t|)
Edad_t                   -0.01470456  0.00049494 -29.7097 < 2.2e-16 ***
Anios_de_contrato_t      -0.07928633  0.00822887  -9.6351 3.363e-12 ***
team_num_t                0.00615791  0.00045960  13.3985 < 2.2e-16 ***
X_Porcentaje_on_base_t    0.00350752  0.03295303   0.1064  0.915740
X_Porcentaje_on_base_t_1 -0.04764339  0.01236537  -3.8530  0.000393 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Test:"

    Hausman Test

data:  formula
chisq = 11.857, df = 5, p-value = 0.03681
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                            Estimate Std. Error t value Pr(>|t|)
Edad_t                     0.0093657  0.0079922  1.1719 0.243434
Anios_de_contrato_t       -0.0215180  0.0095815 -2.2458 0.026432 *
team_num_t                 0.0021767  0.0008302  2.6219 0.009804 **
X_Porcentaje_on_base_2_t   0.1583094  0.0533669  2.9664 0.003596 **
X_Porcentaje_on_base_2_t_1 0.0239370  0.0233410  1.0255 0.307046
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"
```

```
t test of coefficients:

                              Estimate  Std. Error  t value  Pr(>|t|)
Edad_t                     -0.01522125  0.00055288 -27.5310 < 2.2e-16 ***
Anios_de_contrato_t        -0.07058055  0.01188677  -5.9377 4.882e-07 ***
team_num_t                  0.00579347  0.00065068   8.9037 3.191e-11 ***
X_Porcentaje_on_base_2_t   -0.02942489  0.04994078  -0.5892 0.5588861
X_Porcentaje_on_base_2_t_1 -0.05190939  0.01238743  -4.1905 0.0001399 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Test:"

    Hausman Test

data:  formula
chisq = 8.9246, df = 5, p-value = 0.1121
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                        Estimate  Std. Error t value Pr(>|t|)
Edad_t                0.00826290  0.00847563  0.9749  0.33145
Anios_de_contrato_t  -0.01796502  0.00873393 -2.0569  0.04172 *
team_num_t            0.00099354  0.00077344  1.2846  0.20126
X_Runs_batted_in_t   -0.00050641  0.00148828 -0.3403  0.73421
X_Runs_batted_in_t_1  0.00257853  0.00140889  1.8302  0.06955 .
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                        Estimate  Std. Error  t value  Pr(>|t|)
Edad_t               -0.01537335  0.00030122 -51.0364 < 2.2e-16 ***
Anios_de_contrato_t  -0.08807950  0.00948818  -9.2831 9.853e-12 ***
team_num_t            0.00554969  0.00104830   5.2940 4.079e-06 ***
X_Runs_batted_in_t    0.00767070  0.00508699   1.5079   0.13906
X_Runs_batted_in_t_1  0.00624733  0.00332130   1.8810   0.06692 .
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Test:"

    Hausman Test

data:  formula
chisq = 4.5016, df = 5, p-value = 0.4797
alternative hypothesis: one model is inconsistent
```

```
[1] "First two years:"

t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
Edad_t               0.00642532  0.00851676  0.7544  0.45198
Anios_de_contrato_t -0.01796541  0.00870755 -2.0632  0.04112 *
team_num_t           0.00106286  0.00076008  1.3984  0.16442
X_Triples_t          0.00097430  0.01332984  0.0731  0.94185
X_Triples_t_1        0.00506225  0.01315489  0.3848  0.70101
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                       Estimate  Std. Error  t value  Pr(>|t|)
Edad_t              -0.01189390  0.00066651 -17.8449 < 2.2e-16 ***
Anios_de_contrato_t -0.07218691  0.01318267  -5.4759 2.244e-06 ***
team_num_t           0.00445586  0.00045125   9.8745 1.634e-12 ***
X_Triples_t         -0.04465453  0.00840024  -5.3159 3.797e-06 ***
X_Triples_t_1       -0.01450160  0.01407215  -1.0305    0.3087
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Test:"

    Hausman Test

data:  formula
chisq = 27.246, df = 5, p-value = 5.109e-05
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
Edad_t               0.00647084  0.00855011  0.7568  0.45055
Anios_de_contrato_t -0.01736406  0.00858718 -2.0221  0.04525 *
team_num_t           0.00111270  0.00075792  1.4681  0.14453
X_Triples_2_t        0.00229222  0.00394284  0.5814  0.56202
X_Triples_2_t_1      0.00379933  0.00498616  0.7620  0.44748
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                       Estimate  Std. Error  t value  Pr(>|t|)
Edad_t              -0.01497807  0.00047917 -31.2583 < 2.2e-16 ***
Anios_de_contrato_t -0.03545552  0.00380699  -9.3133 8.980e-12 ***
```

```
team_num_t           0.00551913  0.00045765  12.0596 3.151e-15 ***
X_Triples_2_t        0.12015886  0.01024265  11.7312 7.750e-15 ***
X_Triples_2_t_1      0.02590837  0.00182367  14.2067 < 2.2e-16 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Test:"

    Hausman Test

data:  formula
chisq = 47.959, df = 5, p-value = 3.621e-09
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                      Estimate  Std. Error t value Pr(>|t|)
Edad_t               0.00327365  0.00763199  0.4289 0.668690
Anios_de_contrato_t -0.02415826  0.00933575 -2.5877 0.010777 *
team_num_t           0.00119022  0.00071736  1.6592 0.099531 .
X_WAR_t              0.02020918  0.00735007  2.7495 0.006832 **
X_WAR_t_1            0.00853426  0.00919162  0.9285 0.354905
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                      Estimate  Std. Error  t value  Pr(>|t|)
Edad_t              -0.02518353  0.00059852 -42.0764 < 2.2e-16 ***
Anios_de_contrato_t -0.07608583  0.00785660  -9.6843 2.898e-12 ***
team_num_t           0.00663185  0.00092814   7.1453 9.015e-09 ***
X_WAR_t              0.05355556  0.00415618  12.8858 3.477e-16 ***
X_WAR_t_1            0.05849648  0.00358558  16.3144 < 2.2e-16 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Test:"

    Hausman Test

data:  formula
chisq = 11.073, df = 5, p-value = 0.04995
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                      Estimate  Std. Error t value Pr(>|t|)
Edad_t               0.00521064  0.00700870  0.7435  0.45857
```

```
Anios_de_contrato_t -0.01965684  0.01044272 -1.8823  0.06206 .
team_num_t           0.00104603  0.00077515  1.3494  0.17958
X_WAR_2_t            0.00356561  0.00485192  0.7349  0.46375
X_WAR_2_t_1          0.00811632  0.00621532  1.3059  0.19394
---
Signif. codes:  0 ’***’ 0.001 ’**’ 0.01 ’*’ 0.05 ’.’ 0.1 ’ ’ 1

[1] "Remaining years:"

t test of coefficients:

                       Estimate  Std. Error  t value  Pr(>|t|)
Edad_t              -0.01572683  0.00097291 -16.1648 < 2.2e-16 ***
Anios_de_contrato_t -0.05568701  0.00161233 -34.5382 < 2.2e-16 ***
team_num_t           0.00488393  0.00082505   5.9196 5.184e-07 ***
X_WAR_2_t            0.06275124  0.01326614   4.7302 2.544e-05 ***
X_WAR_2_t_1         -0.01942290  0.00797414  -2.4357   0.01919 *
---
Signif. codes:  0 ’***’ 0.001 ’**’ 0.01 ’*’ 0.05 ’.’ 0.1 ’ ’ 1

[1] "Test:"

    Hausman Test

data:  formula
chisq = 23.62, df = 5, p-value = 0.0002568
alternative hypothesis: one model is inconsistent
```

Starting pitcher

```
# loop over the variables in var_hitter_list
for (i in 1:length(stat_fielder_t_1)){
  # run linear regression with grouped errors by country and robust errors
  base_vars_s  <- paste(vars_fe, stat_fielder_t[[i]],
                        sep = '+')
  formula <- paste(base_vars_s,
                   stat_fielder_t_1[[i]],
                   sep = " + ")

  print("First two years:")
  s_m_first_d_i <- plm(formula, data = starting_first_two,
                       model = "fd",
                       index = c("id", "Anio_ref"))

  my_lm_cluster_i <- coeftest(s_m_first_d_i,
                              vcov = vcovHC(s_m_first_d_i,
                                            type = "HC1",
                                            cluster = "group"))
  print(my_lm_cluster_i)

  print("Remaining years:")
  s_m_first_d_f <- plm(formula, data = starting_remaining,
```

```
                      model = "fd",
                      index = c("id", "Anio_ref"))

  my_lm_cluster_f <- coeftest(s_m_first_d_f,
                              vcov = vcovHC(s_m_first_d_f,
                                            type = "HC1",
                                            cluster = "group"))
  print(my_lm_cluster_f)

  print("Wu Haussman test:")
  print(phtest(s_m_first_d_i,s_m_first_d_f))
}
```

```
[1] "First two years:"

t test of coefficients:

                      Estimate  Std. Error t value Pr(>|t|)
Edad_t              -3.9309e-03  1.5633e-02 -0.2515  0.80252
Anios_de_contrato_t  7.4626e-04  5.6300e-03  0.1326  0.89509
team_num_t           1.9394e-03  7.4939e-04  2.5879  0.01267 *
X_Bateos_2_t        -3.9965e-05  8.5848e-05 -0.4655  0.64361
X_Bateos_2_t_1       1.0082e-06  8.7039e-05  0.0116  0.99080
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                      Estimate  Std. Error t value Pr(>|t|)
Edad_t               7.0276e-02  2.1541e-02  3.2624 0.006798 **
Anios_de_contrato_t  9.5690e-02  2.7995e-02  3.4181 0.005096 **
team_num_t           1.6290e-03  1.4861e-03  1.0962 0.294519
X_Bateos_2_t        -4.9513e-05  3.0116e-05 -1.6441 0.126078
X_Bateos_2_t_1      -5.0470e-05  6.0350e-05 -0.8363 0.419341
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Wu Haussman test:"

    Hausman Test

data:  formula
chisq = 1.5504, df = 5, p-value = 0.9072
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                      Estimate  Std. Error t value Pr(>|t|)
Edad_t              -0.00519214  0.01192445 -0.4354 0.665170
```

```
Anios_de_contrato_t -0.02010688  0.00785071 -2.5612 0.013562 *
team_num_t           0.00289588  0.00098936  2.9270 0.005177 **
X_Bateos_t           0.00575078  0.00209923  2.7395 0.008559 **
X_Bateos_t_1        -0.00013738  0.00110164 -0.1247 0.901270
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                      Estimate Std. Error t value  Pr(>|t|)
Edad_t               0.0542332  0.0218480  2.4823 0.0288368 *
Anios_de_contrato_t  0.0775180  0.0294153  2.6353 0.0217620 *
team_num_t           0.0037965  0.0010621  3.5745 0.0038205 **
X_Bateos_t          -0.0016336  0.0006989 -2.3373 0.0375677 *
X_Bateos_t_1         0.0034597  0.0007158  4.8334 0.0004096 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Wu Haussman test:"

