JeffPar Model fitting

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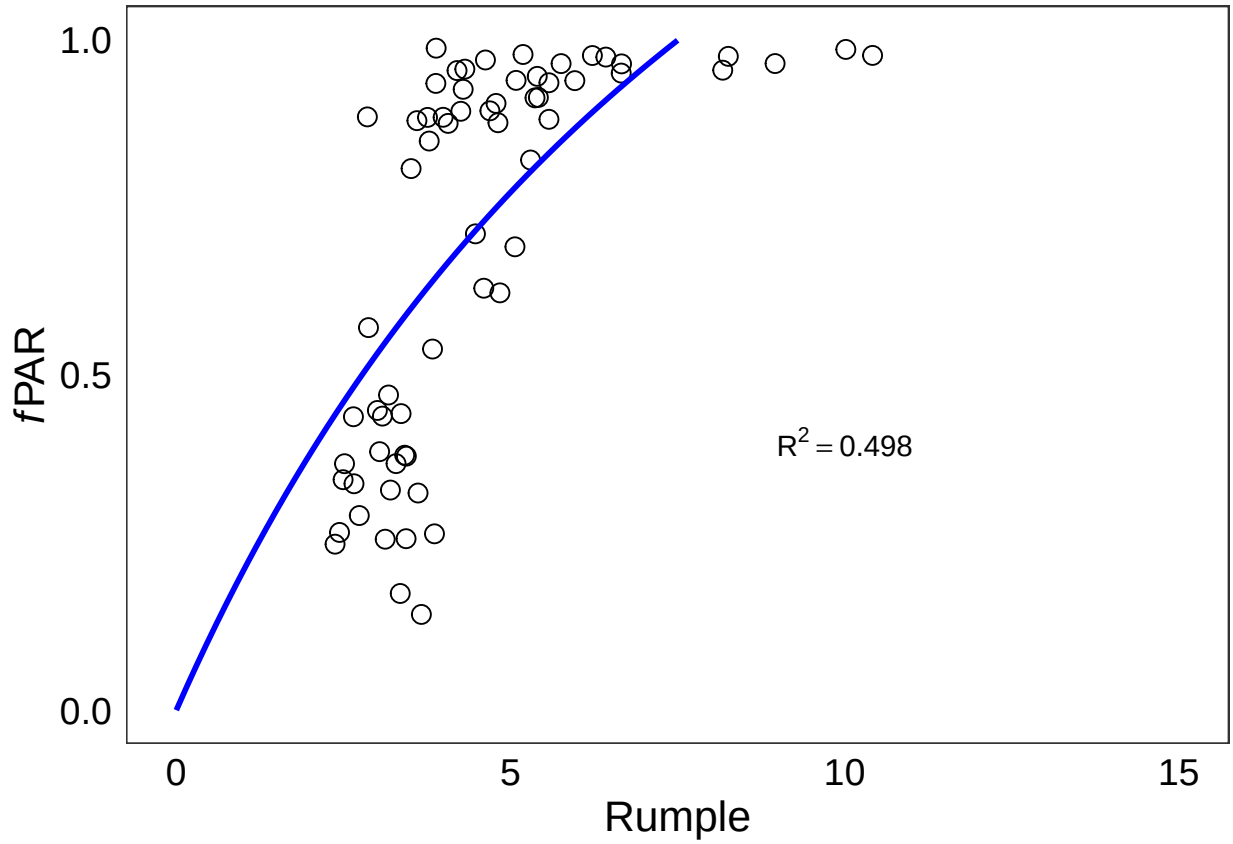
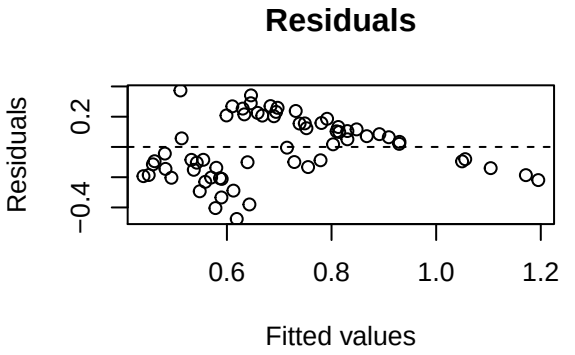
Rectangular Hyperbola Option 1

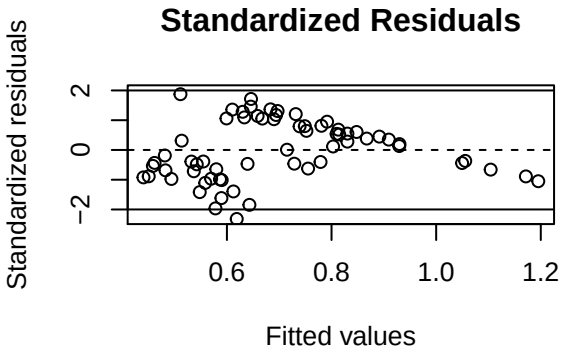
Focusing on model fit for plot means for fPAR and Rumple under high light conditions. First with the equation $y = a * x/b + x$

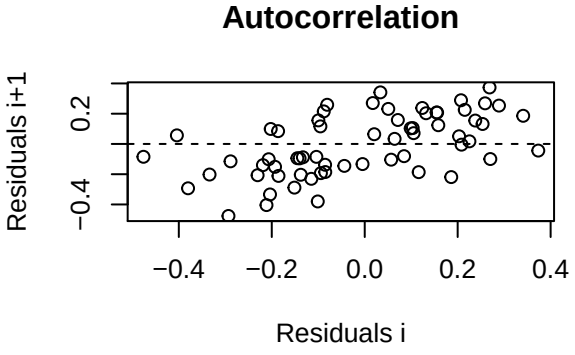
```
##         a         b
##  2.419728 10.672213
```

