Example 9-6 and Figure 9-6

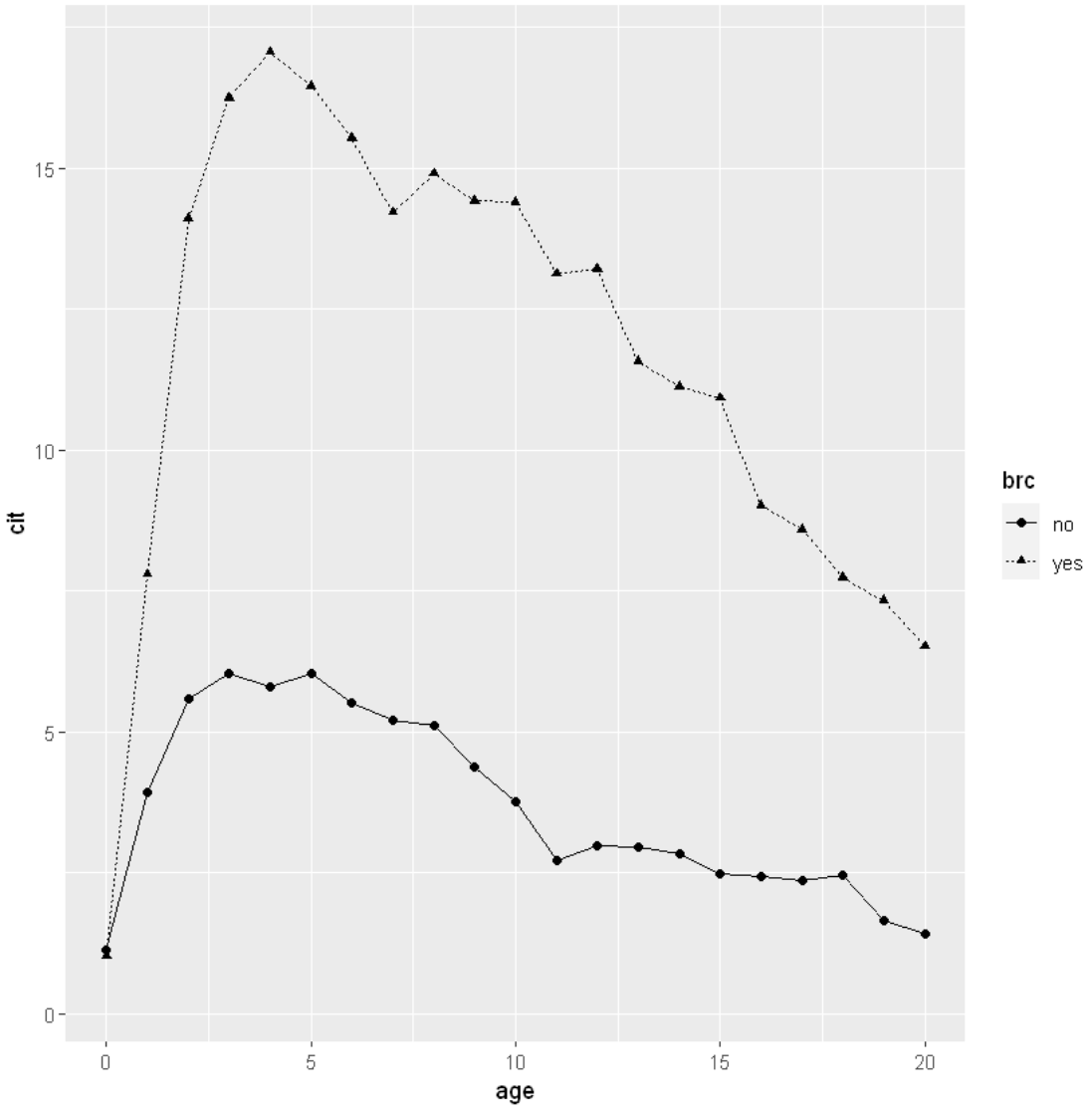
September 11, 2020

[ ]:
```
# install the following packages and libraries
install.packages("pder")
install.packages("pglm")
install.packages("texreg")
install.packages("ggplot2")

library("pglm")
library("dplyr")
library("ggplot2")
library("maxLik")
library("texreg")
```