    Hausman Test

data:  formula
chisq = 13.252, df = 5, p-value = 0.02113
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                           Estimate  Std. Error t value Pr(>|t|)
Edad_t                  -0.00156220  0.01434212 -0.1089  0.91371
Anios_de_contrato_t     -0.00114373  0.00580553 -0.1970  0.84464
team_num_t               0.00198340  0.00075074  2.6419  0.01103 *
X_Carreras_ganadas_2_t  -0.00016747  0.00014134 -1.1849  0.24178
X_Carreras_ganadas_2_t_1  0.00015200  0.00014795  1.0274  0.30927
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                           Estimate  Std. Error t value Pr(>|t|)
Edad_t                   6.9556e-02  2.2957e-02  3.0298  0.01047 *
Anios_de_contrato_t      9.2557e-02  3.0910e-02  2.9944  0.01118 *
team_num_t               2.3737e-03  1.5666e-03  1.5152  0.15562
X_Carreras_ganadas_2_t  -3.9829e-05  7.3476e-05 -0.5421  0.59770
X_Carreras_ganadas_2_t_1  2.3632e-05  1.4092e-04  0.1677  0.86962
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
[1] "Wu Haussman test:"

    Hausman Test

data:  formula
chisq = 1.9911, df = 5, p-value = 0.8504
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                          Estimate  Std. Error t value Pr(>|t|)
Edad_t                  0.00182061  0.01449796  0.1256  0.90058
Anios_de_contrato_t    -0.00225087  0.00595600 -0.3779  0.70712
team_num_t              0.00154940  0.00076710  2.0198  0.04889 *
X_Carreras_ganadas_t    0.00091299  0.00139215  0.6558  0.51501
X_Carreras_ganadas_t_1  0.00349721  0.00147710  2.3676  0.02190 *
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                          Estimate Std. Error t value Pr(>|t|)
Edad_t                  0.0670055  0.0243531  2.7514  0.01756 *
Anios_de_contrato_t     0.0907269  0.0321878  2.8187  0.01550 *
team_num_t              0.0047066  0.0017533  2.6844  0.01987 *
X_Carreras_ganadas_t   -0.0019487  0.0012626 -1.5434  0.14869
X_Carreras_ganadas_t_1  0.0043404  0.0019600  2.2145  0.04690 *
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Wu Haussman test:"

    Hausman Test

data:  formula
chisq = 1.1871, df = 5, p-value = 0.9461
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
Edad_t              -0.00197227  0.01210853 -0.1629  0.87128
Anios_de_contrato_t  0.00846363  0.00722369  1.1716  0.24700
team_num_t           0.00124648  0.00078401  1.5899  0.11829
X_ERA_t              0.02046603  0.00789887  2.5910  0.01257 *
X_ERA_t_1           -0.01208968  0.00664866 -1.8184  0.07512 .
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
[1] "Remaining years:"

t test of coefficients:

                       Estimate  Std. Error t value  Pr(>|t|)
Edad_t                0.10610425  0.02729384  3.8875 0.0021584 **
Anios_de_contrato_t   0.13844834  0.03491163  3.9657 0.0018740 **
team_num_t            0.00458540  0.00104400  4.3922 0.0008774 ***
X_ERA_t              -0.02300245  0.00651299 -3.5318 0.0041329 **
X_ERA_t_1             0.00255774  0.00082896  3.0855 0.0094415 **
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Wu Haussman test:"

    Hausman Test

data:  formula
chisq = 8.394, df = 5, p-value = 0.1358
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
Edad_t                0.00269220  0.01379517  0.1952  0.84608
Anios_de_contrato_t -0.00812823  0.00718574 -1.1312  0.26349
team_num_t            0.00179031  0.00079432  2.2539  0.02871 *
X_Carreras_t          0.00314556  0.00144194  2.1815  0.03397 *
X_Carreras_t_1        0.00341933  0.00145184  2.3552  0.02256 *
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                        Estimate Std. Error t value Pr(>|t|)
Edad_t                0.0548727  0.0195283  2.8099  0.01575 *
Anios_de_contrato_t   0.0738558  0.0266854  2.7676  0.01704 *
team_num_t            0.0029912  0.0012703  2.3546  0.03641 *
X_Carreras_t         -0.0018904  0.0012000 -1.5753  0.14117
X_Carreras_t_1        0.0025871  0.0012334  2.0975  0.05780 .
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Wu Haussman test:"

    Hausman Test

data:  formula
chisq = 0.033692, df = 5, p-value = 1
```

```
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
Edad_t              -5.4959e-03  1.5661e-02 -0.3509 0.727148
Anios_de_contrato_t -8.3084e-05  5.3454e-03 -0.0155 0.987662
team_num_t           2.2943e-03  8.3219e-04  2.7570 0.008173 **
X_Comando_2_t       -3.3842e-03  4.9114e-03 -0.6890 0.494045
X_Comando_2_t_1      2.1171e-06  2.0213e-06  1.0474 0.300050
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
Edad_t               0.08404544  0.02958247  2.8411  0.01487 *
Anios_de_contrato_t  0.11279514  0.03897539  2.8940  0.01348 *
team_num_t           0.00353367  0.00184677  1.9134  0.07985 .
X_Comando_2_t       -0.02081724  0.00729138 -2.8550  0.01449 *
X_Comando_2_t_1     -0.00162246  0.00069341 -2.3398  0.03740 *
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Wu Haussman test:"

    Hausman Test

data:  formula
chisq = 1.1627, df = 5, p-value = 0.9484
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
Edad_t              -0.00139242  0.01561255 -0.0892   0.9293
Anios_de_contrato_t -0.00666729  0.00436009 -1.5292   0.1327
team_num_t           0.00170102  0.00087411  1.9460   0.0574 .
X_Comando_t          0.01675275  0.01985880  0.8436   0.4030
X_Comando_t_1        0.00030972  0.00018243  1.6977   0.0959 .
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                     Estimate Std. Error t value  Pr(>|t|)
```

```
Edad_t               0.0833979  0.0270333  3.0850  0.009450 **
Anios_de_contrato_t  0.1077709  0.0349324  3.0851  0.009448 **
team_num_t           0.0043655  0.0029836  1.4632  0.169120
X_Comando_t         -0.0373303  0.0055345 -6.7450 2.059e-05 ***
X_Comando_t_1        0.0098435  0.0199203  0.4941  0.630127
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Wu Haussman test:"

    Hausman Test

data:  formula
chisq = 2.1662, df = 5, p-value = 0.8257
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                      Estimate  Std. Error t value Pr(>|t|)
Edad_t              -0.00303239  0.01388415 -0.2184 0.828019
Anios_de_contrato_t  0.00142952  0.00686509  0.2082 0.835912
team_num_t           0.00235834  0.00078647  2.9987 0.004252 **
X_Control_2_t       -0.07273050  0.04347975 -1.6727 0.100752
X_Control_2_t_1     -0.04367462  0.01629469 -2.6803 0.009991 **
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                      Estimate Std. Error  t value  Pr(>|t|)
Edad_t               0.0785168  0.0158371   4.9578  0.000332 ***
Anios_de_contrato_t  0.1032418  0.0223977   4.6095  0.000601 ***
team_num_t           0.0036655  0.0013856   2.6454  0.021358 *
X_Control_2_t        0.2577310  0.0203310  12.6767 2.618e-08 ***
X_Control_2_t_1     -0.3903539  0.0304392 -12.8240 2.300e-08 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Wu Haussman test:"

    Hausman Test

data:  formula
chisq = 20.599, df = 5, p-value = 0.000964
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:
```

```
                      Estimate  Std. Error t value Pr(>|t|)
Edad_t              -0.00058648  0.01238001 -0.0474 0.962408
Anios_de_contrato_t -0.00282521  0.00693441 -0.4074 0.685475
team_num_t           0.00214507  0.00076801  2.7930 0.007428 **
X_Control_t         -0.01769364  0.02864232 -0.6177 0.539604
X_Control_t_1       -0.06535029  0.03483807 -1.8758 0.066642 .
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                     Estimate Std. Error  t value  Pr(>|t|)
Edad_t              0.0426059  0.0142265   2.9948  0.011174 *
Anios_de_contrato_t  0.0706201  0.0182783   3.8636  0.002254 **
team_num_t           0.0095439  0.0010473   9.1125 9.682e-07 ***
X_Control_t         -0.0340017  0.0133609  -2.5449  0.025707 *
X_Control_t_1       -0.2354006  0.0105400 -22.3341 3.831e-11 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Wu Haussman test:"

    Hausman Test

data:  formula
chisq = 3.4391, df = 5, p-value = 0.6326
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                      Estimate  Std. Error t value Pr(>|t|)
Edad_t              -0.00347803  0.01285559 -0.2705 0.787877
Anios_de_contrato_t  0.00414036  0.00682158  0.6070 0.546686
team_num_t           0.00259386  0.00096556  2.6864 0.009834 **
X_Dominio_2_t       -0.02015606  0.02633081 -0.7655 0.447649
X_Dominio_2_t_1      0.02820122  0.01050136  2.6855 0.009857 **
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                      Estimate  Std. Error  t value  Pr(>|t|)
Edad_t               0.00349781  0.00544343   0.6426 0.5325857
Anios_de_contrato_t -0.00478787  0.00731020  -0.6550 0.5248511
team_num_t          -0.00049783  0.00018328  -2.7163 0.0187363 *
X_Dominio_2_t       -0.00269709  0.00054836  -4.9184 0.0003547 ***
X_Dominio_2_t_1     -0.12881966  0.00177099 -72.7386 < 2.2e-16 ***
---
```

```
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Wu Haussman test:"

    Hausman Test

data:  formula
chisq = 17.387, df = 5, p-value = 0.003822
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
Edad_t              -0.00451257  0.01363659 -0.3309   0.7421
Anios_de_contrato_t -0.00146098  0.00723599 -0.2019   0.8408
team_num_t           0.00214061  0.00087929  2.4345   0.0186 *
X_Dominio_t          0.00246013  0.01151474  0.2137   0.8317
X_Dominio_t_1        0.01695764  0.01424380  1.1905   0.2396
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                       Estimate  Std. Error  t value  Pr(>|t|)
Edad_t              -0.01652640  0.00191483  -8.6307 1.715e-06 ***
Anios_de_contrato_t -0.02249326  0.00268381  -8.3811 2.328e-06 ***
team_num_t           0.00153267  0.00015212  10.0757 3.301e-07 ***
X_Dominio_t         -0.06192740  0.00152402 -40.6342 3.193e-14 ***
X_Dominio_t_1       -0.12249068  0.00178618 -68.5769 < 2.2e-16 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Wu Haussman test:"

    Hausman Test

data:  formula
chisq = 25.985, df = 5, p-value = 8.982e-05
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                         Estimate  Std. Error t value Pr(>|t|)
Edad_t                -2.5887e-03  1.4605e-02 -0.1772  0.86005
Anios_de_contrato_t    6.2317e-04  5.9025e-03  0.1056  0.91635
team_num_t             2.0047e-03  7.6190e-04  2.6312  0.01134 *
X_Inning_pitched_2_t  -5.1394e-05  7.3958e-05 -0.6949  0.49039
X_Inning_pitched_2_t_1 5.1415e-05  8.0840e-05  0.6360  0.52773
```

```
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                         Estimate  Std. Error t value  Pr(>|t|)
Edad_t                  6.2353e-02  2.2945e-02  2.7175 0.0186953 *
Anios_de_contrato_t     7.3878e-02  2.9332e-02  2.5187 0.0269756 *
team_num_t              2.4205e-03  1.2414e-03  1.9498 0.0749572 .
X_Inning_pitched_2_t   -1.4997e-04  3.4325e-05 -4.3692 0.0009134 ***
X_Inning_pitched_2_t_1  1.5676e-04  3.4415e-05  4.5549 0.0006605 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Wu Haussman test:"