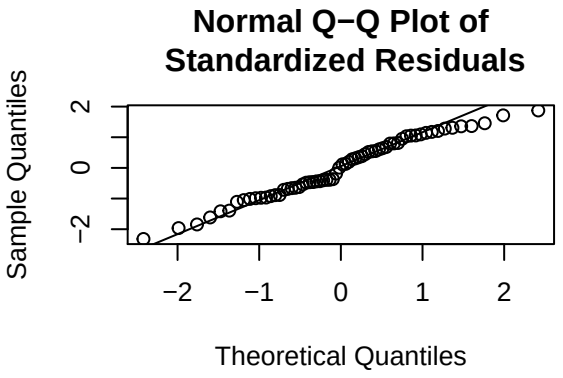
```
## [1] -18.74452
```

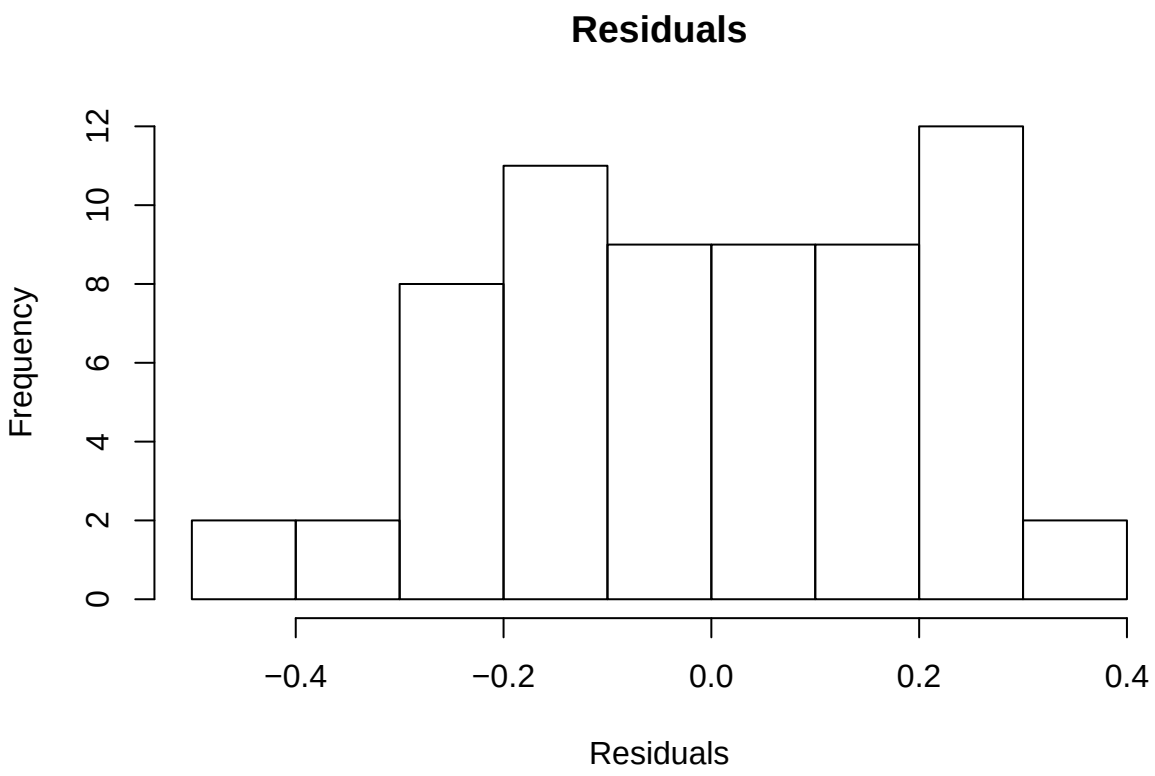

1.0
0.5
0.0
fPAR
0
5
10
15
Rumple
R2 = 0.498

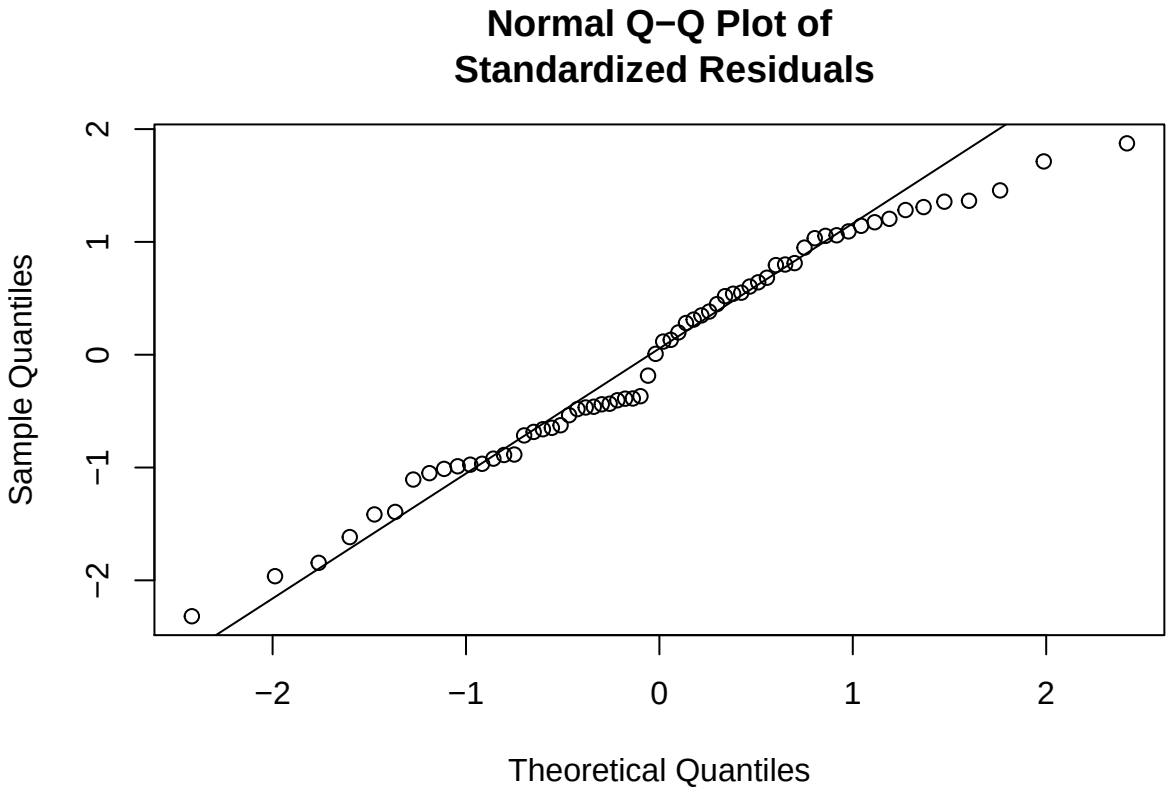

Residuals
Residuals
0.2
−0.4
0.6
0.8
1.0
1.2
Fitted values


Standardized Residuals
Standardized residuals
2
0
−2
0.6
0.8
1.0
1.2
Fitted values


Autocorrelation
Residuals i+1
0.2
−0.4
−0.4
−0.2
0.0
0.2
0.4
Residuals i


Normal Q−Q Plot of
Standardized Residuals
Sample Quantiles
2
0
−2
−2
−1
0
1
2
Theoretical Quantiles


Residuals
Frequency
0
2
4
6
8
10
12
−0.4
−0.2
0.0
0.2
0.4
Residuals

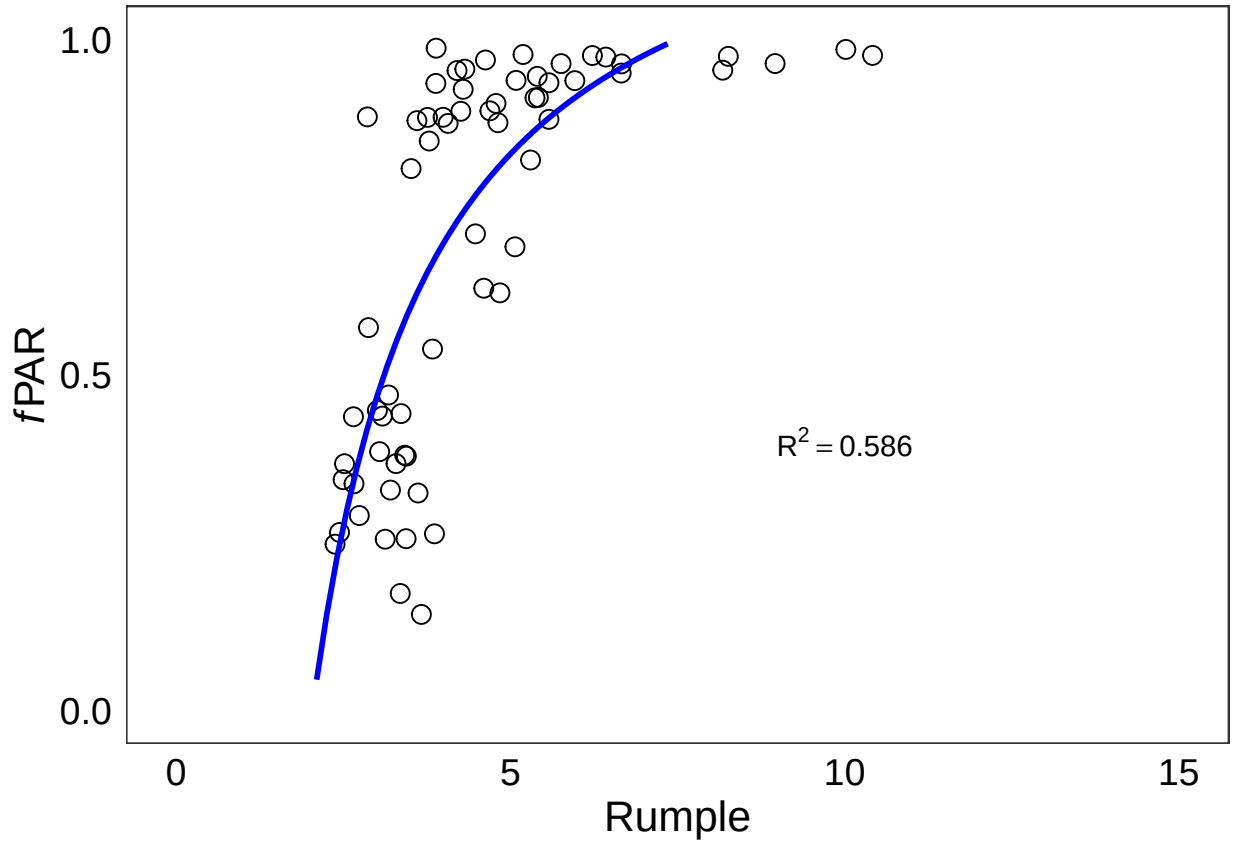

Normal Q−Q Plot of
Standardized Residuals
Sample Quantiles
Theoretical Quantiles
−2
−1
0
1
2

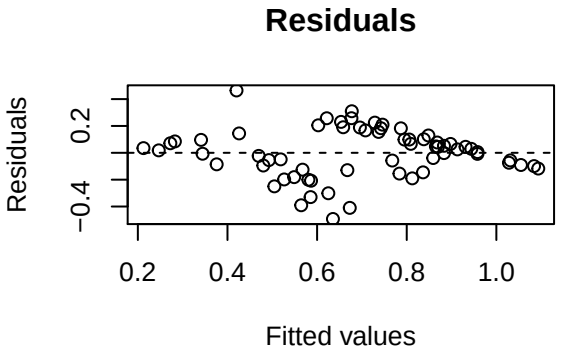
Rectangular Hyperbola Option 2

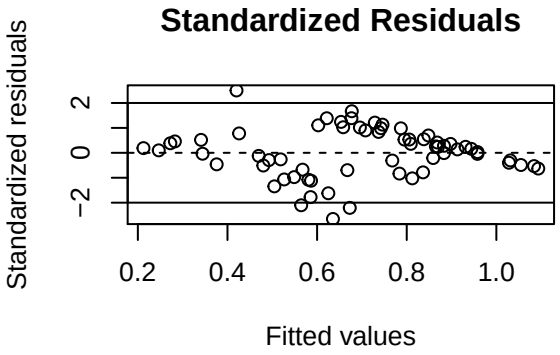
Using the equation $y = a + b * x/c + x$

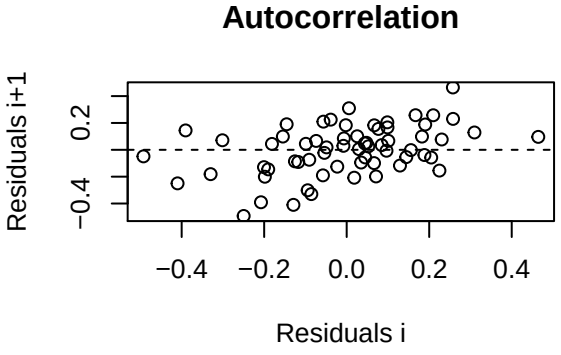
```
##          a          b          c
##  9.9500902 -8.6260593 -0.2710948
```