[2]:
```
# code to create a table for our results
extract.maxLik <- function (model, include.nobs = TRUE, ...){
    s <- summary(model, ...)
    names <- rownames(s$estimate)
    class(names) <- "character"
    co <- s$estimate[, 1]
    se <- s$estimate[, 2]
    pval <- s$estimate[, 4]
    class(co) <- class(se) <- class(pval) <- "numeric"
    n <- nrow(model$gradientObs)
    lik <- logLik(model)
    gof <- numeric()
    gof.names <- character()
    gof.decimal <- logical()
    gof <- c(gof, n, lik)
    gof.names <- c(gof.names, "Num. obs.", "Log Likelihood")
    gof.decimal <- c(gof.decimal, FALSE, TRUE)
    tr <- createTexreg(coef.names = names, coef = co, se = se, pvalues = pval,
                       gof.names = gof.names, gof = gof, gof.decimal = gof.
 ↪decimal)
    return(tr)
}
setMethod("extract", signature = className("maxLik", "maxLik"), definition =␣
 ↪extract.maxLik)
```

[6]:
```
##---------------------------------Block 1--------------------------------

#### Example 9-6 ####

## ------------------------------------------------------------------------
data("GiantsShoulders", package = "pder")
head(GiantsShoulders)

## ------------------------------------------------------------------------
library("dplyr")
GiantsShoulders <- mutate(GiantsShoulders, age = year - pubyear)
cityear <- summarise(group_by(GiantsShoulders, brc, age),
                     cit = mean(citations, na.rm = TRUE))

#### Figure 9-6 ####

ggplot(cityear, aes(age, cit)) + geom_line(aes(lty = brc)) +
    geom_point(aes(shape = brc)) + scale_x_continuous(limits = c(0, 20))
```

pair	article	brc	pubyear	brcyear	year	citations
184	1184	yes	1983	1994	1983	0
184	1184	yes	1983	1994	1984	31
184	1184	yes	1983	1994	1985	89
184	1184	yes	1983	1994	1986	105
184	1184	yes	1983	1994	1987	84
184	1184	yes	1983	1994	1988	75



[7]:
```
##---------------------------------Block 2---------------------------------

# creates two covariates to estimate the marginal causal effect of the hosting␣
 ↪institution
# window is 1 if around the hosting date (3-year period centered around hosting␣
 ↪year)
# post_brc is 1 if articles were hosted for more than a year
GiantsShoulders <- mutate(GiantsShoulders,
                          window = as.numeric( (brc == "yes") &
                                               abs(brcyear - year) <= 1),
                          post_brc = as.numeric( (brc == "yes") &
                                                 year - brcyear > 1),
                          age = year - pubyear)
```

```r
# fixed effects for the age of articles (omitting the 31 years of age dummy)
GiantsShoulders$age[GiantsShoulders$age == 31] <- 0

# 5-year fixed effects for the periods of 1970-74 and 1975-79
GiantsShoulders$year[GiantsShoulders$year %in% 1970:1974] <- 1970
GiantsShoulders$year[GiantsShoulders$year %in% 1975:1979] <- 1975

## ------------------------------------------------------------------------

# linear model with age fixed effects
t3c1 <- lm(log(1 + citations) ~ brc + window + post_brc + factor(age),
           data = GiantsShoulders)

# linear model with pair and year fixed effects
t3c2 <- update(t3c1, . ~ .+  factor(pair) + factor(year))

# fixed effects NegBin model with pair fixed effects
t3c3 <- pglm(citations ~ brc + window + post_brc + factor(age) + factor(year),
           data = GiantsShoulders, index = "pair",
           effect = "individual", model = "within", family = negbin)

# fixed effects NegBin model with article fixed effects
t3c4 <- pglm(citations ~ window + post_brc + factor(age) + factor(year),
             data = GiantsShoulders, index = "article",
             effect = "individual", model = "within", family = negbin)

# print results in table
screenreg(list(t3c2, t3c3, t3c4),
          custom.model.names = c("ols: age/year/pair-FE",
                                 "NB:age/year/pair-FE", "NB: age/year/
 ↪article-FE"),
          omit.coef="(factor)|(Intercept)", digits = 3)
```

'\n==========
ols: age/year/pair-FE NB:age/year/pair-FE NB: age/year/article-FE\n----------
----------\nbrcyes 0.501 *** 0.752 *** \n (0.057) (0.073) \nwindow
0.385 *** 0.352 *** 0.565 *** \n (0.074) (0.082) (0.065) \npost_brc 0.535 *** 0.538 *** 0.810
*** \n (0.063) (0.079) (0.056) \n----------
\nR^2 0.538 \nAdj. R^2 0.522 \nNum. obs. 4857 4857 4857 \nLog Likelihood -10759.180 -9632.404
\n==========
p < 0.001; ** p < 0.01; * p < 0.05\n'