    Hausman Test

data:  formula
chisq = 3.313, df = 5, p-value = 0.6518
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
Edad_t               -0.00019827  0.01352770 -0.0147 0.988365
Anios_de_contrato_t   0.00151865  0.00778464  0.1951 0.846135
team_num_t            0.00214150  0.00077107  2.7773 0.007745 **
X_Inning_pitched_t   -0.00062855  0.00092691 -0.6781 0.500889
X_Inning_pitched_t_1  0.00241406  0.00100307  2.4067 0.019913 *
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                       Estimate  Std. Error t value  Pr(>|t|)
Edad_t                0.06680865  0.02539596  2.6307   0.02195 *
Anios_de_contrato_t   0.08859828  0.03348772  2.6457   0.02135 *
team_num_t            0.00309035  0.00133570  2.3137   0.03922 *
X_Inning_pitched_t   -0.00081638  0.00049489 -1.6496   0.12493
X_Inning_pitched_t_1  0.00247543  0.00035443  6.9842 1.467e-05 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Wu Haussman test:"

    Hausman Test
```

```
data:  formula
chisq = 1.4718, df = 5, p-value = 0.9163
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
Edad_t              -0.00269711  0.01401474 -0.1924 0.848187
Anios_de_contrato_t -0.00062525  0.00664387 -0.0941 0.925406
team_num_t           0.00215900  0.00076736  2.8136 0.007033 **
X_Losses_2_t         0.00099054  0.00079385  1.2478 0.218044
X_Losses_2_t_1       0.00035639  0.00088526  0.4026 0.689009
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
Edad_t               0.06707483  0.02201447  3.0469  0.01014 *
Anios_de_contrato_t  0.09126887  0.02988573  3.0539  0.01001 *
team_num_t           0.00118111  0.00160947  0.7338  0.47713
X_Losses_2_t        -0.00274460  0.00177879 -1.5430  0.14879
X_Losses_2_t_1      -0.00080573  0.00266316 -0.3025  0.76742
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Wu Haussman test:"

    Hausman Test

data:  formula
chisq = 2.0224, df = 5, p-value = 0.846
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                       Estimate  Std. Error t value  Pr(>|t|)
Edad_t              -0.00429667  0.01390442 -0.3090  0.758621
Anios_de_contrato_t -0.00079581  0.00625708 -0.1272  0.899314
team_num_t           0.00219829  0.00081174  2.7081  0.009292 **
X_Saves_2_t          0.30106038  0.00384758 78.2468 < 2.2e-16 ***
X_Saves_2_t_1        0.01397887  0.01277945  1.0939  0.279367
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:
```

```
                     Estimate Std. Error t value  Pr(>|t|)
Edad_t               0.0719248  0.0220834  3.2570  0.006867 **
Anios_de_contrato_t  0.0964262  0.0293894  3.2810  0.006568 **
team_num_t           0.0024917  0.0010979  2.2695  0.042476 *
X_Saves_2_t          0.0902649  0.0034534 26.1380 6.012e-12 ***
X_Saves_2_t_1       -0.2425565  0.0286755 -8.4587 2.115e-06 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Wu Haussman test:"

    Hausman Test

data:  formula
chisq = 1.7209, df = 5, p-value = 0.8863
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
Edad_t              -0.00412418  0.01413118 -0.2918  0.77163
Anios_de_contrato_t -0.00083126  0.00627191 -0.1325  0.89510
team_num_t           0.00215811  0.00081026  2.6635  0.01044 *
X_Saves_t            0.19066845  0.01509549 12.6308  < 2e-16 ***
X_Saves_t_1          0.01672501  0.02751121  0.6079  0.54604
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                       Estimate  Std. Error t value  Pr(>|t|)
Edad_t               0.07512311  0.02097350  3.5818 0.0037697 **
Anios_de_contrato_t  0.10070584  0.02787610  3.6126 0.0035624 **
team_num_t           0.00267557  0.00099858  2.6794 0.0200602 *
X_Saves_t            0.06395618  0.00455674 14.0355  8.29e-09 ***
X_Saves_t_1         -0.10928985  0.02076138 -5.2641 0.0001997 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Wu Haussman test:"

    Hausman Test

data:  formula
chisq = 2.1889, df = 5, p-value = 0.8224
alternative hypothesis: one model is inconsistent

[1] "First two years:"
```

```
t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
Edad_t              -1.3894e-03  1.3413e-02 -0.1036 0.917924
Anios_de_contrato_t  5.9092e-03  8.4041e-03  0.7031 0.485301
team_num_t           2.0619e-03  7.2948e-04  2.8265 0.006793 **
X_Strike_outs_2_t   -9.7220e-05  4.8544e-05 -2.0027 0.050754 .
X_Strike_outs_2_t_1 -3.5883e-05  9.0270e-05 -0.3975 0.692723
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                       Estimate  Std. Error  t value  Pr(>|t|)
Edad_t               6.5593e-02  2.2693e-02   2.8904   0.01357 *
Anios_de_contrato_t  8.2934e-02  2.9977e-02   2.7666   0.01707 *
team_num_t           2.8674e-03  1.1898e-03   2.4101   0.03291 *
X_Strike_outs_2_t   -1.9919e-04  1.8507e-05 -10.7630 1.609e-07 ***
X_Strike_outs_2_t_1  1.7301e-04  5.3203e-06  32.5178 4.525e-13 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Wu Haussman test:"

    Hausman Test

data:  formula
chisq = 2.3822, df = 5, p-value = 0.7941
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
Edad_t              -0.00297882  0.01351363 -0.2204 0.826452
Anios_de_contrato_t -0.00873855  0.00867104 -1.0078 0.318508
team_num_t           0.00243956  0.00088516  2.7561 0.008193 **
X_Strike_outs_t      0.00152156  0.00095492  1.5934 0.117504
X_Strike_outs_t_1    0.00226550  0.00103040  2.1987 0.032653 *
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                       Estimate  Std. Error t value  Pr(>|t|)
Edad_t               0.06618332  0.02442960  2.7091   0.01899 *
Anios_de_contrato_t  0.08099254  0.03190341  2.5387   0.02600 *
team_num_t           0.00329580  0.00134384  2.4525   0.03045 *
X_Strike_outs_t     -0.00082948  0.00043541 -1.9051   0.08101 .
```

```
X_Strike_outs_t_1    0.00236332  0.00014066 16.8010 1.056e-09 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Wu Haussman test:"

    Hausman Test

data:  formula
chisq = 2.2097, df = 5, p-value = 0.8194
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                      Estimate  Std. Error t value Pr(>|t|)
Edad_t              -0.00275005  0.01348293 -0.2040 0.839225
Anios_de_contrato_t  0.00140603  0.00728908  0.1929 0.847838
team_num_t           0.00216977  0.00078114  2.7777 0.007737 **
X_WAR_2_t           -0.00278689  0.00186343 -1.4956 0.141177
X_WAR_2_t_1         -0.00127099  0.00165563 -0.7677 0.446363
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                     Estimate Std. Error t value  Pr(>|t|)
Edad_t               0.0802197  0.0250157  3.2068  0.007537 **
Anios_de_contrato_t  0.1264567  0.0348940  3.6240  0.003489 **
team_num_t           0.0015821  0.0011648  1.3583  0.199363
X_WAR_2_t            0.0079746  0.0047338  1.6846  0.117874
X_WAR_2_t_1         -0.0054223  0.0009122 -5.9442 6.773e-05 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Wu Haussman test:"

    Hausman Test

data:  formula
chisq = 1.823, df = 5, p-value = 0.8731
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                      Estimate  Std. Error t value Pr(>|t|)
Edad_t              0.00652103  0.01280099  0.5094 0.612747
Anios_de_contrato_t 0.00798064  0.00699079  1.1416 0.259172
team_num_t          0.00198134  0.00080396  2.4645 0.017276 *
```

```
X_WHIP_2_t           0.01277894  0.01061440  1.2039 0.234402
X_WHIP_2_t_1        -0.03038273  0.01112977 -2.7299 0.008778 **
---
Signif. codes:  0 ’***’ 0.001 ’**’ 0.01 ’*’ 0.05 ’.’ 0.1 ’ ’ 1

[1] "Remaining years:"

t test of coefficients:

                      Estimate  Std. Error t value  Pr(>|t|)
Edad_t               4.3522e-02  8.5200e-03  5.1082 0.0002582 ***
Anios_de_contrato_t  5.6109e-02  1.0168e-02  5.5180 0.0001324 ***
team_num_t           5.8426e-06  5.6222e-04  0.0104 0.9918793
X_WHIP_2_t           3.3993e-02  2.2321e-02  1.5229 0.1536893
X_WHIP_2_t_1        -3.0902e-03  5.7817e-03 -0.5345 0.6027713
---
Signif. codes:  0 ’***’ 0.001 ’**’ 0.01 ’*’ 0.05 ’.’ 0.1 ’ ’ 1

[1] "Wu Haussman test:"

    Hausman Test

data:  formula
chisq = 3.1525, df = 5, p-value = 0.6765
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                      Estimate Std. Error t value Pr(>|t|)
Edad_t               0.0027183  0.0127828  0.2127 0.832481
Anios_de_contrato_t  0.0034337  0.0056309  0.6098 0.544815
team_num_t           0.0018407  0.0008242  2.2334 0.030124 *
X_WHIP_t             0.0049603  0.0147989  0.3352 0.738919
X_WHIP_t_1          -0.0469907  0.0175151 -2.6829 0.009924 **
---
Signif. codes:  0 ’***’ 0.001 ’**’ 0.01 ’*’ 0.05 ’.’ 0.1 ’ ’ 1

[1] "Remaining years:"

t test of coefficients:

                      Estimate  Std. Error t value Pr(>|t|)
Edad_t               0.04828053  0.01986590  2.4303  0.03171 *
Anios_de_contrato_t  0.06683690  0.02678981  2.4949  0.02818 *
team_num_t           0.00099214  0.00091785  1.0809  0.30097
X_WHIP_t             0.02393213  0.01062476  2.2525  0.04380 *
X_WHIP_t_1          -0.00288547  0.00322931 -0.8935  0.38914
---
Signif. codes:  0 ’***’ 0.001 ’**’ 0.01 ’*’ 0.05 ’.’ 0.1 ’ ’ 1

[1] "Wu Haussman test:"
```

```
    Hausman Test

data:  formula
chisq = 7.7591, df = 5, p-value = 0.17
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                       Estimate  Std. Error t value Pr(>|t|)
Edad_t               0.00026036  0.01269067  0.0205  0.98372
Anios_de_contrato_t -0.00091543  0.00642429 -0.1425  0.88727
team_num_t           0.00158008  0.00058962  2.6798  0.01000 *
X_Walks_2_t          0.00057358  0.00026960  2.1275  0.03844 *
X_Walks_2_t_1        0.00050504  0.00024562  2.0562  0.04511 *
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                       Estimate  Std. Error t value  Pr(>|t|)
Edad_t               0.07054063  0.01863397  3.7856 0.0025970 **
Anios_de_contrato_t  0.09317381  0.02498689  3.7289 0.0028797 **
team_num_t           0.00042042  0.00162987  0.2579 0.8008169
X_Walks_2_t         -0.00075597  0.00017279 -4.3750 0.0009043 ***
X_Walks_2_t_1       -0.00035952  0.00021432 -1.6775 0.1192842
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Wu Haussman test:"