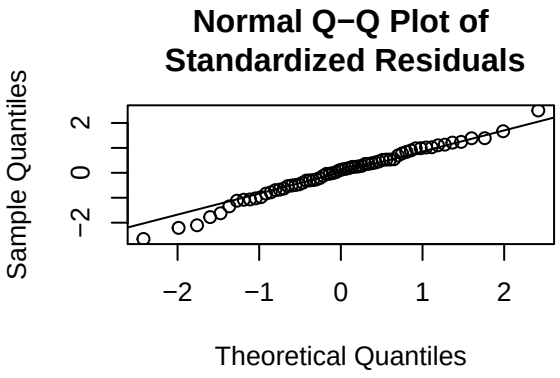
```
## [1] -28.99604
```

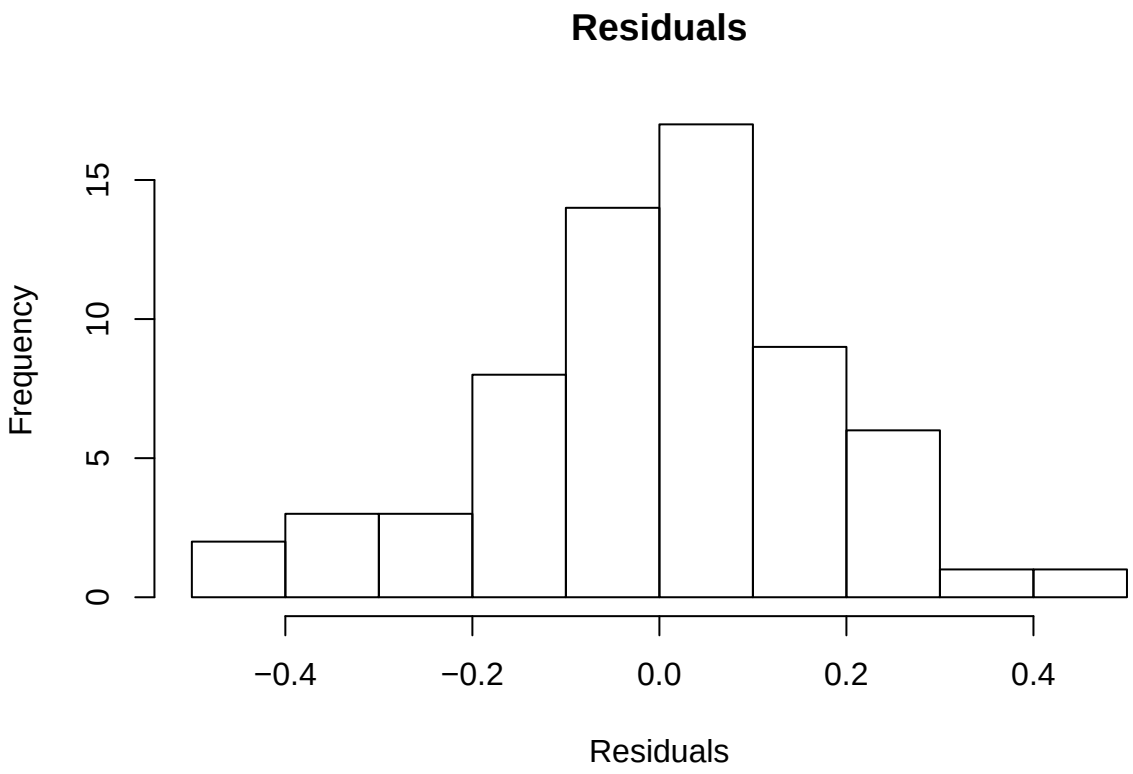

1.0
0.5
0.0
fPAR
0
5
10
15
Rumple
R2 = 0.586

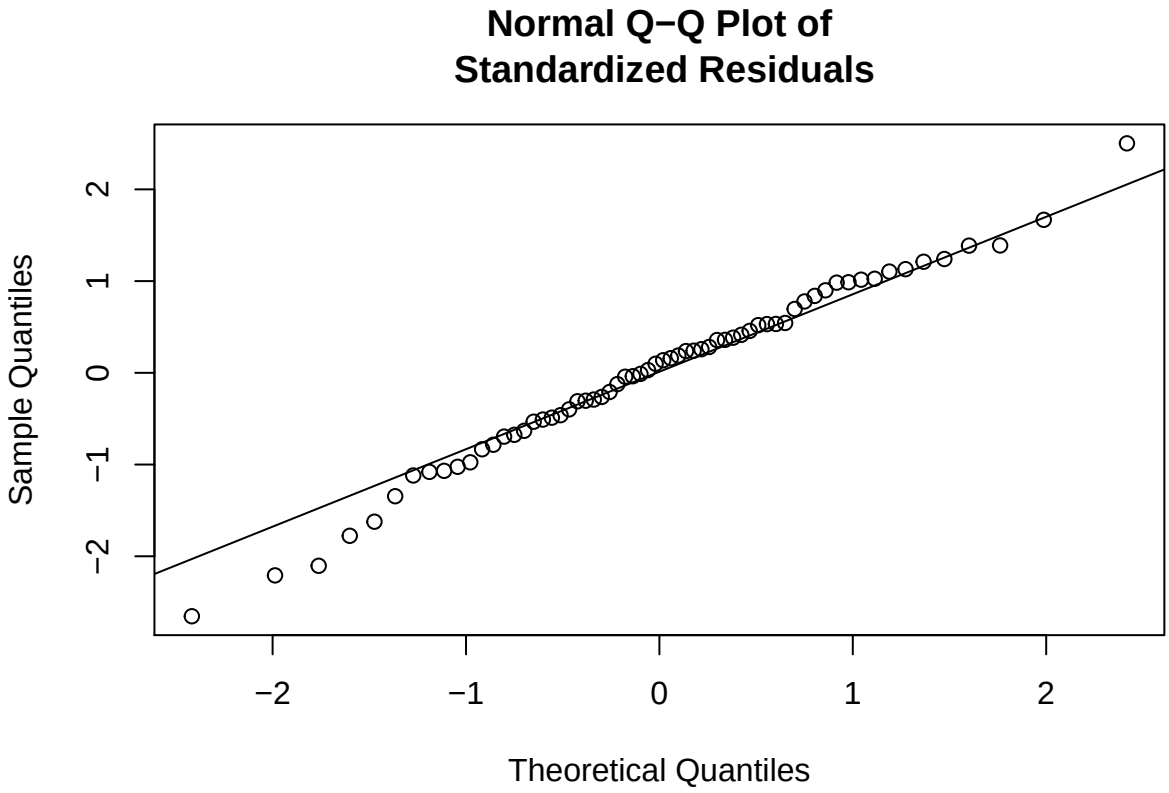

Residuals
Residuals
0.2
−0.4
0.2
0.4
0.6
0.8
1.0
Fitted values


Standardized Residuals
Standardized residuals
2
0
−2
0.2
0.4
0.6
0.8
1.0
Fitted values


Autocorrelation
Residuals i+1
0.2
−0.4
−0.4
−0.2
0.0
0.2
0.4
Residuals i


Normal Q−Q Plot of
Standardized Residuals
Sample Quantiles
2
0
−2
−2
−1
0
1
2
Theoretical Quantiles


Residuals
Frequency
0
5
10
15
−0.4
−0.2
0.0
0.2
0.4
Residuals

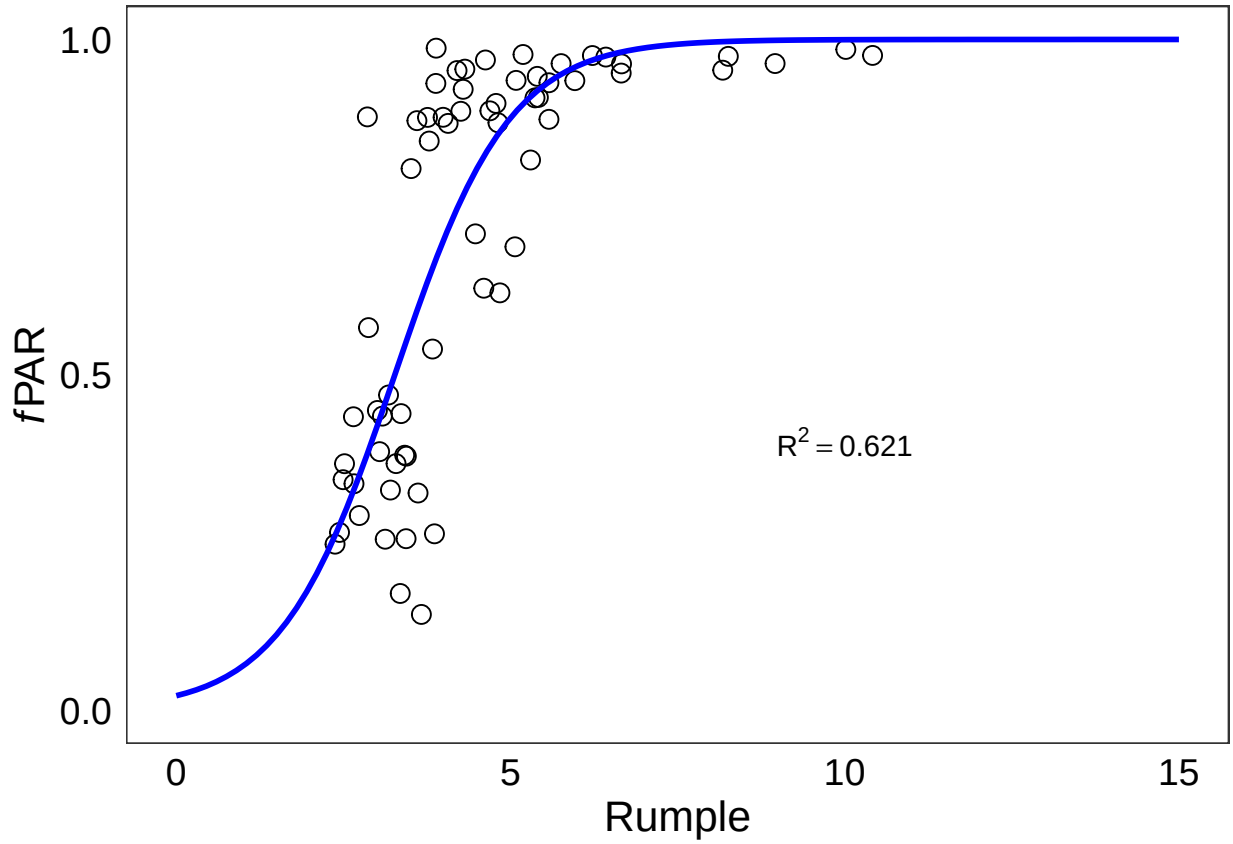

Normal Q−Q Plot of
Standardized Residuals
Sample Quantiles
Theoretical Quantiles
−2
−1
0
1
2

