HW3 寃쎄꼍遺<84>

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# HW 3

#### Table 9.2. 모형 (4)에서의 설명 변수중 Unemployment rate를 빼고 재분석 합니다.

#### logit모형을 적합시키고 모형에서 오즈비 추정의 차이를 계산합니다.

##### 단, 다른 변수들은 모두 평균을 사용합니다.

#mortdeny.data <- tbl\_df(mortdeny.data)  
  
names(mortdeny.data)

## [1] "pi\_rat" "hse\_inc" "ltv" "ccred" "mcred" "pubrec"   
## [7] "denpmi" "selfemp" "single" "hischl" "probunmp" "condo"   
## [13] "black" "deny" "ltv\_high" "blk\_pi" "blk\_hse"

head(mortdeny.data)

## pi\_rat hse\_inc ltv ccred mcred pubrec denpmi selfemp single hischl  
## 1 0.221 0.221 0.8000000 5 2 0 0 0 0 1  
## 2 0.265 0.265 0.9218750 2 2 0 0 0 1 1  
## 3 0.372 0.248 0.9203980 1 2 0 0 0 0 1  
## 4 0.320 0.250 0.8604651 1 2 0 0 0 0 1  
## 5 0.360 0.350 0.6000000 1 1 0 0 0 0 1  
## 6 0.240 0.170 0.5105263 1 1 0 0 0 0 1  
## probunmp condo black deny ltv\_high blk\_pi blk\_hse  
## 1 3.9 0 0 0 0 0 0  
## 2 3.2 0 0 0 0 0 0  
## 3 3.2 0 0 0 0 0 0  
## 4 4.3 0 0 0 0 0 0  
## 5 3.2 0 0 0 0 0 0  
## 6 3.9 0 0 0 0 0 0

apply(mortdeny.data, 2, mean)

## pi\_rat hse\_inc ltv ccred mcred pubrec   
## 0.33081357 0.25534612 0.73777591 2.11638655 1.72100840 0.07352941   
## denpmi selfemp single hischl probunmp condo   
## 0.02016807 0.11638655 0.36176471 0.98361345 3.77449585 0.28823529   
## black deny ltv\_high blk\_pi blk\_hse   
## 0.14243697 0.11974790 0.03403361 0.04999382 0.03792618

logit\_model\_4 <- glm( deny ~ black + pi\_rat + hse\_inc + ltv\_med + ltv\_high +  
 ccred + mcred + pubrec + denpmi + selfemp + single +   
 hischl + condo, data = mortdeny.data,   
 family = binomial(link = logit))  
  
summary(logit\_model\_4)

##   
## Call:  
## glm(formula = deny ~ black + pi\_rat + hse\_inc + ltv\_med + ltv\_high +   
## ccred + mcred + pubrec + denpmi + selfemp + single + hischl +   
## condo, family = binomial(link = logit), data = mortdeny.data)  
##   
## Deviance Residuals:   
## Min 1Q Median 3Q Max   
## -2.4086 -0.4150 -0.3011 -0.2341 3.0600   
##   
## Coefficients:  
## Estimate Std. Error z value Pr(>|z|)   
## (Intercept) -4.47441 0.57279 -7.812 5.65e-15 \*\*\*  
## black 0.68325 0.18286 3.736 0.000187 \*\*\*  
## pi\_rat 4.81319 1.02685 4.687 2.77e-06 \*\*\*  
## hse\_inc -0.39557 1.23358 -0.321 0.748461   
## ltv\_med 0.24407 0.17105 1.427 0.153616   
## ltv\_high 1.37807 0.30514 4.516 6.30e-06 \*\*\*  
## ccred 0.29639 0.04011 7.390 1.47e-13 \*\*\*  
## mcred 0.25559 0.14207 1.799 0.072018 .   
## pubrec 1.27160 0.20715 6.138 8.34e-10 \*\*\*  
## denpmi 4.56617 0.55433 8.237 < 2e-16 \*\*\*  
## selfemp 0.68566 0.21317 3.216 0.001298 \*\*   
## single 0.48037 0.15797 3.041 0.002359 \*\*   
## hischl -1.21111 0.41509 -2.918 0.003526 \*\*   
## condo -0.12366 0.17019 -0.727 0.467475   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## (Dispersion parameter for binomial family taken to be 1)  
##   
## Null deviance: 1744.2 on 2379 degrees of freedom  
## Residual deviance: 1261.0 on 2366 degrees of freedom  
## AIC: 1289  
##   
## Number of Fisher Scoring iterations: 6

### 오즈비 추정

#오즈비 추정   
  
OR <- exp(logit\_model\_4$coefficients)  
OR.U <- exp(logit\_model\_4$coef + 1.96\*summary(logit\_model\_4)$coef[,2])  
OR.L <- exp(logit\_model\_4$coef - 1.96\*summary(logit\_model\_4)$coef[,2])

### 오즈비, 오즈비 95% 신뢰구간

* 흑인이 백인보다 기각 Odds 크다.
* black의 Odds 신뢰구간 : (1.383813725, 2.8339224)
* 1을 포함하지 않는다. 흑인과 백인간의 차이는 유의하다.

#오즈비, 오즈비 95% 신뢰구간  
cbind(OR, OR.L, OR.U)

## OR OR.L OR.U  
## (Intercept) 0.01139699 0.003708694 0.0350235  
## black 1.98030823 1.383813725 2.8339224  
## pi\_rat 123.12316885 16.453976715 921.3161639  
## hse\_inc 0.67329457 0.060000765 7.5553300  
## ltv\_med 1.27642933 0.912843305 1.7848319  
## ltv\_high 3.96725183 2.181460517 7.2149310  
## ccred 1.34498862 1.243305430 1.4549879  
## mcred 1.29121757 0.977386374 1.7058175  
## pubrec 3.56654421 2.376371810 5.3527977  
## denpmi 96.17500252 32.449325169 285.0484891  
## selfemp 1.98508189 1.307137493 3.0146409  
## single 1.61667123 1.186184989 2.2033881  
## hischl 0.29786652 0.132035514 0.6719742  
## condo 0.88368329 0.633039601 1.2335661