    Hausman Test

data:  formula
chisq = 2.7943, df = 5, p-value = 0.7317
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                     Estimate Std. Error t value Pr(>|t|)
Edad_t              0.00283403 0.01370675  0.2068  0.83705
Anios_de_contrato_t 0.00142041 0.00848518  0.1674  0.86774
team_num_t          0.00146665 0.00079357  1.8482  0.07062 .
X_Walks_t           0.00484428 0.00232439  2.0841  0.04239 *
X_Walks_t_1         0.00591694 0.00218746  2.7049  0.00937 **
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"
```

```
t test of coefficients:

                      Estimate  Std. Error t value  Pr(>|t|)
Edad_t               0.06144703  0.02141979  2.8687 0.0141237 *
Anios_de_contrato_t  0.08229694  0.02896351  2.8414 0.0148580 *
team_num_t           0.00501748  0.00096628  5.1926 0.0002246 ***
X_Walks_t           -0.00423778  0.00127687 -3.3189 0.0061229 **
X_Walks_t_1          0.00729859  0.00100284  7.2779 9.766e-06 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Wu Haussman test:"

    Hausman Test

data:  formula
chisq = 0.37273, df = 5, p-value = 0.996
alternative hypothesis: one model is inconsistent

[1] "First two years:"

t test of coefficients:

                      Estimate  Std. Error t value Pr(>|t|)
Edad_t              -0.00251259  0.01404812 -0.1789  0.85879
Anios_de_contrato_t  0.00267724  0.00875334  0.3059  0.76101
team_num_t           0.00211117  0.00079532  2.6545  0.01068 *
X_Wins_t            -0.00381068  0.00458836 -0.8305  0.41028
X_Wins_t_1           0.00067196  0.00345034  0.1948  0.84639
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Remaining years:"

t test of coefficients:

                      Estimate  Std. Error t value Pr(>|t|)
Edad_t               0.06424351  0.02543577  2.5257 0.026628 *
Anios_de_contrato_t  0.07624434  0.03314437  2.3004 0.040171 *
team_num_t           0.00387012  0.00132643  2.9177 0.012895 *
X_Wins_t            -0.00064195  0.00215335 -0.2981 0.770712
X_Wins_t_1           0.00908365  0.00171671  5.2913 0.000191 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[1] "Wu Haussman test:"

    Hausman Test

data:  formula
chisq = 1.0795, df = 5, p-value = 0.9559
alternative hypothesis: one model is inconsistent
```

Cambio en el poder de negociación al convertirse en agente

Obtendremos el estimador del cambio en el poder de negociación un periodo antes de que el jugador se convierta en agente libre con el primer periodo como agente libre. Importemos las bases de datos

```
setwd("~/Documentos/Github/Proyectos/MLB_HN/")
hitters_panel_ch <- read.csv('ETL_Data/Panel/Cumulative/Bargaining_change/panel_hitters_cum_ch.csv')
fielders_panel_ch <- read.csv('ETL_Data/Panel/Cumulative/Bargaining_change/panel_fielders_cum_ch.csv')
```

Por otro lado, se mostrarán las dimensiones de cada pánel

```
print("Bateadores: ")
```

```
[1] "Bateadores: "
```

```
print(dim(hitters_panel_ch))
```

```
[1] 592 199
```

```
print("")
```

```
[1] ""
```

```
print("Fildeadores: ")
```

```
[1] "Fildeadores: "
```

```
print(dim(fielders_panel_ch))
```

```
[1] 546 213
```

```
# Convert categorical column to numerical
hitters_panel_ch$position_num_t <- as.numeric(factor(hitters_panel_ch$Posicion_t))
fielders_panel_ch$position_num_t <- as.numeric(factor(fielders_panel_ch$Posicion_t))
hitters_panel_ch$team_num_t <- as.numeric(factor(hitters_panel_ch$Acronimo_t))
fielders_panel_ch$team_num_t <- as.numeric(factor(fielders_panel_ch$Acronimo_t))
```

Como adelanto, se descartaron los controles por posición puesto que no son significativos para los modelos y afectan los resultados. Tal vez por el hehco de que los jugadores tienden a rotar de posición en un mismo partido e incluso a lo largo de la temporada. aAgreguemos una columna de 1's que represente la dummy de ser agente libre

```
# add a column of 1s to the panel data
hitters_panel_ch <- cbind(hitters_panel_ch,
                          fa = rep(1, nrow(hitters_panel_ch)))
fielders_panel_ch <- cbind(fielders_panel_ch,
                           fa = rep(1, nrow(fielders_panel_ch)))
```

Segundo, crearemos las categorías de acuerdo a la especificación mencionada arriba

Tercero, concatenaremos estas bases de datos de acuerdo a los grupos señalados anteriormente

Procedamos con las estimaciones de forma directa, no conjunta, puesto que tenemos como objetivo probar que hay un aumento en el poder de negociación

Creemos la lista de variables sobre las cuáles se va a iterar el clico

Variables para los fildeadores

Las variables base para ambos tipos de jugadores son los controles

```
# Constroles:
vars  <- 'Y_Sueldo_regular_norm_t ~ Edad_t + Anios_de_contrato_t + team_num_t'
```

```
hitter_stats_1_ch = c("$Edad_{t}$" , "Años contrato$_{t}$", "Eqipo$_{t}$",
                      "$X_{AB_{t}}$","$X_{AB_{t-1}}$","$X_{AB^{2}_{t}}$","$X_{AB^{2}_{t-1}}$",
                      "$X_{H_{t}}$","$X_{H_{t-1}}$","$X_{H^{2}_{t}}$","$X_{H^{2}_{t-1}}$",
                      "$X_{BA_{t}}$","$X_{BA_{t-1}}$", "$X_{BA^{2}_{t}}$","$X_{BA^{2}_{t-1}}$",
                      "Intercepto")
hitter_stats_2_ch = c("$Edad_{t}$" , "Años contrato$_{t}$", "Eqipo$_{t}$",
                      "$X_{D_{t}}$","$X_{D_{t-1}}$","$X_{D^{2}_{t}}$","$X_{D^{2}_{t-1}}$",
                      "$X_{HR_{t}}$","$X_{HR_{t-1}}$","$X_{HR^{2}_{t}}$","$X_{HR^{2}_{t-1}}$",
                      "$X_{GS_{t}}$","$X_{GS_{t-1}}$", "$X_{GS^{2}_{t}}$","$X_{GS^{2}_{t-1}}$",
                      "Intercepto")
hitter_stats_3_ch = c("$Edad_{t}$" , "Años contrato$_{t}$", "Eqipo$_{t}$",
                      "$X_{OPS_{t}}$","$X_{OPS_{t-1}}$","$X_{OPS^{2}_{t}}$","$X_{OPS^{2}_{t-1}}$",
                      "$X_{OBP_{t}}$","$X_{OBP_{t-1}}$","$X_{OBP^{2}_{t}}$","$X_{OBP^{2}_{t-1}}$",
                      "$X_{SLG_{t}}$","$X_{SLG_{t-1}}$", "$X_{SLG^{2}_{t}}$","$X_{SLG^{2}_{t-1}}$",
                      "Intercepto")
hitter_stats_4_ch = c("$Edad_{t}$" , "Años contrato$_{t}$", "Eqipo$_{t}$",
                      "$X_{RBI_{t}}$","$X_{RBI_{t-1}}$","$X_{RBI^{2}_{t}}$","$X_{RBI^{2}_{t-1}}$",
                      "$X_{WAR_{t}}$","$X_{WAR_{t-1}}$", "$X_{WAR^{2}_{t}}$","$X_{WAR^{2}_{t-1}}$",
                      "Intercepto")
hitter_stats_ch <- list(hitter_stats_1_ch,
                        hitter_stats_2_ch,
                        hitter_stats_3_ch,
                        hitter_stats_4_ch)
# Cycles for loop
hitter_rep_ch <- 3
# Stats to show
hitter_stat_num <- 6
```

```
fielder_stats_1_ch = c("$Edad_{t}$" , "Años contrato$_{t}$", "Eqipo$_{t}$",
                       "$X_{H^{2}_{t}}$","$X_{H^{2}_{t-1}}$","$X_{H_{t}}$","$X_{H_{t-1}}$",
                       "$X_{R^{2}_{t}}$","$X_{R^{2}_{t-1}}$","$X_{ER^{2}_{t}}$","$X_{ER^{2}_{t-1}}$",
                       "$X_{ER_{t}}$","$X_{ER_{t-1}}$", "$X_{R_{t}}$","$X_{R_{t-1}}$",
                       "Intercepto")
fielder_stats_2_ch = c("$Edad_{t}$" , "Años contrato$_{t}$", "Eqipo$_{t}$",
                       "$X_{Comando^{2}_{t}}$","$X_{Comando^{2}_{t-1}}$","$X_{Comando_{t}}$","$X_{Coma
                       "$X_{Control^{2}_{t}}$","$X_{Control^{2}_{t-1}}$","$Control_{H_{t}}$","$X_{Cont
                       "$X_{Dominio^{2}_{t}}$","$X_{Dominio^{2}_{t-1}}$","$X_{Dominio_{t}}$","$X_{Domi
                       "Intercepto")
fielder_stats_3_ch = c("$Edad_{t}$" , "Años contrato$_{t}$", "Eqipo$_{t}$",
                       "$X_{ERA^{2}_{t}}$","$X_{ERA^{2}_{t-1}}$","$X_{ERA_{t}}$","$X_{ERA_{t-1}}$",
```

```
                        "$X_{IP^{2}_{t}}$","$X_{IP^{2}_{t-1}}$","$X_{IP_{t}}$","$X_{IP_{t-1}}$",
                        "$X_{L^{2}_{t}}$","$X_{L^{2}_{t-1}}$", "$X_{L_{t}}$","$X_{L_{t-1}}$",
                        "Intercepto")
fielder_stats_4_ch = c("$Edad_{t}$" , "Años contrato$_{t}$", "Eqipo$_{t}$",
                        "$X_{SO^{2}_{t}}$","$X_{SO^{2}_{t-1}}$","$X_{SO_{t}}$","$X_{SO_{t-1}}$",
                        "$X_{WAR^{2}_{t}}$","$X_{WAR^{2}_{t-1}}$","$X_{WAR_{t}}$","$X_{WAR_{t-1}}$",
                        "$X_{WHIP^{2}_{t}}$","$X_{WHIP^{2}_{t-1}}$","$X_{WHIP_{t}}$","$X_{WHIP_{t-1}}$"
                        "Intercepto")
fielder_stats_5_ch = c("$Edad_{t}$" , "Años contrato$_{t}$", "Eqipo$_{t}$",
                        "$X_{BB^{2}_{t}}$","$X_{BB^{2}_{t-1}}$","$X_{BB_{t}}$","$X_{BB_{t-1}}$",
                        "Intercepto")
fielder_stats_ch <- list(fielder_stats_1_ch,
                         fielder_stats_2_ch,
                         fielder_stats_3_ch,
                         fielder_stats_4_ch,
                         fielder_stats_5_ch)
# Cycles for loop
fielder_rep_ch <- 4
# Stats to show
fielder_stat_num <- 6
```

Pooling

Bateadores

Se obtendrán las estimaciones de las variables referentes a estadísticas deportivas sin controles

```
# Create a model to store the results
hitter_simple_pooling_ch <- list()