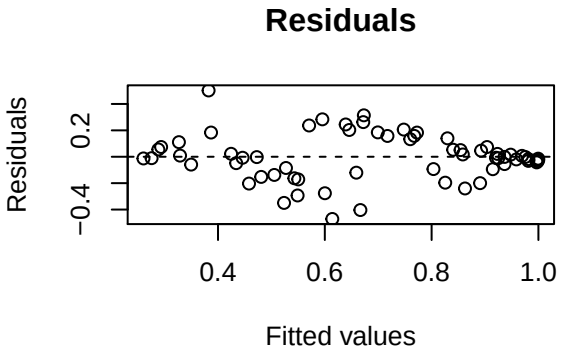
Sigmoidal Function

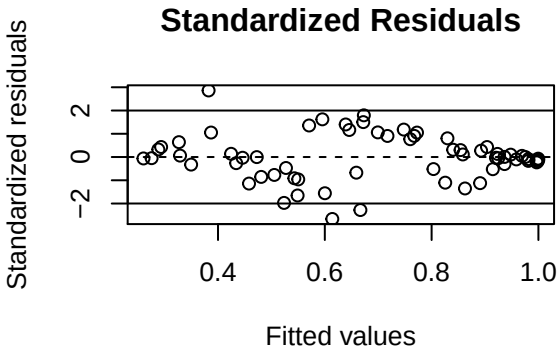
Using the equation: $y = 1/(1 + exp(a * (x - b)))$

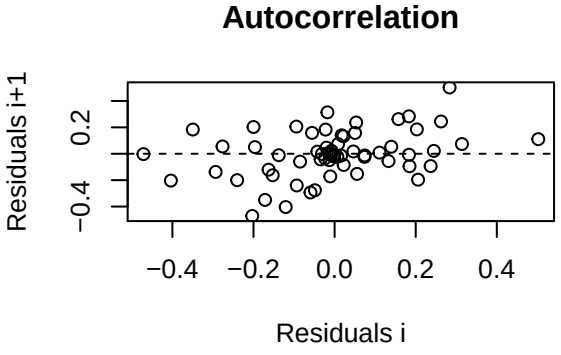
```
##        a        b
## 1.167727 3.268969
```

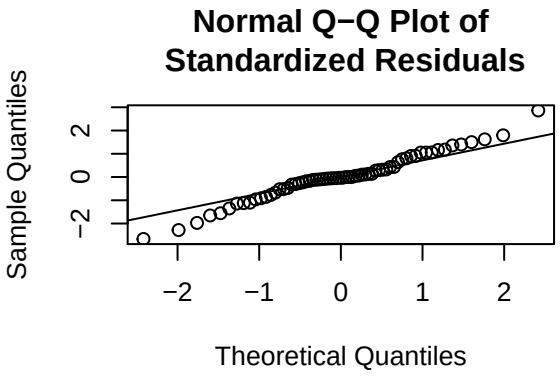
```
## [1] -36.67212
```

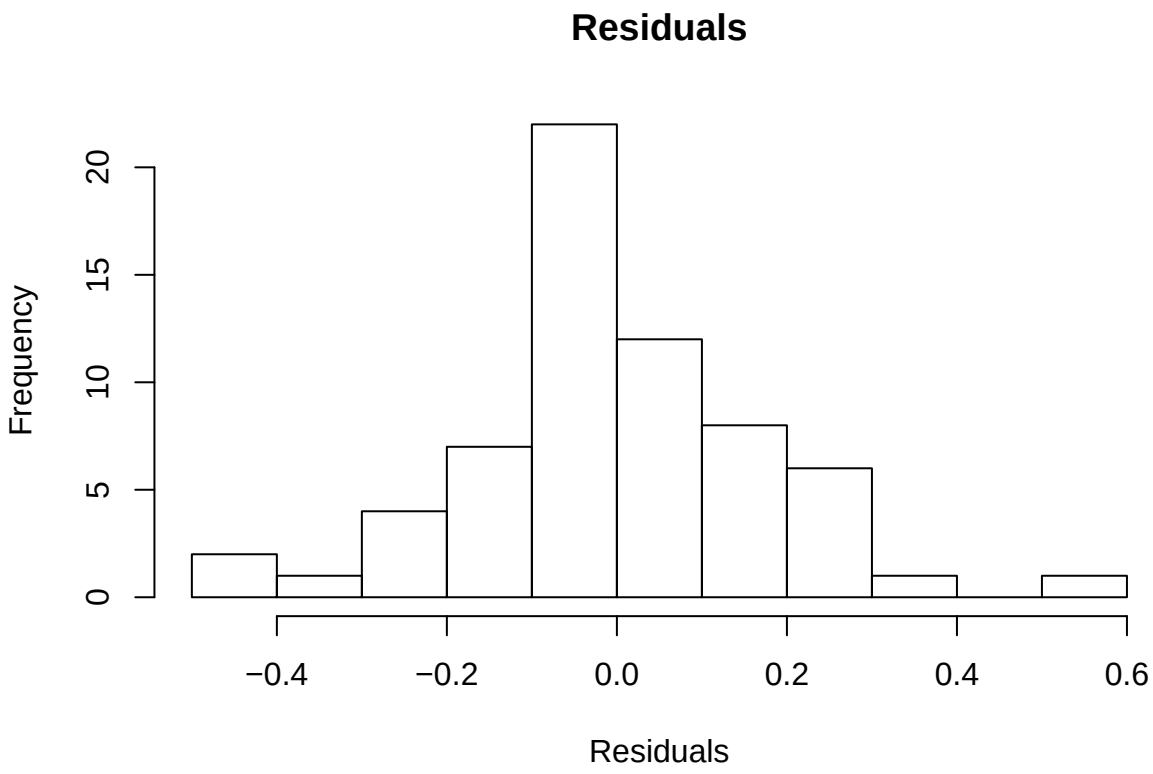

1.0
0.5
0.0
fPAR
0
5
10
15
Rumple
R2 = 0.621

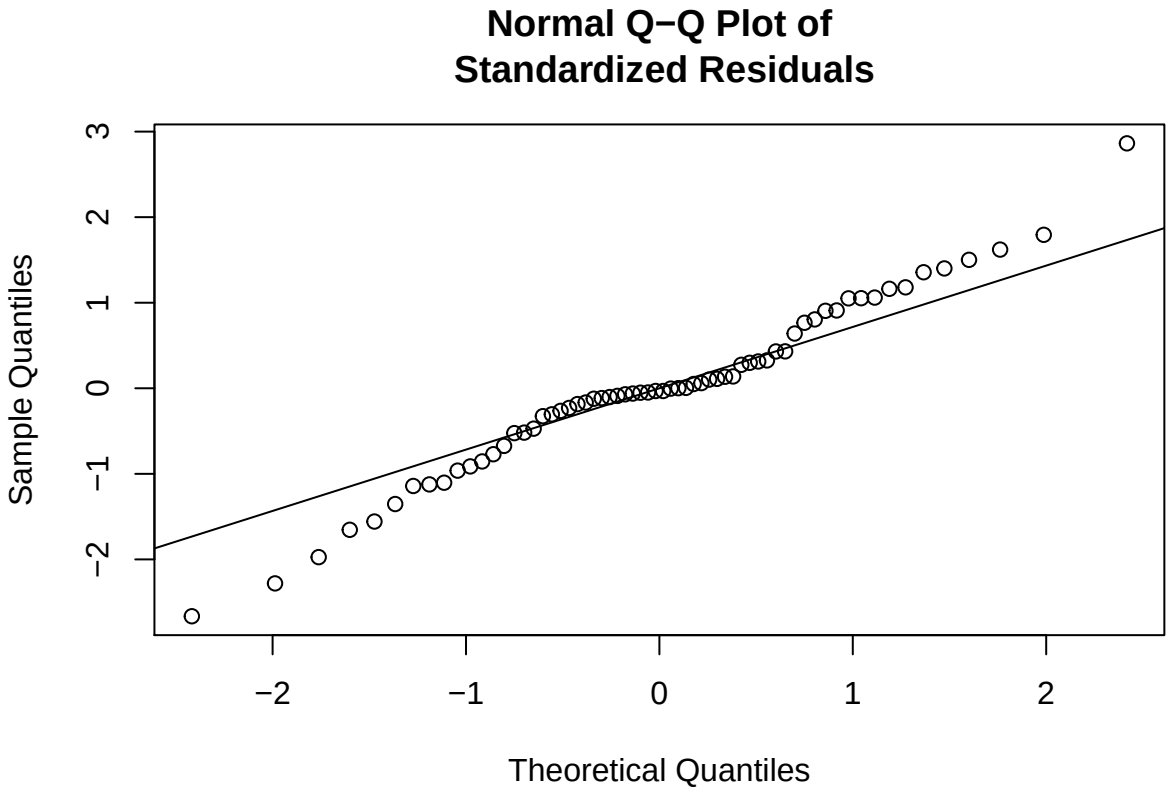

Residuals
Residuals
0.2
−0.4
0.4
0.6
0.8
1.0
Fitted values


Standardized Residuals
Standardized residuals
2
0
−2
0.4
0.6
0.8
1.0
Fitted values


Autocorrelation
Residuals i+1
0.2
−0.4
−0.4
−0.2
0.0
0.2
0.4
Residuals i


Normal Q−Q Plot of
Standardized Residuals
Sample Quantiles
2
0
−2
−2
−1
0
1
2
Theoretical Quantiles


