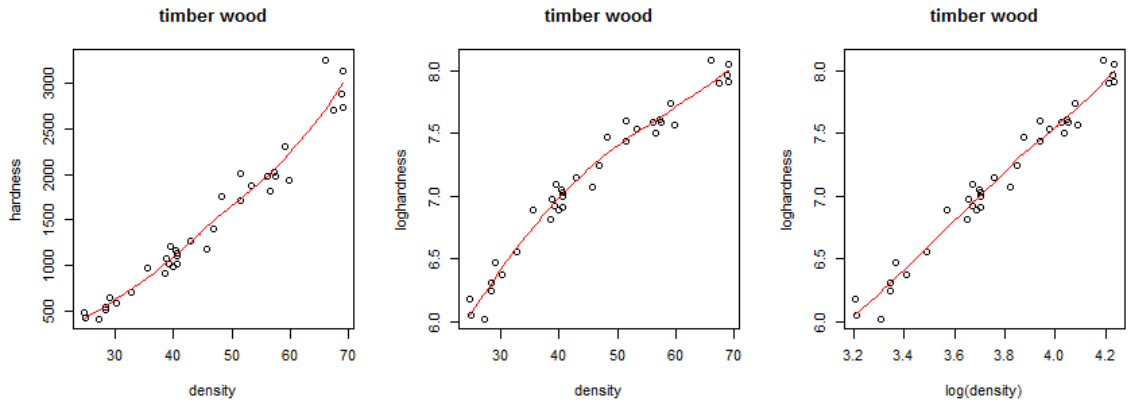
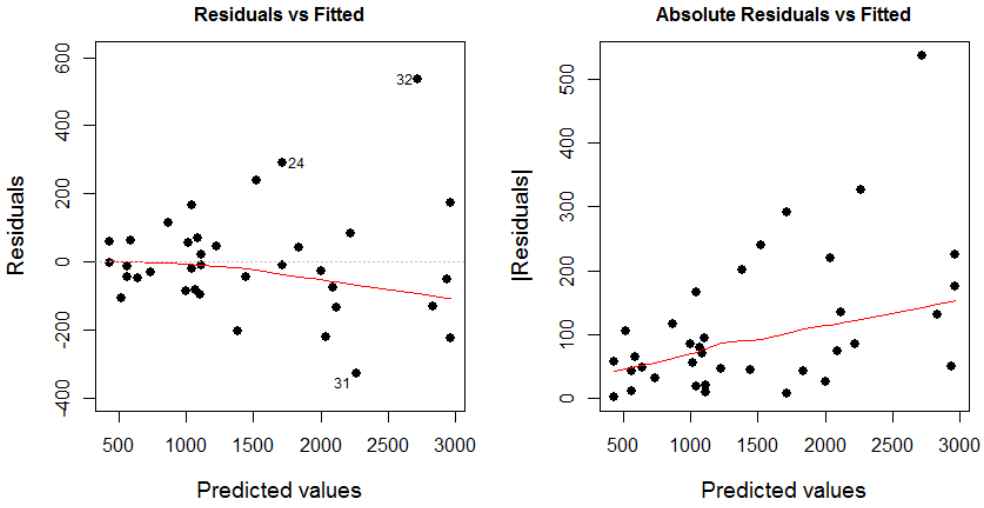
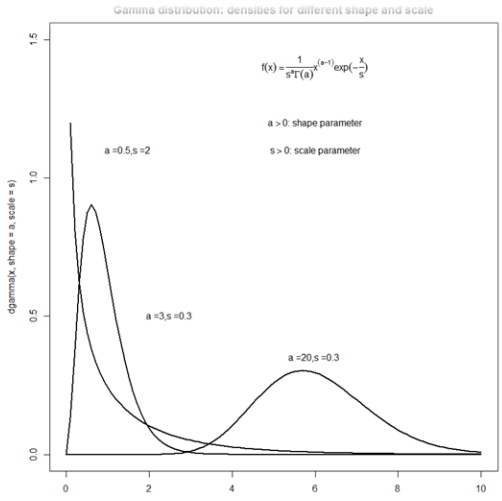
Datos de maderas.