# To store the results
hitter_results_simple_pooling_1_ch <- list()
hitter_results_simple_pooling_2_ch <- list()
hitter_results_simple_pooling_3_ch <- list()
hitter_results_simple_pooling_4_ch <- list()
hitter_results_simple_pooling_ch <- list(result_1 = hitter_results_simple_pooling_1_ch,
                                         result_2 = hitter_results_simple_pooling_2_ch,
                                         result_3 = hitter_results_simple_pooling_3_ch,
                                         result_4 = hitter_results_simple_pooling_4_ch)

# Loop over the variables in var_hitter_list
for (j in 1:hitter_rep_ch){

  for (i in 1:hitter_stat_num){
    # Run linear regression with grouped errors by country and robust errors
    base_vars_h  <- paste(vars_ms, stat_hitter_t_ch[[i + hitter_stat_num*(j - 1)]],
                          sep = '+')
    formula <- paste(base_vars_h,
                     stat_hitter_t_1_ch[[i + hitter_stat_num*(j - 1)]],
                     sep = " + ")

    hitter_simple_pooling_ch[[i + hitter_stat_num*(j - 1)]] <- plm(formula, data = hitter_data_ch,
```

```
                                                    model = "pooling",
                                                    index = c("id", "Anio_ref"))

    hitter_results_simple_pooling_ch[[j]][[i]] <- coeftest(hitter_simple_pooling_ch[[i + hitter_stat_nu
                                                          vcov = vcovHC(hitter_simple_pooling_ch[[i + hit
                                                                        type = "HC1",
                                                                        cluster = "group"))
  }

  # Print the third block of results
  stargazer(hitter_results_simple_pooling_ch[[j]],
          no.space = TRUE,
          type = "text",
          title = "Bateadores: Modelo Pooling",
          covariate.labels = hitter_stats_ch[[j]])

  # For last variables:
  if (j == 3){
    for (i in 1:4){
    # Run linear regression with grouped errors by country and robust errors
    base_vars_h  <- paste(vars_ms, stat_hitter_t_ch[[i + hitter_stat_num*(j)]],
                          sep = '+')
    formula <- paste(base_vars_h,
                     stat_hitter_t_1_ch[[i + hitter_stat_num*(j)]],
                     sep = " + ")

    hitter_simple_pooling_ch[[i + hitter_stat_num*(j)]] <- plm(formula, data = hitter_data_ch,
                                                    model = "pooling",
                                                    index = c("id", "Anio_ref"))

    hitter_results_simple_pooling_ch[[4]][[i]] <- coeftest(hitter_simple_pooling_ch[[i + hitter_stat_nu
                                                            vcov = vcovHC(hitter_simple_pooling_ch[[i +
                                                                          type = "HC1",
                                                                          cluster = "group"))
  }

  # Print the third block of results
  stargazer(hitter_results_simple_pooling_ch[[4]],
          no.space = TRUE,
          type = "text",
          title = "Bateadores: Modelo Pooling",
          covariate.labels = hitter_stats_ch[[4]])
  }
}
```

```
Bateadores: Modelo Pooling
================================================================
                              Dependent variable:
                    ---------------------------------------------

                      (1)      (2)      (3)      (4)      (5)      (6)
----------------------------------------------------------------------
Edadt               -0.006   -0.007   -0.007   -0.007   -0.007   -0.007
```

```
                (0.004) (0.004)  (0.005) (0.004)  (0.004) (0.004)
Años contratot -0.006   -0.005  -0.005   -0.006  -0.006  -0.006
                (0.008) (0.008)  (0.008) (0.008)  (0.008) (0.008)
Eqipot           0.001   0.002    0.002   0.002    0.002   0.002
                (0.001) (0.001)  (0.001) (0.001)  (0.001) (0.001)
XABt            -0.002
                (0.001)
XABt-1          0.002**
                (0.001)
XAB2t                   -0.00005
                        (0.0001)
XAB2t-1                 0.00004
                        (0.0001)
XHt                             -0.001
                                (0.002)
XHt-1                            0.001
                                (0.002)
XH2t                                    -0.0003*
                                        (0.0002)
XH2t-1                                  0.0003*
                                        (0.0002)
XBAt                                              0.006
                                                 (0.032)
XBAt-1                                            0.045
                                                 (0.034)
XBA2t                                                     0.032
                                                         (0.030)
XBA2t-1                                                  -0.007
                                                         (0.050)
Intercepto       0.166   0.181    0.191   0.176    0.183   0.190
                (0.142) (0.146)  (0.151) (0.143)  (0.149) (0.149)
=================================================================
=================================================================
Note:                                *p<0.1; **p<0.05; ***p<0.01

Bateadores: Modelo Pooling
=================================================================
                              Dependent variable:
                -------------------------------------------------

                   (1)      (2)      (3)      (4)      (5)       (6)
-----------------------------------------------------------------------
Edadt           -0.007   -0.007   -0.007   -0.007   -0.006    -0.007
                (0.004)  (0.004)  (0.004)  (0.004)  (0.004)   (0.004)
Años contratot  -0.006   -0.005   -0.004   -0.005   -0.005    -0.006
                (0.008)  (0.008)  (0.008)  (0.008)  (0.008)   (0.008)
Eqipot           0.002    0.002    0.002    0.002    0.002     0.002
                (0.001)  (0.001)  (0.001)  (0.001)  (0.001)   (0.001)
XDt             -0.0001
                (0.005)
XDt-1            0.003
                (0.004)
XD2t                    -0.0002
                        (0.001)
```

```
XD2t-1                  0.0002
                        (0.001)
XHRt                            -0.009*
                                (0.005)
XHRt-1                           0.008
                                (0.006)
XHR2t                                    -0.001
                                         (0.001)
XHR2t-1                                  0.0003
                                         (0.001)
XGSt                                              -0.003
                                                  (0.002)
XGSt-1                                             0.003
                                                  (0.002)
XGS2t                                                       -0.0005**
                                                            (0.0002)
XGS2t-1                                                      0.0004*
                                                            (0.0002)
Intercepto       0.186   0.185   0.166   0.182   0.166    0.175
                (0.149) (0.149) (0.145) (0.148) (0.144)  (0.143)
=================================================================
=================================================================
Note:                                  *p<0.1; **p<0.05; ***p<0.01

Bateadores: Modelo Pooling
=================================================================
                              Dependent variable:
                ------------------------------------------------

                   (1)      (2)      (3)      (4)      (5)      (6)
-----------------------------------------------------------------
Edadt           -0.007   -0.007   -0.007   -0.007   -0.007   -0.007
                (0.005)  (0.004)  (0.004)  (0.004)  (0.005)  (0.005)
Años contratot  -0.006   -0.007   -0.005   -0.006   -0.006   -0.006
                (0.008)  (0.008)  (0.008)  (0.008)  (0.008)  (0.008)
Eqipot           0.001    0.002    0.002    0.002    0.002    0.002
                (0.001)  (0.001)  (0.001)  (0.001)  (0.001)  (0.001)
XOPSt            0.022
                (0.021)
XOPSt-1          0.006
                (0.020)
XOPS2t                    0.004
                         (0.019)
XOPS2t-1                  0.026
                         (0.020)
XOBPt                             0.024
                                 (0.032)
XOBPt-1                           0.013
                                 (0.035)
XOBP2t                                    0.016
                                         (0.034)
XOBP2t-1                                  0.064
                                         (0.051)
XSLGt                                                 0.029
```

```
                                                  (0.030)
XSLGt-1                                            0.010
                                                  (0.026)
XSLG2t                                                     0.022
                                                          (0.038)
XSLG2t-1                                                   0.011
                                                          (0.032)
Intercepto      0.177   0.176   0.183   0.188   0.173   0.181
               (0.151) (0.149) (0.148) (0.148) (0.152) (0.150)
================================================================
================================================================
Note:                               *p<0.1; **p<0.05; ***p<0.01
```

```
Bateadores: Modelo Pooling
================================================
                      Dependent variable:
                  -------------------------------

                    (1)     (2)      (3)     (4)
------------------------------------------------
Edadt            -0.007   -0.007  -0.007  -0.007
                 (0.005) (0.004)  (0.004) (0.005)
Años contratot -0.005   -0.004  -0.007  -0.006
                 (0.008) (0.008)  (0.008) (0.008)
Eqipot            0.002   0.002    0.002   0.002
                 (0.001) (0.001)  (0.001) (0.001)
XRBIt            -0.001
                 (0.003)
XRBIt-1          0.0001
                 (0.003)
XRBI2t                   -0.001*
                         (0.0003)
XRBI2t-1                  0.0005
                         (0.0004)
XWARt                              0.004
                                  (0.013)
XWARt-1                           0.024*
                                  (0.012)
XWAR2t                                     0.003
                                          (0.008)
XWAR2t-1                                   0.005
                                          (0.006)
Intercepto        0.191   0.181    0.197   0.191
                 (0.152) (0.142)  (0.147) (0.149)
================================================
================================================
Note:                *p<0.1; **p<0.05; ***p<0.01
```

Starting pitcher

```
# Create a model to store the results
fielder_simple_pooling_ch <- list()
```

```r
# To store the results
fielder_results_simple_pooling_1_ch <- list()
fielder_results_simple_pooling_2_ch <- list()
fielder_results_simple_pooling_3_ch <- list()
fielder_results_simple_pooling_4_ch <- list()
fielder_results_simple_pooling_5_ch <- list()
fielder_results_simple_pooling_ch <- list(result_1 = fielder_results_simple_pooling_1_ch,
                                          result_2 = fielder_results_simple_pooling_2_ch,
                                          result_3 = fielder_results_simple_pooling_3_ch,
                                          result_4 = fielder_results_simple_pooling_4_ch,
                                          result_5 = fielder_results_simple_pooling_5_ch)

# Loop over the variables in var_hitter_list
for (j in 1:fielder_rep_ch){

  for (i in 1:fielder_stat_num){
    # Run linear regression with grouped errors by country and robust errors
    base_vars_h  <- paste(vars_fe, stat_fielder_t_ch[[i + fielder_stat_num*(j - 1)]],
                          sep = '+')
    formula <- paste(base_vars_h,
                     stat_fielder_t_1_ch[[i + fielder_stat_num*(j - 1)]],
                     sep = " + ")

    fielder_simple_pooling_ch[[i + hitter_stat_num*(j - 1)]] <- plm(formula, data = starting_data_ch,
                                                                    model = "pooling",
                                                                    index = c("id", "Anio_ref"))

    fielder_results_simple_pooling_ch[[j]][[i]] <- coeftest(fielder_simple_pooling_ch[[i + fielder_stat
                                                            vcov = vcovHC(fielder_simple_pooling_ch[[i
                                                                   type = "HC1",
                                                                   cluster = "group"))
  }

  # Print the third block of results
  stargazer(fielder_results_simple_pooling_ch[[j]],
            no.space = TRUE,
            type = "text",
            title = "Lanzadores Iniciales: Modelo Pooling",
            covariate.labels = fielder_stats_ch[[j]])

  # For last variables:
  if (j == 4){
    for (i in 1:2){
    # Run linear regression with grouped errors by country and robust errors
    base_vars_h  <- paste(vars_fe, stat_fielder_t_ch[[i + fielder_stat_num*(j)]],
                          sep = '+')
    formula <- paste(base_vars_h,
                     stat_fielder_t_1_ch[[i + fielder_stat_num*(j)]],
                     sep = " + ")

    fielder_simple_pooling_ch[[i + fielder_stat_num*(j)]] <- plm(formula, data = starting_data_ch,
                                                                 model = "pooling",
                                                                 index = c("id", "Anio_ref"))
```