Residuals
Frequency
0
5
10
15
20
−0.4
−0.2
0.0
0.2
0.4
0.6
Residuals

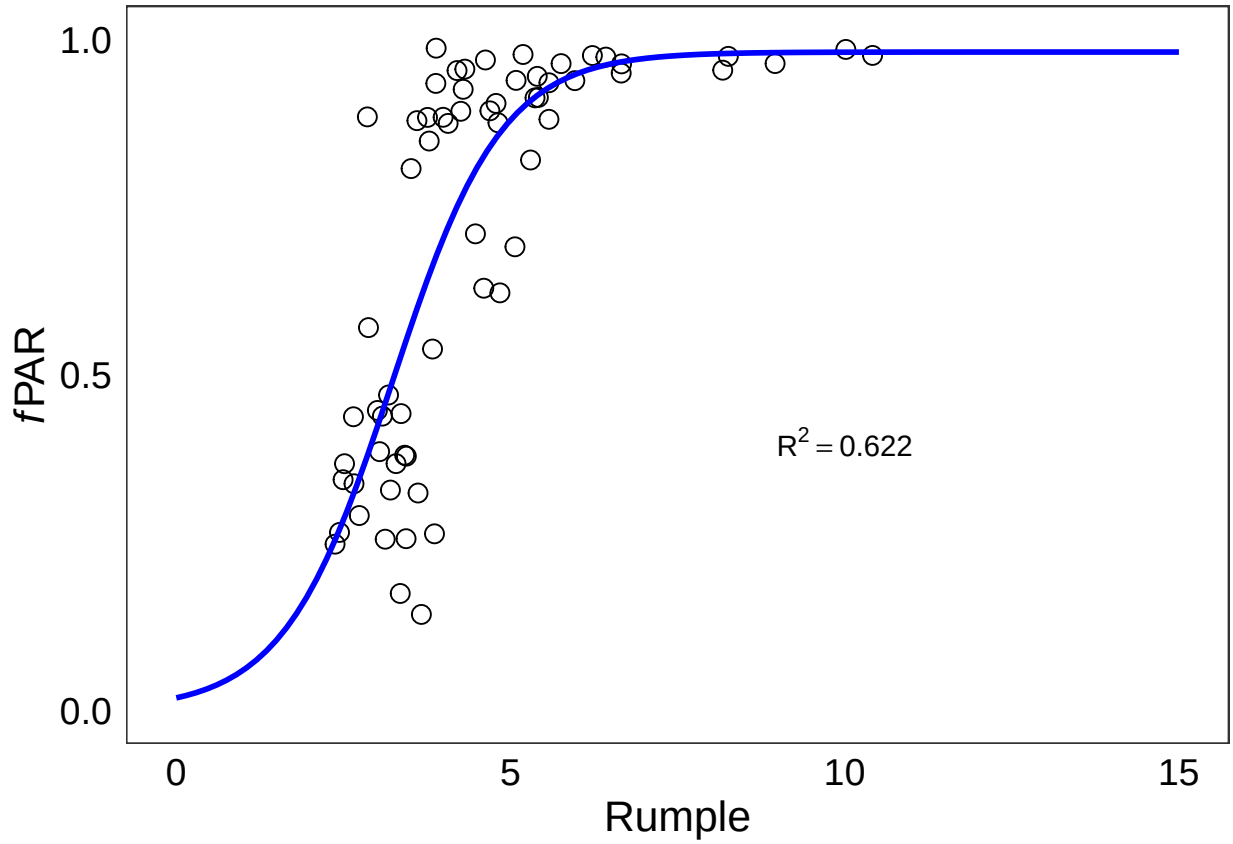

Normal Q−Q Plot of
Standardized Residuals
Sample Quantiles
Theoretical Quantiles
−2
−1
0
1
2
3

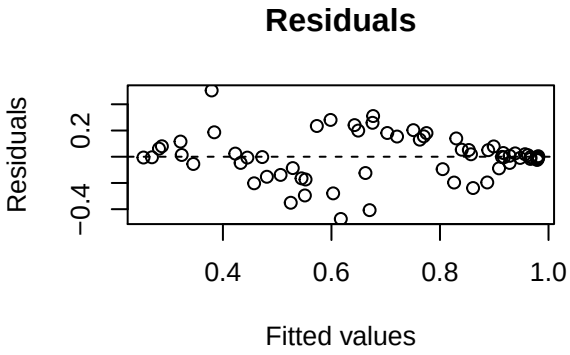
Logistic Growth Model

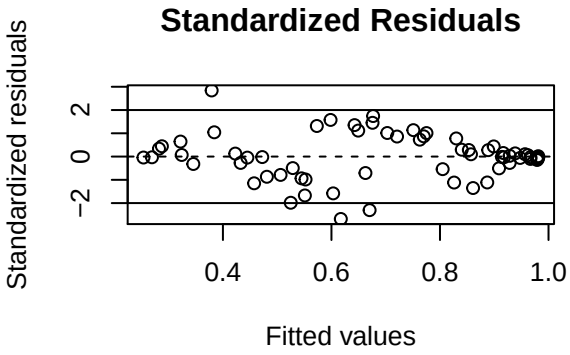
Using the equation: $y = a/(1 + b * exp(-k * x)$

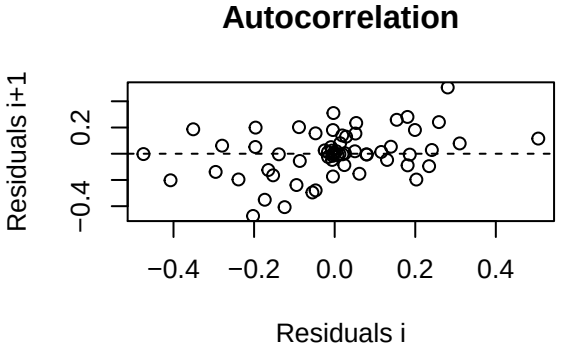
```
##           a           b           k
##  0.9812569 52.6467638  1.2250290
```