Ajusto una regresión normal con término cuadrático (hardness^2) y sus residuales se ven así:



La varianza crece al crecer la media. Uso una distribución Gamma

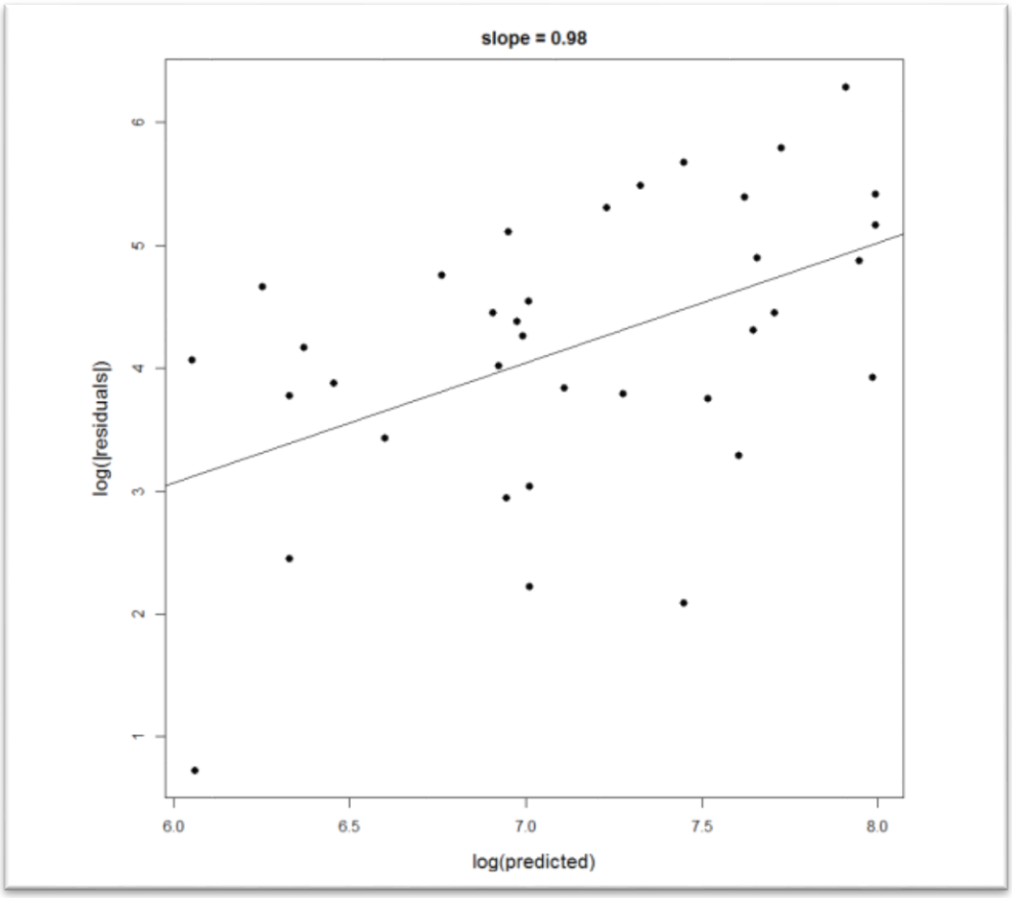


La gamma tiene coeficiente de variación constante, $CV = \sqrt{(\mu_i^2/\nu)}/\mu_i = k$

Checar a ojímetro si son datos Gamma

De los datos podemos pensar que los residuales son similares a la desviación estándar y los valores ajustados son similares a la media, así que

$\frac{res_i}{\hat{y}_i}$=cte. Sacando logaritmos y despejando queda:$\log(res_i) = \log(cte) + 1 * \log(y_i)$. Una recta con pendiente "1".



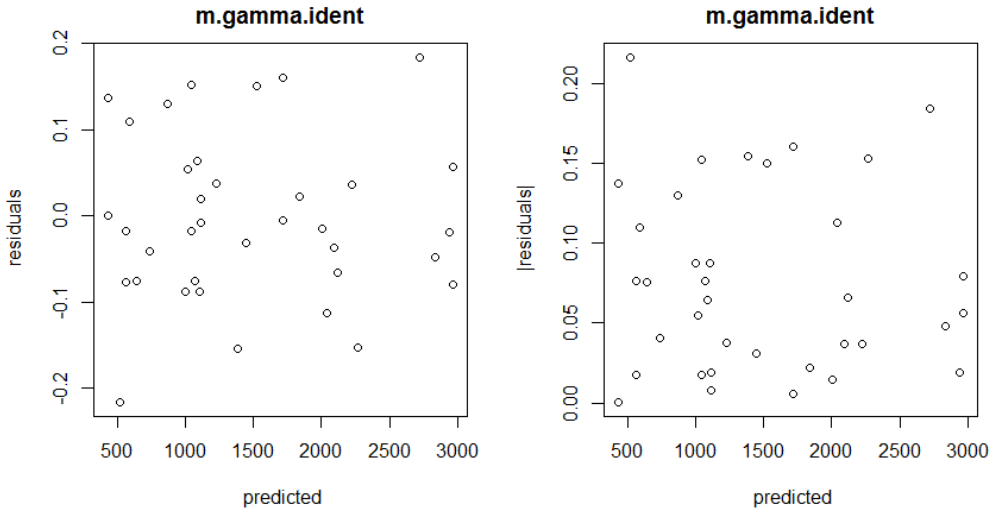
Los datos lo cumplen!!! Son gamma fiu!