```
    fielder_results_simple_pooling_ch[[5]][[i]] <- coeftest(fielder_simple_pooling_ch[[i + fielder_stat
                                                           vcov = vcovHC(fielder_simple_pooling_ch[[i +
                                                                         type = "HC1",
                                                                         cluster = "group"))
  }

  # Print the third block of results
  stargazer(fielder_results_simple_pooling_ch[[5]],
          no.space = TRUE,
          type = "text",
          title = "Bateadores: Modelo Pooling",
          covariate.labels = fielder_stats_ch[[5]])
  }
}
```

Lanzadores Iniciales: Modelo Pooling

	Dependent variable:					
	(1)	(2)	(3)	(4)	(5)	(6)
Edadt	0.001	0.0001	0.0002	0.0002	-0.0002	-0.0003
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Años contratot	-0.012	-0.013	-0.012	-0.012	-0.011	-0.010
	(0.011)	(0.011)	(0.011)	(0.011)	(0.012)	(0.012)
Eqipot	0.0002	0.001	0.001	0.001	0.001	0.001
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
XH2t	-0.0001					
	(0.0002)					
XH2t-1	0.0002					
	(0.0002)					
XHt		0.002				
		(0.003)				
XHt-1		0.002				
		(0.002)				
XR2t			0.0004			
			(0.0004)			
XR2t-1			0.0002			
			(0.0004)			
XER2t				0.001		
				(0.0005)		
XER2t-1				0.00003		
				(0.0004)		
XERt					0.005	
					(0.005)	
XERt-1					0.001	
					(0.004)	
XRt						0.006
						(0.005)
XRt-1						0.001
						(0.004)

```
=====================================================================
Note:                                    *p<0.1; **p<0.05; ***p<0.01

Lanzadores Iniciales: Modelo Pooling
=====================================================================
                                Dependent variable:
                    ---------------------------------------------------

                      (1)      (2)      (3)       (4)      (5)      (6)
---------------------------------------------------------------------
Edadt               0.0003   0.001    0.001     0.001    0.001    0.001
                    (0.002) (0.002)  (0.002)   (0.002)  (0.002) (0.002)
Años contratot     -0.009   -0.008   -0.013    -0.008   -0.012   -0.012
                    (0.012) (0.011)  (0.011)   (0.010)  (0.012) (0.011)
Eqipot              0.001   -0.0003  -0.001    -0.002    0.0002  -0.00001
                    (0.002) (0.002)  (0.002)   (0.002)  (0.002) (0.002)
XComando2t          0.003
                    (0.009)
XComando2t-1       -0.006
                    (0.008)
XComandot                   -0.009
                            (0.016)
XComandot-1                 0.027*
                            (0.016)
XControl2t                           0.041
                                    (0.062)
XControl2t-1                        -0.296***
                                    (0.106)
ControlHt                                      0.026
                                              (0.047)
XControlt-1                                   -0.189***
                                              (0.048)
XDominio2t                                               0.031
                                                        (0.033)
XDominio2t-1                                             0.051
                                                        (0.042)
XDominiot                                                         0.012
                                                                 (0.031)
XDominiot-1                                                       0.056*
                                                                 (0.033)
=====================================================================
=====================================================================
Note:                                    *p<0.1; **p<0.05; ***p<0.01

Lanzadores Iniciales: Modelo Pooling
=================================================================
                                Dependent variable:
                    -----------------------------------------------

                      (1)      (2)      (3)       (4)      (5)      (6)
-----------------------------------------------------------------
Edadt               0.0004   0.0005   0.001     0.001    0.001    0.0003
                    (0.002) (0.002)  (0.002)   (0.002)  (0.002) (0.002)
Años contratot     -0.008   -0.013   -0.014    -0.013   -0.009   -0.012
```

```
               (0.011) (0.011) (0.011)  (0.011) (0.010) (0.011)
Eqipot          0.001   0.001   0.0003  0.0004  -0.0001  0.0001
               (0.002) (0.002) (0.002)  (0.002) (0.002) (0.002)
XERA2t         0.008*
               (0.004)
XERA2t-1       -0.004
               (0.006)
XERAt                  0.019*
                       (0.011)
XERAt-1                -0.022*
                       (0.012)
XIP2t                          -0.0003
                               (0.0002)
XIP2t-1                        0.0003**
                               (0.0001)
XIPt                                    0.0001
                                        (0.003)
XIPt-1                                   0.003
                                        (0.002)
XL2t                                            0.007**
                                                (0.003)
XL2t-1                                          -0.005*
                                                (0.003)
XLt                                                     0.030***
                                                        (0.011)
XLt-1                                                   -0.017*
                                                        (0.010)
=========================================================================
=========================================================================
Note:                                  *p<0.1; **p<0.05; ***p<0.01

Lanzadores Iniciales: Modelo Pooling
=========================================================================
                                Dependent variable:
               ---------------------------------------------------

                   (1)      (2)     (3)     (4)     (5)     (6)
-------------------------------------------------------------------------
Edadt           0.0004   0.0002   0.001   0.001  0.0005   0.001
                (0.002)  (0.002) (0.002) (0.002) (0.002) (0.002)
Años contratot  -0.013   -0.014  -0.011  -0.014  -0.008  -0.009
                (0.011)  (0.011) (0.011) (0.012) (0.011) (0.011)
Eqipot           0.001    0.001   0.001  0.0002   0.001  -0.0002
                (0.002)  (0.002) (0.002) (0.002) (0.002) (0.002)
XSO2t           -0.0001
               (0.0002)
XSO2t-1        0.0004***
               (0.0001)
XSOt                     -0.0002
                         (0.003)
XSOt-1                   0.005**
                         (0.002)
XWAR2t                           -0.004
                                 (0.011)
```

```
XWAR2t-1                          0.007
                                 (0.004)
XWARt                                    0.025
                                        (0.020)
XWARt-1                                  0.019
                                        (0.018)
XWHIP2t                                          0.020
                                                (0.019)
XWHIP2t-1                                        0.002
                                                (0.021)
XWHIPt                                                    0.024
                                                         (0.020)
XWHIPt-1                                                 -0.030
                                                         (0.022)
=================================================================
=================================================================
Note:                                  *p<0.1; **p<0.05; ***p<0.01

Bateadores: Modelo Pooling
=========================================
                  Dependent variable:
              ---------------------------

                    (1)            (2)
-----------------------------------------
Edadt              0.001         0.0003
                  (0.002)        (0.002)
Años contratot     -0.011        -0.011
                  (0.011)        (0.011)
Eqipot            0.00003        0.0005
                  (0.002)        (0.002)
XBB2t             -0.0002
                  (0.001)
XBB2t-1            0.001
                  (0.0005)
XBBt                              0.003
                                 (0.005)
XBBt-1                            0.002
                                 (0.004)
=========================================
=========================================
Note:           *p<0.1; **p<0.05; ***p<0.01
```

Efectos aleatorios

POr definición, necesitamos más de un periodo de observación. Por lo tanto, no obtendremos dicho modelo por esa restricción.

Efectos aleatorios

Son equivalentes al pooling debido a que solo obtenemos la estimación para un periodo.

First Differences

Presenta las mismas restricciones que el estimador *within*.

Difference in Differences

Análogo a la sección anterior, importemos las bases de datos correspondientes

```
setwd("~/Documentos/Github/Proyectos/MLB_HN/")
hitters_panel_did <- read.csv('ETL_Data/Panel/Cumulative/Bargaining_change/panel_hitters_cum_did.csv')
fielders_panel_did <- read.csv('ETL_Data/Panel/Cumulative/Bargaining_change/panel_fielders_cum_did.csv')
```

Por otro lado, se mostrarán las dimensiones de cada pánel

```
print("Bateadores: ")
```

```
[1] "Bateadores: "
```

```
print(dim(hitters_panel_did))
```

```
[1] 1852  200
```

```
print("")
```

```
[1] ""
```

```
print("Fildeadores: ")
```

```
[1] "Fildeadores: "
```

```
print(dim(fielders_panel_did))
```

```
[1] 1789  214
```

```
# Convert categorical column to numerical
hitters_panel_did$position_num_t <- as.numeric(factor(hitters_panel_did$Posicion_t))
fielders_panel_did$position_num_t <- as.numeric(factor(fielders_panel_did$Posicion_t))
hitters_panel_did$team_num_t <- as.numeric(factor(hitters_panel_did$Acronimo_t))
fielders_panel_did$team_num_t <- as.numeric(factor(fielders_panel_did$Acronimo_t))
```

Como adelanto, se descartaron los controles por posición puesto que no son significativos para los modelos y afectan los resultados. Tal vez por el hehco de que los jugadores tienden a rotar de posición en un mismo partido e incluso a lo largo de la temporada. aAgreguemos una columna de 1's que represente la dummy de ser agente libre

```
# add a column of 1s to the panel data
hitters_panel_did <- cbind(hitters_panel_did,
                           fa = rep(1, nrow(hitters_panel_did)))
fielders_panel_did <- cbind(fielders_panel_did,
                            fa = rep(1, nrow(fielders_panel_did)))
```

Segundo, crearemos las categorías de acuerdo a la especificación mencionada arriba

Tercero, concatenaremos estas bases de datos de acuerdo a los grupos señalados anteriormente

Ahora, estimare el modelo DID para múltiples años. En este caso, ya contamos con una columna que tiene los años escalados de manera adecuada para indicar con 0 el primer año de tratamiento.

Obtengamos el efecto promedio de convertirse en agentes libres

```
# Convert panel_data to a plm data object
plm_data <- pdata.frame(hitter_data_did,
                        index = c("Jugador","Anio_ref"))

# Specify the formula using as.formula
formula <- as.formula("Y_Sueldo_regular_norm_t ~ treatment * factor(Anio_did >= 0) + Anios_de_contrato_

# Estimate DID model with multiple periods
hitter_did_model <- plm(formula,
                        data = plm_data,
                        model = "within")