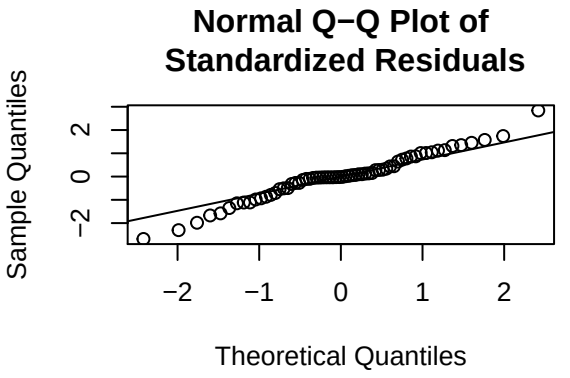
```
## [1] -34.79615
```

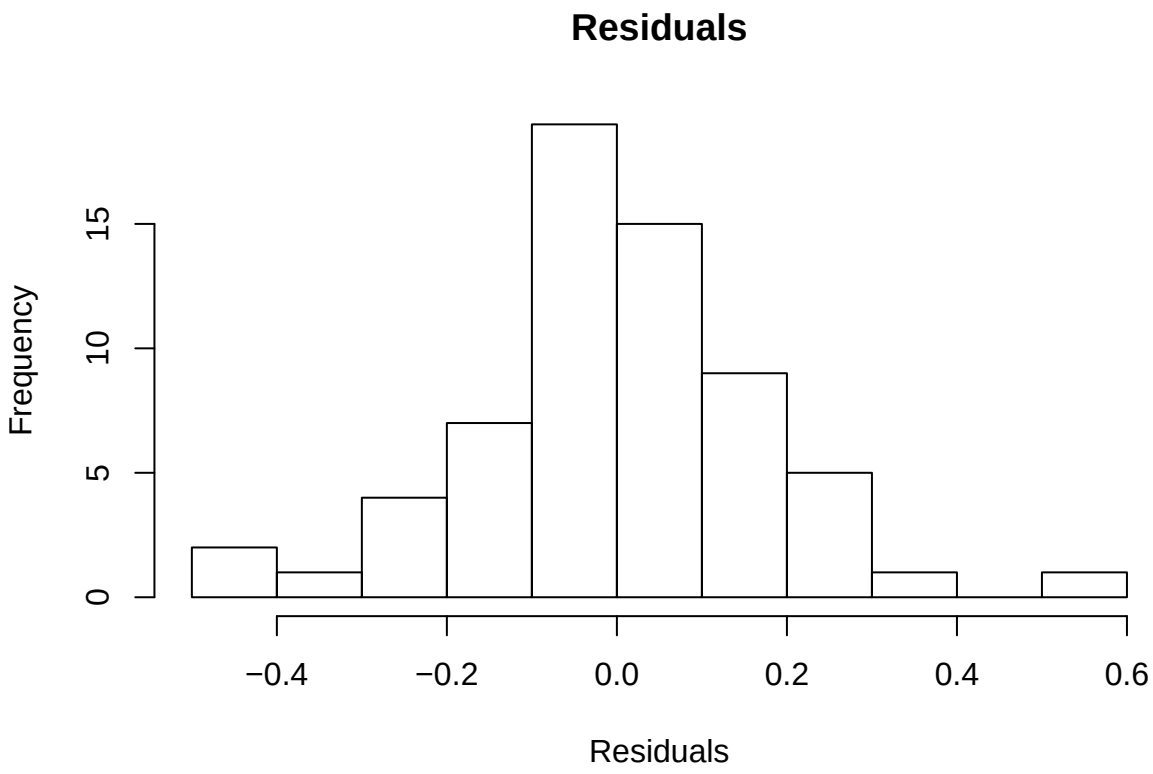

1.0
0.5
0.0
fPAR
0
5
10
15
Rumple
R2 = 0.622

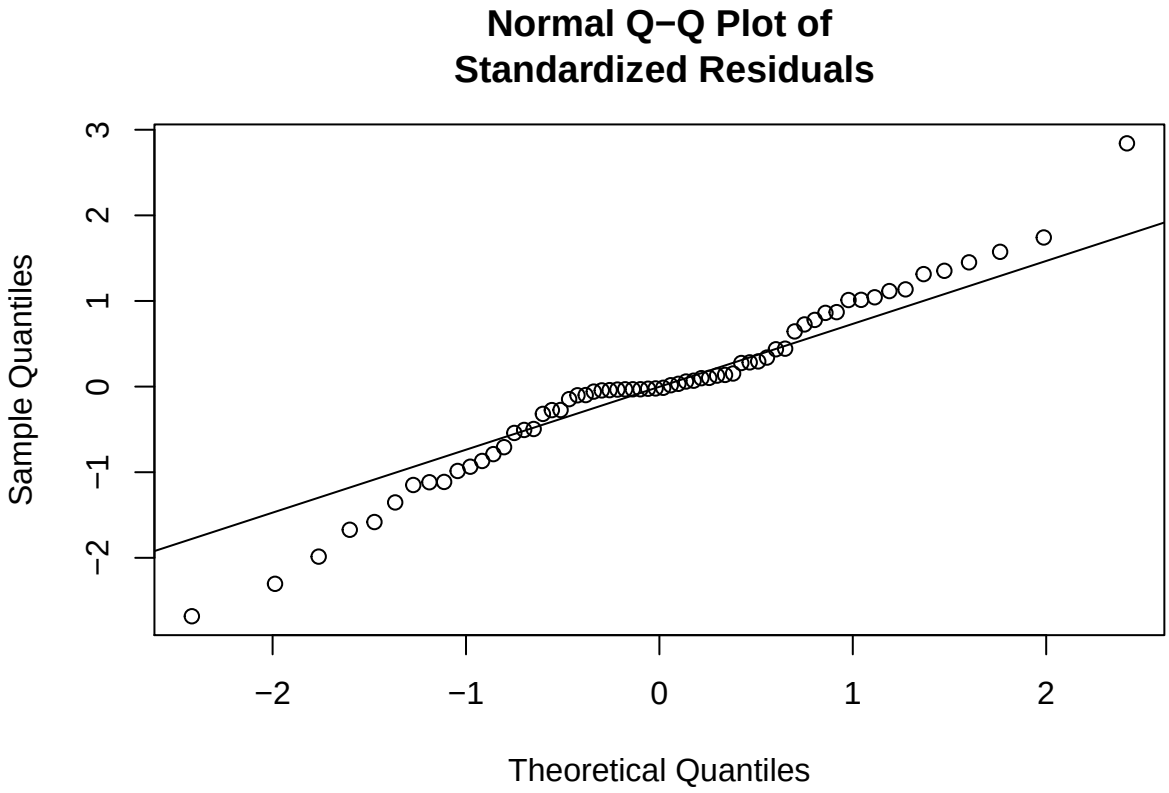

Residuals
Residuals
0.2
−0.4
0.4
0.6
0.8
1.0
Fitted values


Standardized Residuals
Standardized residuals
2
0
−2
0.4
0.6
0.8
1.0
Fitted values


Autocorrelation
Residuals i+1
0.2
−0.4
−0.4
−0.2
0.0
0.2
0.4
Residuals i


Normal Q−Q Plot of
Standardized Residuals
Sample Quantiles
2
0
−2
−2
−1
0
1
2
Theoretical Quantiles


Residuals
Frequency
0
5
10
15
−0.4
−0.2
0.0
0.2
0.4
0.6
Residuals

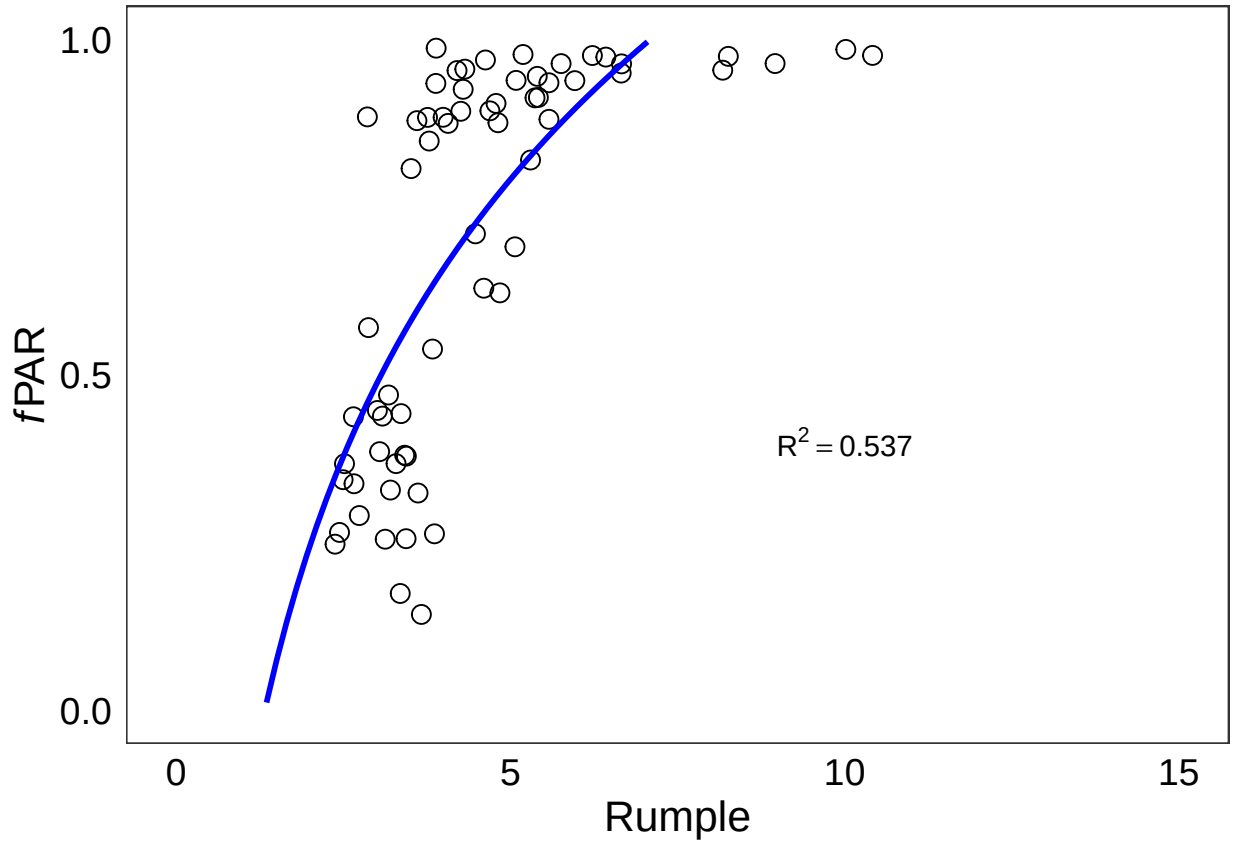

Normal Q−Q Plot of
Standardized Residuals
Sample Quantiles
Theoretical Quantiles
−2
−1
0
1
2
3

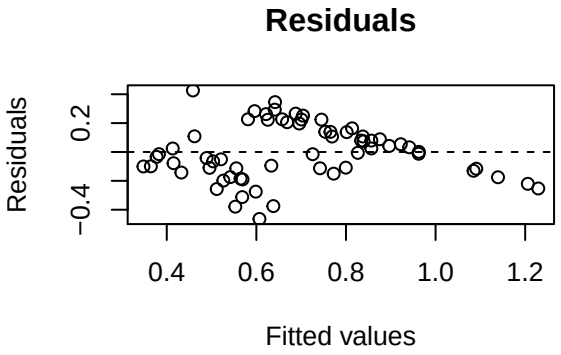
Logarithmic Model

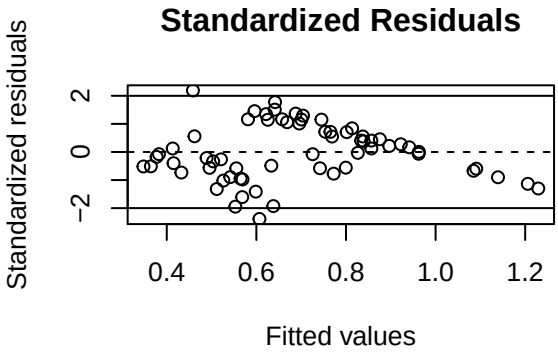
Using the equation: $y = a + bln(x)$

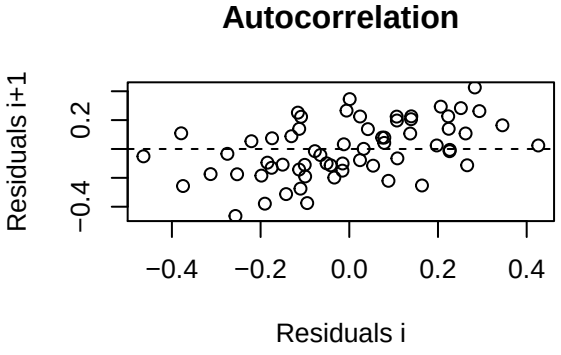
```
##          a          b
## -0.1675272  0.5960200
```