OPCION 1 SIN TRANSFORMAR LA VARIABLE RESPUESTA

```
M.normal.ident<- glm(hardness ~ density + I(density^2),data = timber)

M.gamma.ident <- glm(hardness ~ density + I(density^2),data = timber, family = Gamma(link = identity))

>  tab1 <- coef(summary(M.normal.ident))[, c(1, 2, 4)]

>  tab2 <- coef(summary(M.gamma.ident))[, c(1, 2, 4)]

>  tab <- cbind(tab1, tab2)

>  tab##coefs parecidos pero, menores varianzas para modelo gamma

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

(Intercept)  -118.0073759 334.966905 0.726856611 -121.4091503 195.2285821 0.5382925333

density         9.4340214  14.935620 0.531969926    9.4431776  10.3380467 0.3676373697

I(density^2)    0.5090775   0.156721 0.002669045    0.5106213   0.1272857 0.0003255386
```

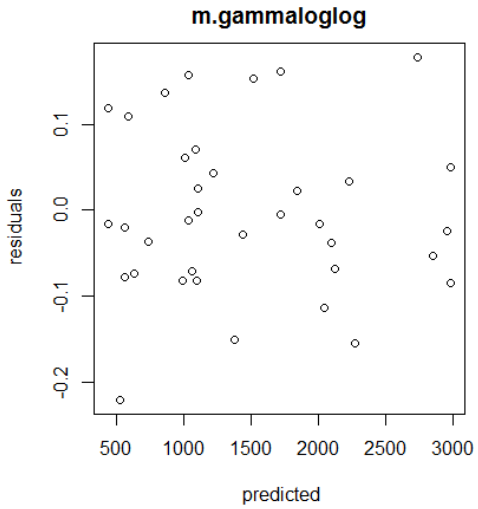
analizar la inclusion termino cuadratico

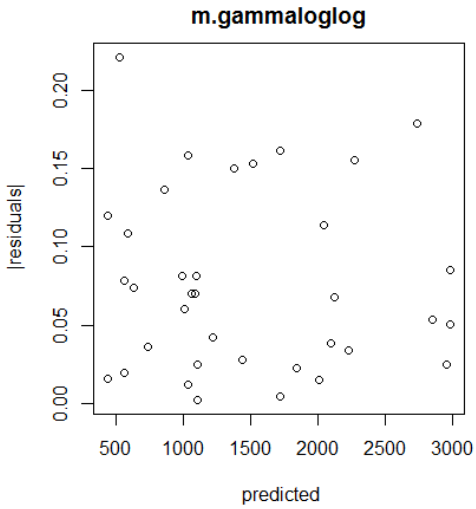
```
 m.gamma.ident <- glm(hardness ~ density + I(density^2),data = timber, family = Gamma(link = identity))

 m.gamma.ident0 <- glm(hardness ~ density, data = timber,family = Gamma(link = identity))>
anova(m.gamma.ident0, m.gamma.ident, test = "F") ##sí es necesario término cuadrático

Analysis of Deviance Table

Model 1: hardness ~ density

Model 2: hardness ~ density + I(density^2)

  Resid. Df Resid. Dev Df Deviance      F    Pr(>F)

1        34    0.49929

2        33    0.32455  1  0.17474 17.643 0.0001899 ***
```



OPCION 2 TRANSFORMANDO LA VARIABLE RESPUESTA

```
m.lognormallog <- glm(log(hardness) ~ log(density) , data = timber)

 m.gammaloglog <- glm(hardness ~ log(density),data = timber, family = Gamma(link = log))

  tab1 <- coef(summary( m.lognormallog))[, c(1, 2, 4)]

 tab2 <- coef(summary(m.gammaloglog))[, c(1, 2, 4)]

 tab <- cbind(tab1, tab2)

 tab

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

(Intercept)  0.01538669 0.20357750 9.401951e-01 0.02603444 0.20426077 8.993297e-01

log(density) 1.88474489 0.05371057 2.729499e-28 1.88312250 0.05389084 3.137937e-28
```


m.gammaloglog
residuals
predicted
-0.2
-0.1
0.0
0.1
500
1000
1500
2000
2500
3000


m.gammaloglog
|residuals|
predicted
0.00
0.05
0.10
0.15
0.20
500
1000
1500
2000
2500
3000