# Extract ATE estimate from DID model
print(hitter_ate_estimate <- coef(hitter_did_model)[6])
```

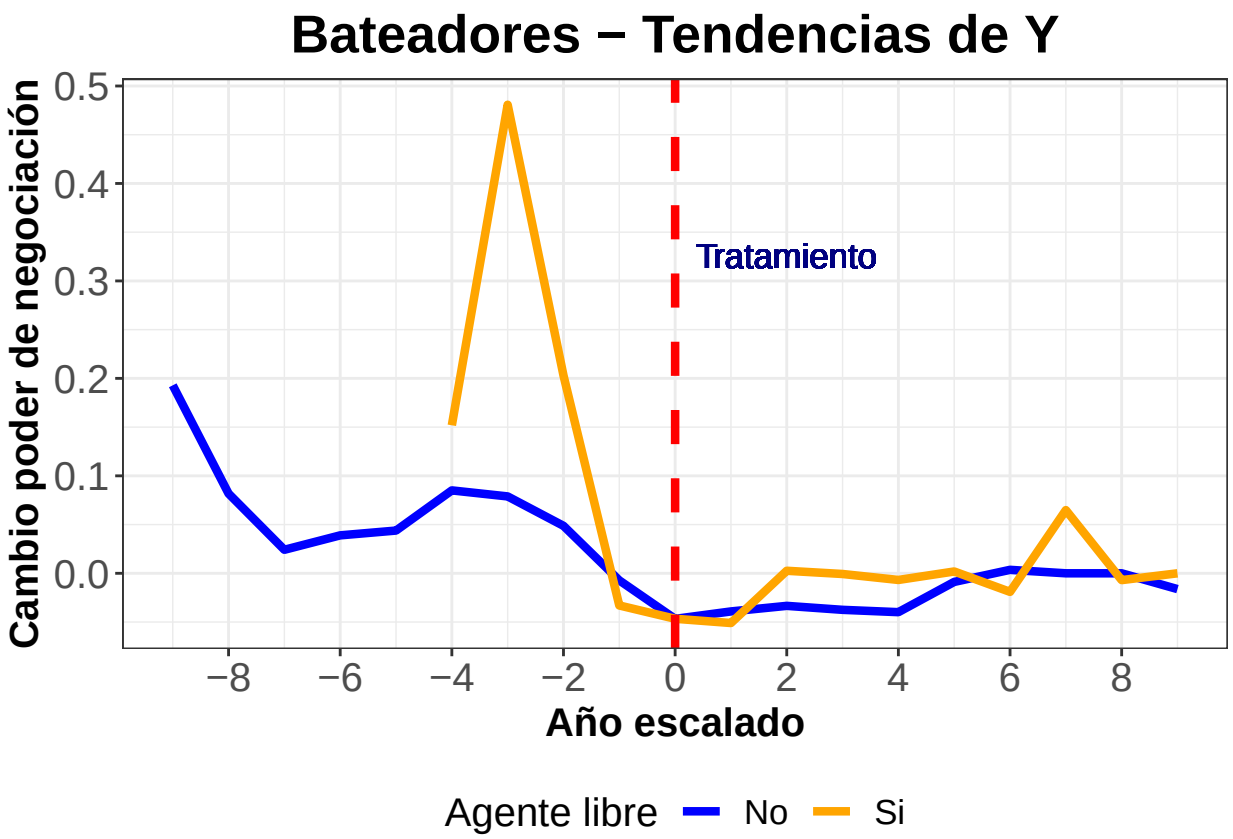
```
treatment:factor(Anio_did >= 0)TRUE
                        -0.01816683
```

```
# Convert panel_data to a plm data object
plm_data <- pdata.frame(starting_data_did,
                        index = c("Jugador","Anio_ref"))

# Specify the formula using as.formula
formula <- as.formula("Y_Sueldo_regular_norm_t ~ treatment * factor(Anio_did >= 0) + Anios_de_contrato_

# Estimate DID model with multiple periods
starting_did_model <- plm(formula,
                          data = plm_data,
                          model = "within")


# Extract ATE estimate from DID model
print(starting_ate_estimate <- coef(starting_did_model)[6])
```

```
treatment:factor(Anio_did >= 0)TRUE
                         0.03396074
```

```r
# Create a data frame with outcome variable, treatment indicator, and time variable
parallel_data <- data.frame(Y_Sueldo_regular_norm_t = hitter_data_did$Y_Sueldo_regular_norm_t,
                            Tratamiento = hitter_data_did$Tratamiento,
                            Anio_did = hitter_data_did$Anio_did)

# Calculate mean outcome for treatment and control groups at each time period
parallel_means <- aggregate(Y_Sueldo_regular_norm_t ~ Tratamiento + Anio_did, data = parallel_data, FUN

# Create plot
ggplot(data = parallel_means,
       aes(x = Anio_did, y = Y_Sueldo_regular_norm_t, color = Tratamiento)) +
  geom_line(size = 1.5) +
  ggtitle("Bateadores - Tendencias de Y") +
  xlab("Año escalado") +
  ylab('Cambio poder de negociación') +
  scale_color_manual(values = c("blue", "orange")) +
  theme_bw() +
  geom_vline(xintercept = 0,
             linetype = "dashed",
             color = "red",
             size = 1.5) +
  theme(
    #Título de los ejes:
    axis.title.x = element_text(color = "Black",
                                size = 15,
                                face = "bold"),
    axis.title.y = element_text(color="Black",
                                size = 15,
                                face = "bold"),

    #Texto de los ejes:
    axis.text.x = element_text(size = 15),
    axis.text.y = element_text(size = 15),

    #T?tulo del gr?fico:
    plot.title = element_text(color = "Black",
                              size = 20,
                              hjust = 0.5,
                              face = "bold"),

    #T?tulo de la Leyenda:
    legend.title = element_text(size = 15),

    #Texto de la Leyenda
    legend.text = element_text(size = 13),

    # POsición de la leyenda:
    legend.position = "bottom"
  ) +
  scale_x_continuous(breaks = seq(-10, 10, by = 2)) +
  geom_text(aes(label = "Tratamiento"), x = 2, y = 0.3,
            size = 4.5,
            color = "navy",
```

```
            angle = 0,
            hjust = 0.5,
            vjust = -0.5) +
  labs(color = "Agente libre")
```

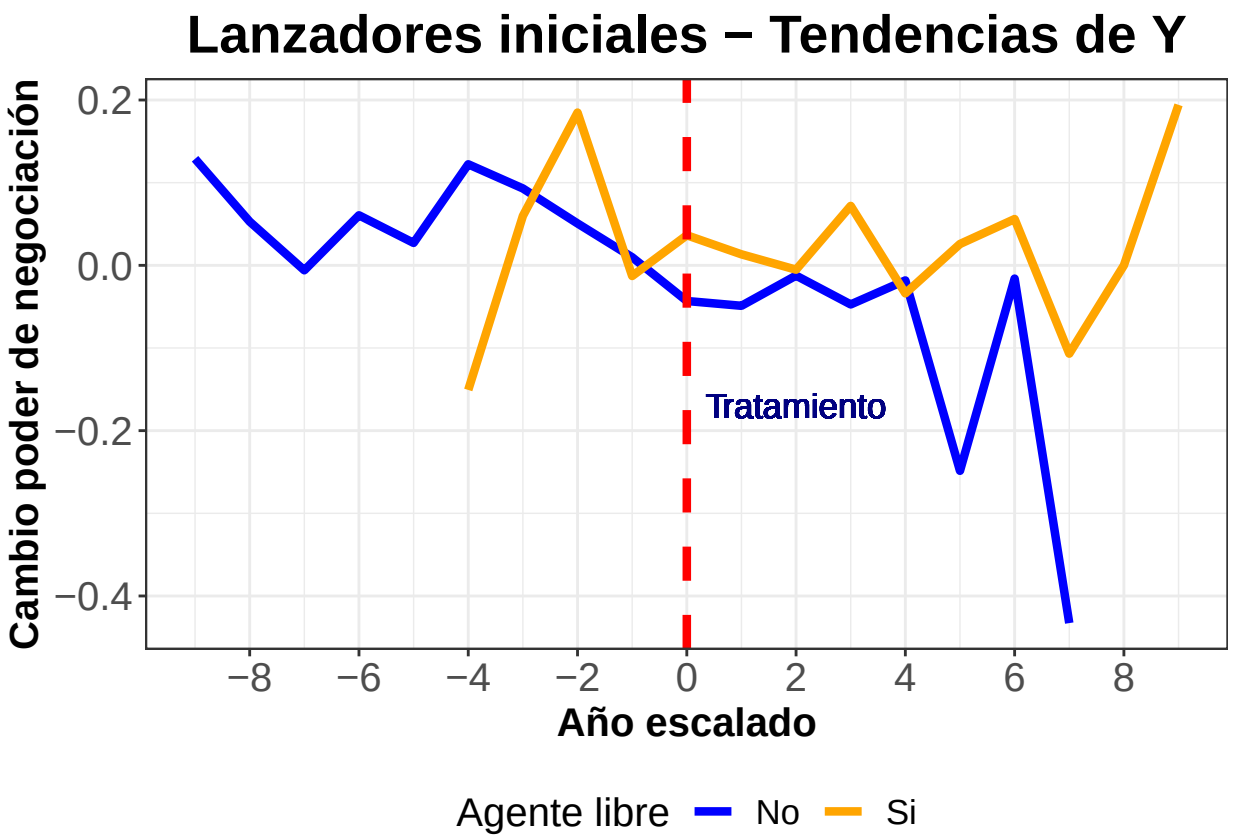



```
# Save the plot as a PDF file
ggsave("did_model_plot_hitter_y.pdf")
```

```
Saving 6.5 x 4.5 in image
```

```
# Create a data frame with outcome variable, treatment indicator, and time variable
parallel_data <- data.frame(Y_Sueldo_regular_norm_t = starting_data_did$Y_Sueldo_regular_norm_t,
                            Tratamiento = starting_data_did$Tratamiento,
                            Anio_did = starting_data_did$Anio_did)

# Calculate mean outcome for treatment and control groups at each time period
parallel_means <- aggregate(Y_Sueldo_regular_norm_t ~ Tratamiento + Anio_did,
                            data = parallel_data,
                            FUN = mean)

# Create plot
ggplot(data = parallel_means,
       aes(x = Anio_did, y = Y_Sueldo_regular_norm_t, color = Tratamiento)) +
  geom_line(size = 1.5) +
  ggtitle("Lanzadores iniciales - Tendencias de Y") +
  xlab("Año escalado") +
```

```
ylab('Cambio poder de negociación') +
scale_color_manual(values = c("blue", "orange")) +
theme_bw() +
theme(plot.title = element_text(hjust = 0.5)) +
geom_vline(xintercept = 0,
           linetype = "dashed",
           color = "red",
           size = 1.5) +
theme(
  #Título de los ejes:
  axis.title.x = element_text(color = "Black",
                              size = 15,
                              face = "bold"),
  axis.title.y = element_text(color="Black",
                              size = 15,
                              face = "bold"),

  #Texto de los ejes:
  axis.text.x = element_text(size = 15),
  axis.text.y = element_text(size = 15),

  #T?tulo del gr?fico:
  plot.title = element_text(color = "Black",
                            size = 20,
                            hjust = 0.5,
                            face = "bold"),

  #T?tulo de la Leyenda:
  legend.title = element_text(size = 15),

  #Texto de la Leyenda
  legend.text = element_text(size = 13),

  # POsición de la leyenda:
  legend.position = "bottom"
) +
scale_x_continuous(breaks = seq(-10, 10, by = 2)) +
geom_text(aes(label = "Tratamiento"), x = 2, y = -0.2,
          size = 4.5,
          color = "navy",
          angle = 0,
          hjust = 0.5,
          vjust = -0.5) +
labs(color = "Agente libre")
```




```
# Save the plot as a PDF file
ggsave("did_model_plot_starting_y.pdf")
```

```
Saving 6.5 x 4.5 in image
```

Repitamos lo mismo para los salarios

```
# Convert panel_data to a plm data object
plm_data <- pdata.frame(hitter_data_did,
                        index = c("Jugador","Anio_ref"))

# Specify the formula using as.formula
formula <- as.formula("Sueldo_regular_norm_t ~ treatment * factor(Anio_did >= 0) + Anios_de_contrato_t +

# Estimate DID model with multiple periods
hitter_did_model <- plm(formula,
                         data = plm_data,
                         model = "within")