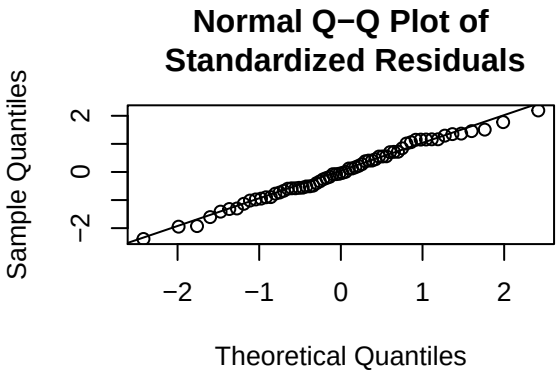
```
## [1] -23.94274
```

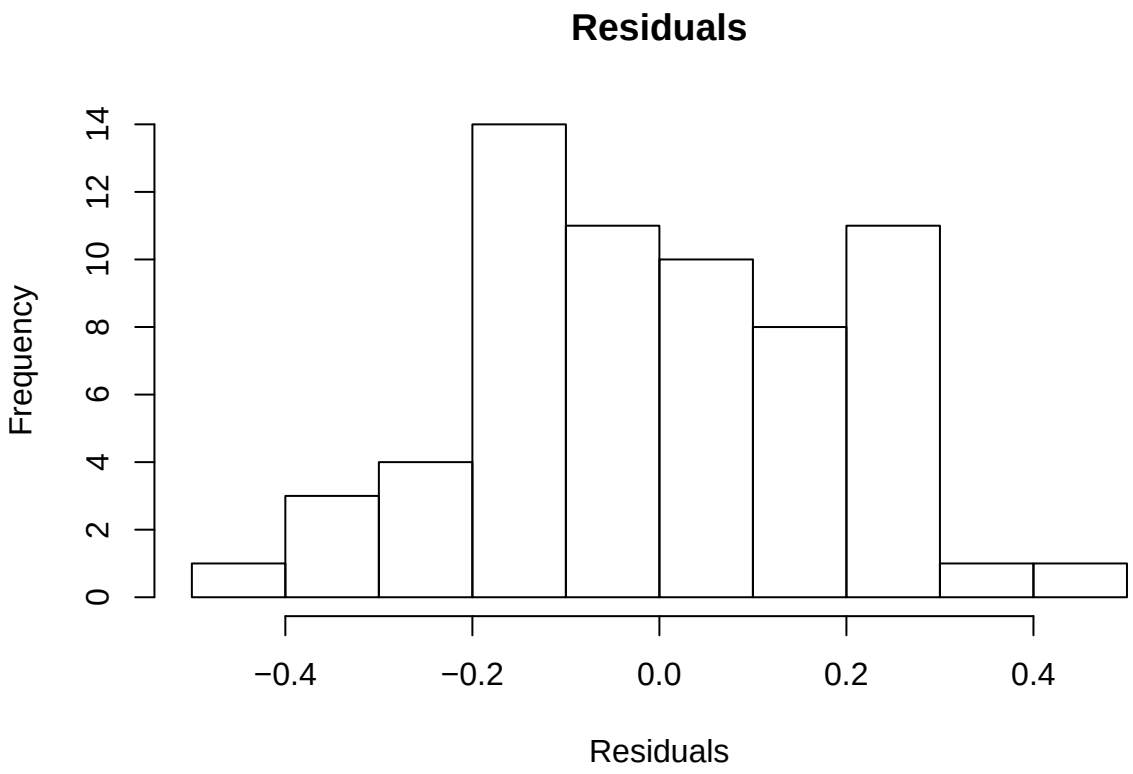

1.0
0.5
0.0
fPAR
0
5
10
15
Rumple
R2 = 0.537

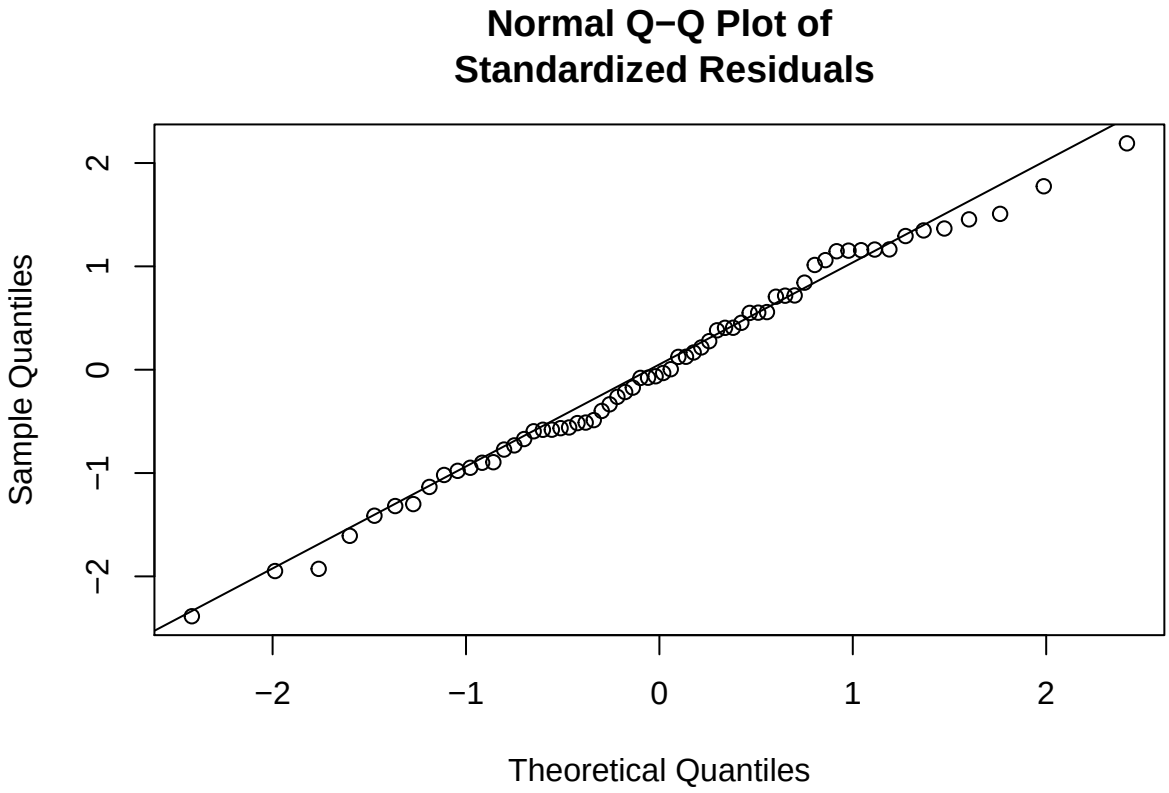

Residuals
Residuals
0.2
−0.4
0.4
0.6
0.8
1.0
1.2
Fitted values


Standardized Residuals
Standardized residuals
2
0
−2
0.4
0.6
0.8
1.0
1.2
Fitted values


Autocorrelation
Residuals i+1
0.2
−0.4
−0.4
−0.2
0.0
0.2
0.4
Residuals i


Normal Q−Q Plot of
Standardized Residuals
Sample Quantiles
2
0
−2
−2
−1
0
1
2
Theoretical Quantiles


Residuals
Frequency
0
2
4
6
8
10
12
14
−0.4
−0.2
0.0
0.2
0.4
Residuals

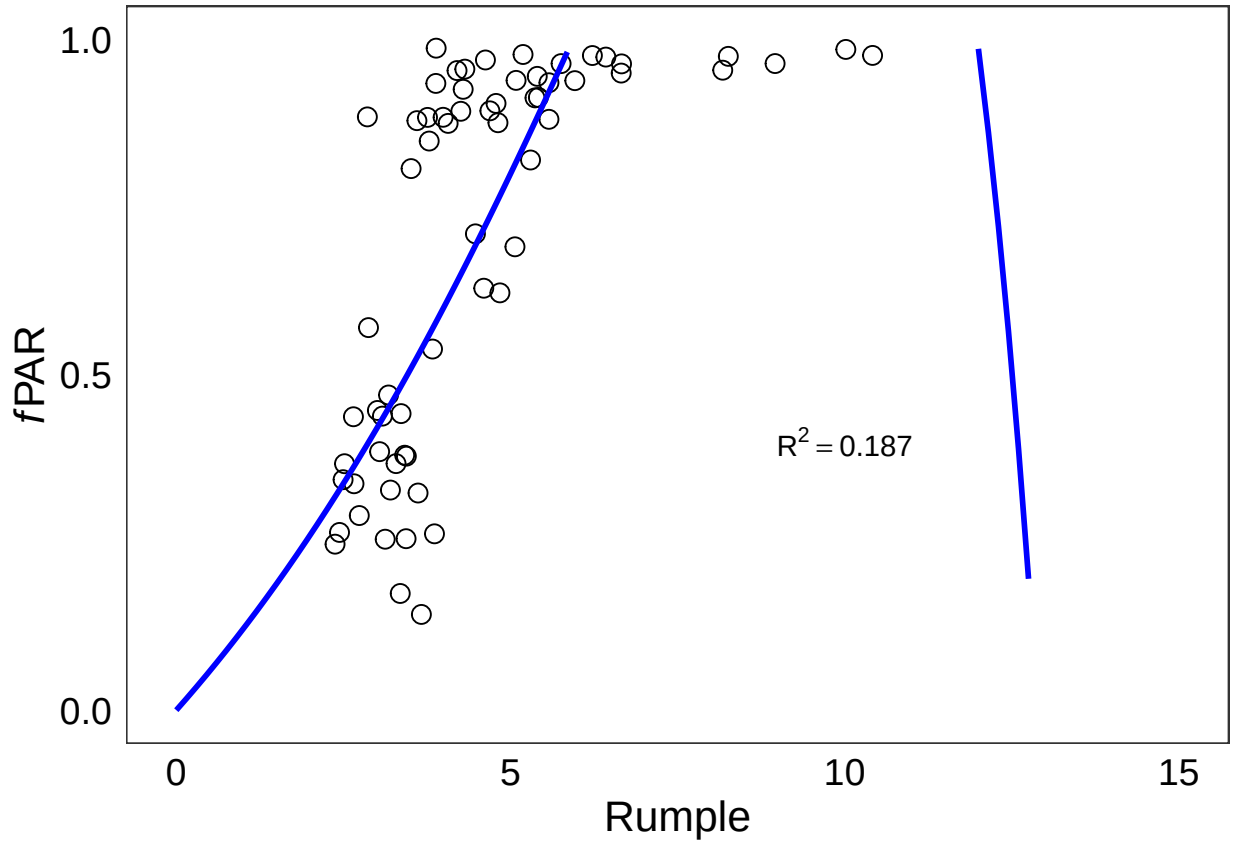

Normal Q−Q Plot of
Standardized Residuals
Sample Quantiles
Theoretical Quantiles
−2
−1
0
1
2

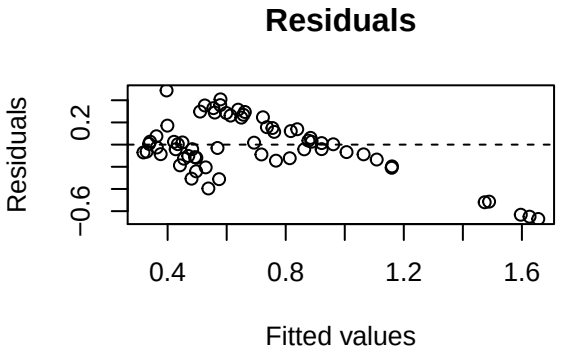
Rise to Max, Raise the Roof

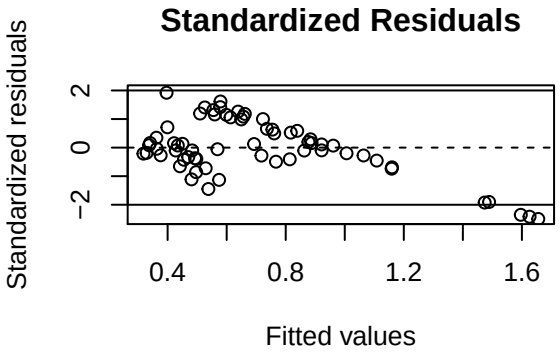
Using the equation: $y = a * (1 - exp(-b * x)) + c * (1 - exp(-d * x))$

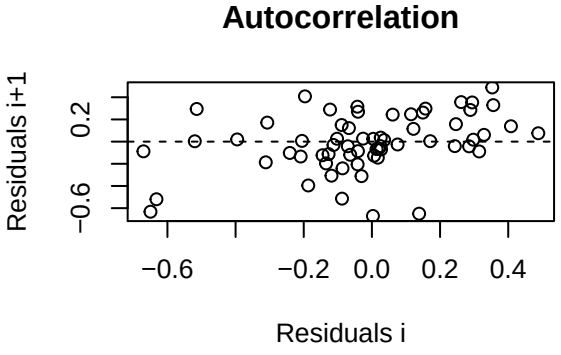
```
##           a           b           c           d
##  0.01245007  0.46945060 -0.71953057  0.16440539
```

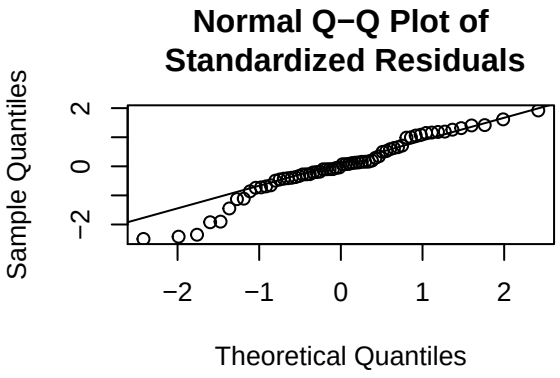
```
## [1] 16.14051
```

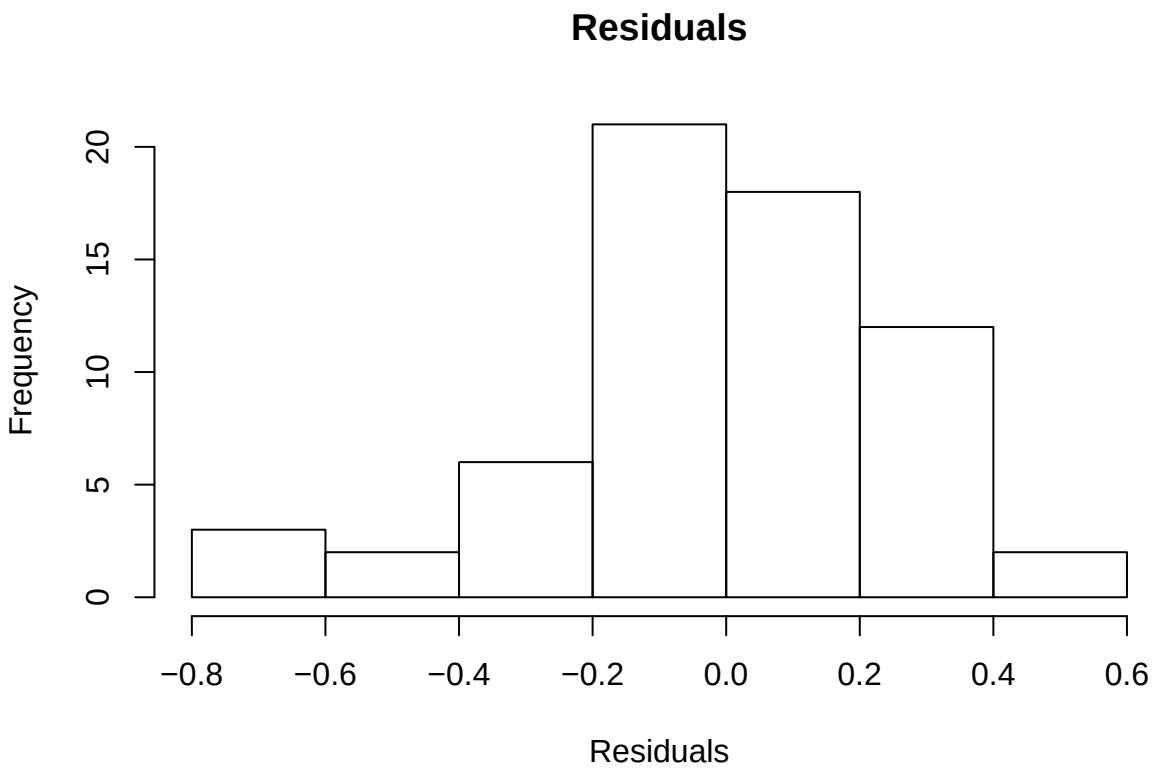

1.0
0.5
0.0
fPAR
0
5
10
15
Rumple
R2 = 0.187

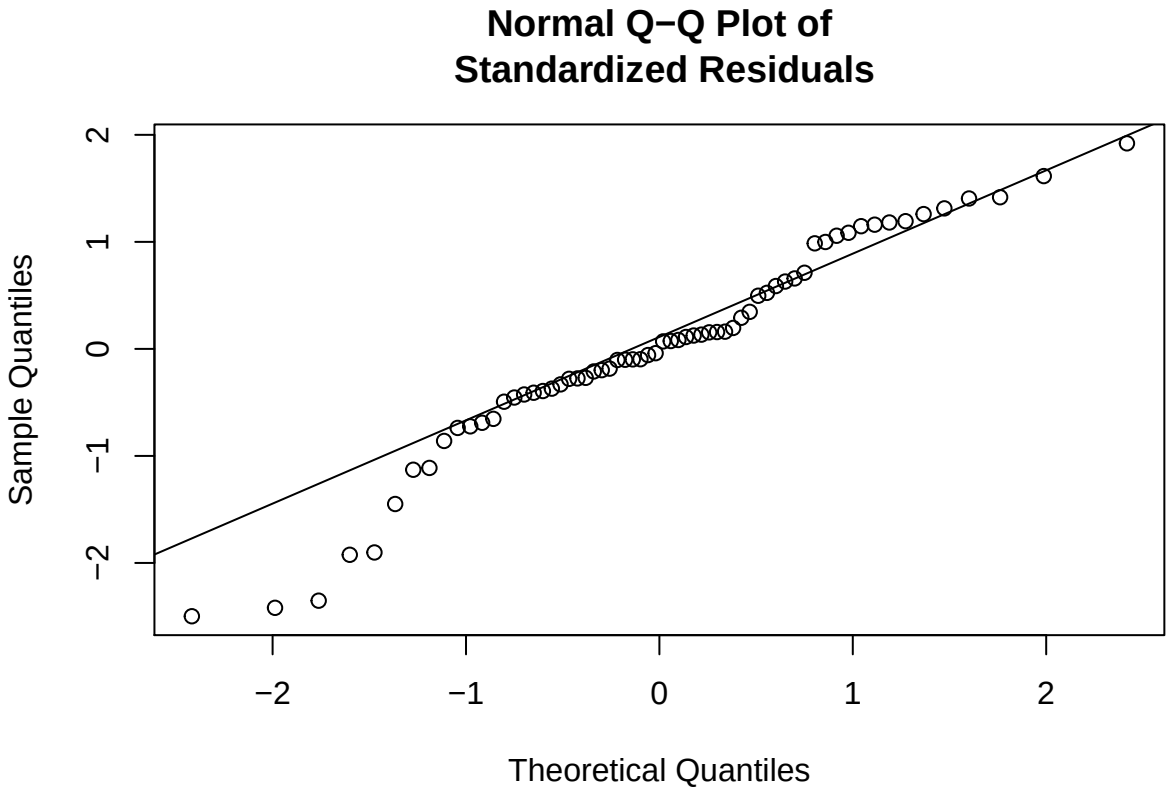

Residuals
Residuals
0.2
−0.6
0.4
0.8
1.2
1.6
Fitted values


Standardized Residuals
Standardized residuals
2
0
−2
0.4
0.8
1.2
1.6
Fitted values


Autocorrelation
Residuals i+1
0.2
−0.6
−0.6
−0.2
0.0
0.2
0.4
Residuals i


Normal Q−Q Plot of
Standardized Residuals
Sample Quantiles
2
0
−2
−2
−1
0
1
2
Theoretical Quantiles


Residuals
Frequency
0
5
10
15
20
−0.8
−0.6
−0.4
−0.2
0.0
0.2
0.4
0.6
Residuals


Normal Q−Q Plot of
Standardized Residuals
Sample Quantiles
Theoretical Quantiles
−2
−1
0
1
2