# Extract ATE estimate from DID model
print(hitter_ate_estimate <- coef(hitter_did_model)[6])
```

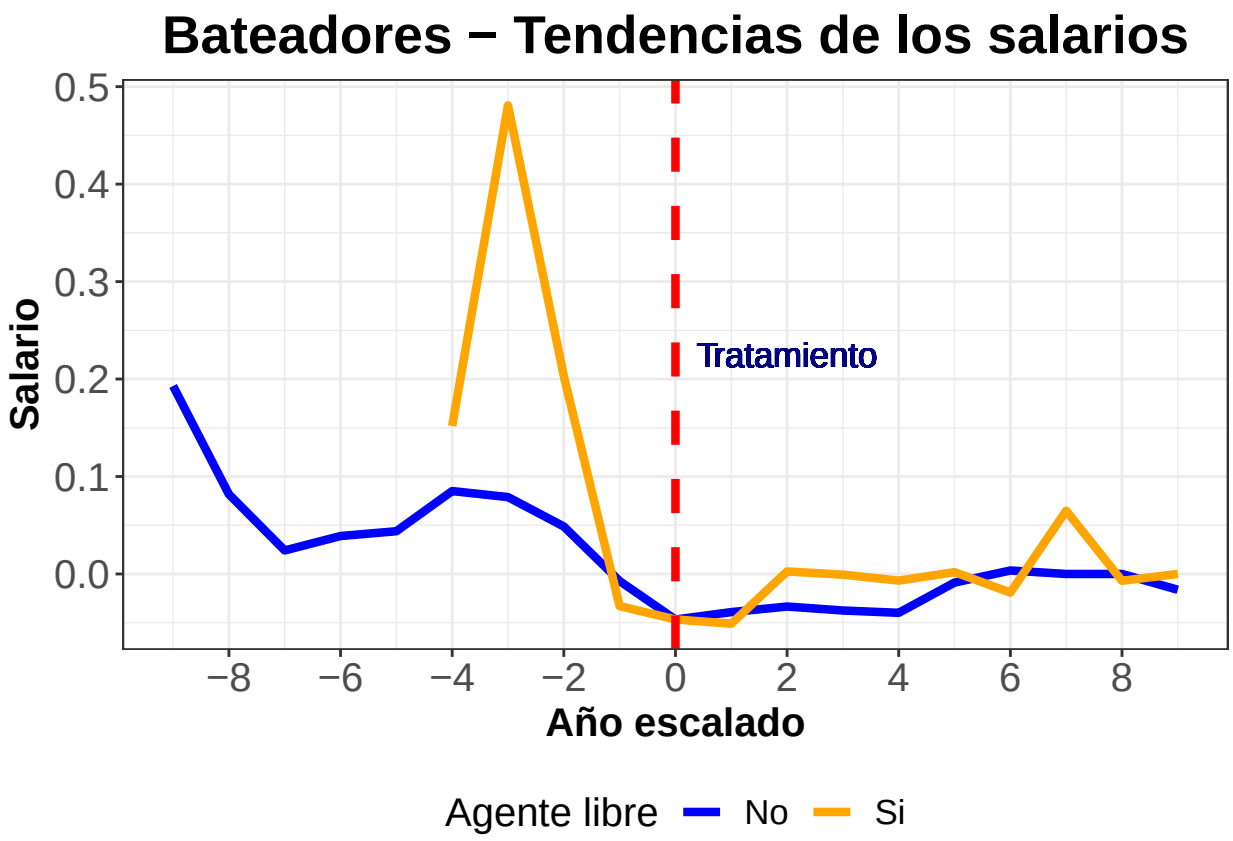
```
treatment:factor(Anio_did >= 0)TRUE
                         -0.04397042
```

```r
# Convert panel_data to a plm data object
plm_data <- pdata.frame(starting_data_did,
                        index = c("Jugador","Anio_ref"))

# Specify the formula using as.formula
formula <- as.formula("Sueldo_regular_norm_t ~ treatment * factor(Anio_did >= 0) + Anios_de_contrato_t +

# Estimate DID model with multiple periods
starting_did_model <- plm(formula,
                          data = plm_data,
                          model = "within")


# Extract ATE estimate from DID model
print(starting_ate_estimate <- coef(starting_did_model)[6])
```

```
treatment:factor(Anio_did >= 0)TRUE
                        -0.06312658
```

```r
# Create a data frame with outcome variable, treatment indicator, and time variable
parallel_data <- data.frame(Sueldo_regular_norm_t = hitter_data_did$Y_Sueldo_regular_norm_t,
                            Tratamiento = hitter_data_did$Tratamiento,
                            Anio_did = hitter_data_did$Anio_did)

# Calculate mean outcome for treatment and control groups at each time period
parallel_means <- aggregate(Sueldo_regular_norm_t ~ Tratamiento + Anio_did, data = parallel_data, FUN =

# Create plot
ggplot(data = parallel_means,
       aes(x = Anio_did, y = Sueldo_regular_norm_t, color = Tratamiento)) +
  geom_line(size = 1.5) +
  ggtitle("Bateadores - Tendencias de los salarios") +
  xlab("Año escalado") +
  ylab('Salario') +
  scale_color_manual(values = c("blue", "orange")) +
  theme_bw() +
  theme(plot.title = element_text(hjust = 0.5)) +
  geom_vline(xintercept = 0,
             linetype = "dashed",
             color = "red",
             size = 1.5) +
  theme(
    #Título de los ejes:
    axis.title.x = element_text(color = "Black",
                                size = 15,
                                face = "bold"),
    axis.title.y = element_text(color="Black",
                                size = 15,
                                face = "bold"),

    #Texto de los ejes:
    axis.text.x = element_text(size = 15),
    axis.text.y = element_text(size = 15),
```

```
  #T?tulo del gr?fico:
  plot.title = element_text(color = "Black",
                            size = 20,
                            hjust = 0.5,
                            face = "bold"),

  #T?tulo de la Leyenda:
  legend.title = element_text(size = 15),

  #Texto de la Leyenda
  legend.text = element_text(size = 13),

  # POsición de la leyenda:
  legend.position = "bottom"
) +
scale_x_continuous(breaks = seq(-10, 10, by = 2)) +
geom_text(aes(label = "Tratamiento"), x = 2, y = 0.2,
          size = 4.5,
          color = "navy",
          angle = 0,
          hjust = 0.5,
          vjust = -0.5) +
labs(color = "Agente libre")
```

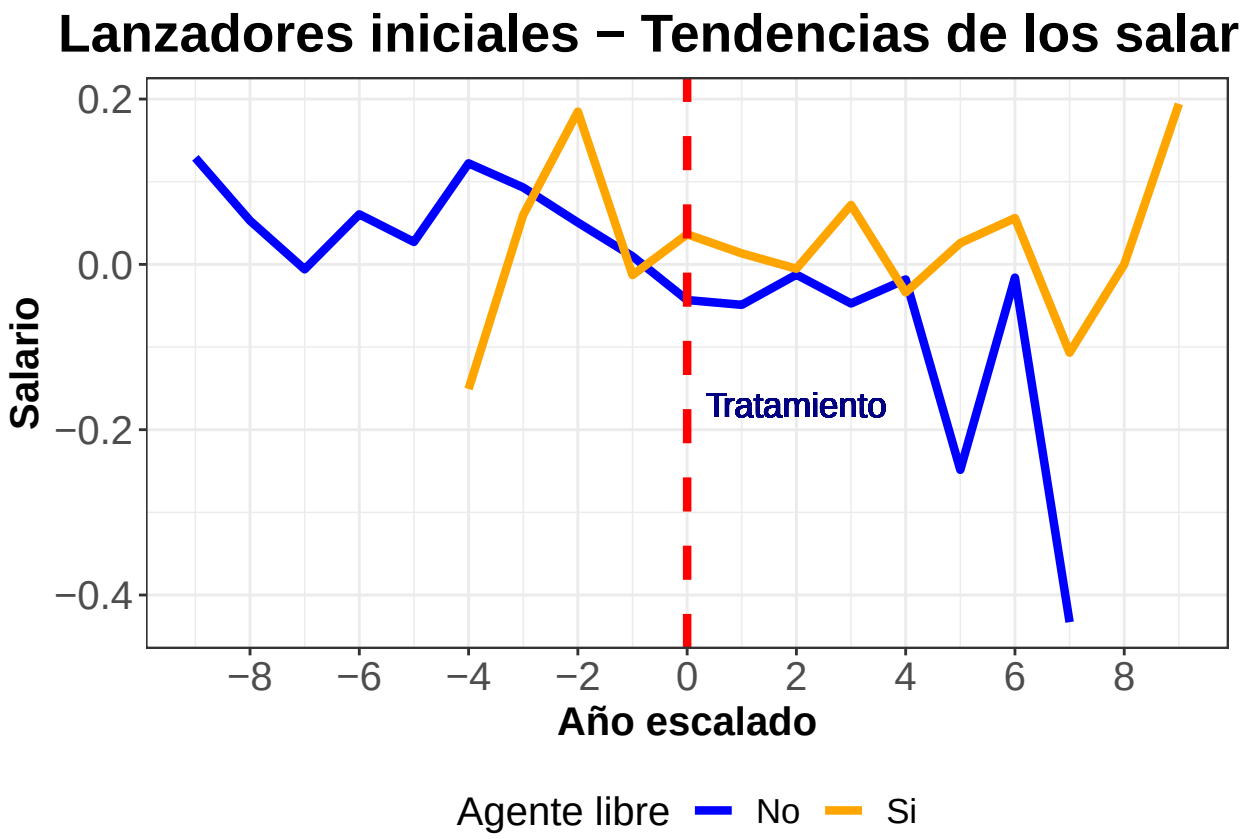


```r
# Save the plot as a PDF file
ggsave("did_model_plot_hitter_w.pdf")
```

```
Saving 6.5 x 4.5 in image
```

```r
# Create a data frame with outcome variable, treatment indicator, and time variable
parallel_data <- data.frame(Sueldo_regular_norm_t = starting_data_did$Y_Sueldo_regular_norm_t,
                            Tratamiento = starting_data_did$Tratamiento,
                            Anio_did = starting_data_did$Anio_did)

# Calculate mean outcome for treatment and control groups at each time period
parallel_means <- aggregate(Sueldo_regular_norm_t ~ Tratamiento + Anio_did, data = parallel_data,
                            FUN = mean)

# Create plot
ggplot(data = parallel_means,
       aes(x = Anio_did, y = Sueldo_regular_norm_t, color = Tratamiento)) +
  geom_line(size = 1.5) +
  ggtitle("Lanzadores iniciales - Tendencias de los salarios") +
  xlab("Año escalado") +
  ylab('Salario') +
  scale_color_manual(values = c("blue", "orange")) +
  theme_bw() +
  theme(plot.title = element_text(hjust = 0.5)) +
  geom_vline(xintercept = 0,
             linetype = "dashed",
             color = "red",
             size = 1.5) +
  theme(
    #Título de los ejes:
    axis.title.x = element_text(color = "Black",
                                size = 15,
                                face = "bold"),
    axis.title.y = element_text(color="Black",
                                size = 15,
                                face = "bold"),

    #Texto de los ejes:
    axis.text.x = element_text(size = 15),
    axis.text.y = element_text(size = 15),

    #T?tulo del gr?fico:
    plot.title = element_text(color = "Black",
                              size = 20,
                              hjust = 0.5,
                              face = "bold"),

    #T?tulo de la Leyenda:
    legend.title = element_text(size = 15),

    #Texto de la Leyenda
    legend.text = element_text(size = 13),
```

```
    # POsición de la leyenda:
    legend.position = "bottom"
  ) +
  scale_x_continuous(breaks = seq(-10, 10, by = 2)) +
  geom_text(aes(label = "Tratamiento"), x = 2, y = -0.2,
            size = 4.5,
            color = "navy",
            angle = 0,
            hjust = 0.5,
            vjust = -0.5) +
  labs(color = "Agente libre")
```




```
# Save the plot as a PDF file
ggsave("did_model_plot_starting_w.pdf")
```

```
Saving 6.5 x 4.5 in image
```