t.test(m$y1,m$y2,paired=TRUE)

Paired t-test

data: m$y1 and m$y2

t = 0.55539, df = 944, p-value = 0.5788

alternative hypothesis: true difference in means is not equal to 0

95 percent confidence interval:

-0.06434363 0.11513728

sample estimates:

mean of the differences

0.02539683

> t.test(m$y1,m$y2)

Welch Two Sample t-test

data: m$y1 and m$y2

t = 0.38647, df = 1887.5, p-value = 0.6992

alternative hypothesis: true difference in means is not equal to 0

95 percent confidence interval:

-0.1034859 0.1542796

sample estimates:

mean of x mean of y

6.304762 6.279365

> fit=lm(y~tm+ap+ta+tx+c,d)

> summary(fit)

Call:

lm(formula = y ~ tm + ap + ta + tx + c, data = d)

Residuals:

Min 1Q Median 3Q Max

-2.91151 -0.29215 -0.02047 0.25583 2.99790

Coefficients:

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

(Intercept) 0.095831 0.118748 0.807 0.420

tm 0.019482 0.016694 1.167 0.243

ap 0.138149 0.013197 10.468 <2e-16 \*\*\*

ta 0.566629 0.013575 41.740 <2e-16 \*\*\*

tx 0.271685 0.012972 20.944 <2e-16 \*\*\*

c -0.001603 0.018309 -0.088 0.930

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.5959 on 1884 degrees of freedom

Multiple R-squared: 0.8263, Adjusted R-squared: 0.8259

F-statistic: 1793 on 5 and 1884 DF, p-value: < 2.2e-16

> AIC(fit)

[1] 3414.845

> anova(lm(y~b+a,d))

Analysis of Variance Table

Response: y

Df Sum Sq Mean Sq F value Pr(>F)

b 3 1.2 0.391 0.1989 0.8972

a 4 148.8 37.208 18.9114 2.936e-15 \*\*\*

Residuals 1882 3702.8 1.967

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

> anova(lm(y~b+a+dc,d))

Analysis of Variance Table

Response: y

Df Sum Sq Mean Sq F value Pr(>F)

b 3 1.2 0.391 0.2005 0.896077

a 4 148.8 37.208 19.0661 2.204e-15 \*\*\*

dc 8 45.7 5.706 2.9241 0.003017 \*\*

Residuals 1874 3657.1 1.952

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

> t.test(a1$y,a2$y,alternative="less")

Welch Two Sample t-test

data: a1$y and a2$y

t = -2.3469, df = 1149.2, p-value = 0.00955

alternative hypothesis: true difference in means is less than 0

95 percent confidence interval:

-Inf -0.05633864

sample estimates:

mean of x mean of y

6.052478 6.241176

> t.test(a2$y,a3$y,alternative="less")

Welch Two Sample t-test

data: a2$y and a3$y

t = 0.84219, df = 208.59, p-value = 0.7997

alternative hypothesis: true difference in means is less than 0

95 percent confidence interval:

-Inf 0.3388753

sample estimates:

mean of x mean of y

6.241176 6.126761

> t.test(a3$y,a4$y,alternative="less")

Welch Two Sample t-test

data: a3$y and a4$y

t = -2.5154, df = 266.19, p-value = 0.006239

alternative hypothesis: true difference in means is less than 0

95 percent confidence interval:

-Inf -0.1271618

sample estimates:

mean of x mean of y

6.126761 6.496622

> t.test(a4$y,a5$y,alternative="less")

Welch Two Sample t-test

data: a4$y and a5$y

t = -3.2965, df = 536.93, p-value = 0.0005219

alternative hypothesis: true difference in means is less than 0

95 percent confidence interval:

-Inf -0.1970673

sample estimates:

mean of x mean of y

6.496622 6.890625

> fit2=lm(y~b+a+dc,d)

> summary(fit2)

Call:

lm(formula = y ~ b + a + dc, data = d)

Residuals:

Min 1Q Median 3Q Max

-4.7757 -0.9331 0.0133 0.9543 3.1774

Coefficients: (1 not defined because of singularities)

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

(Intercept) 5.720356 0.131783 43.407 < 2e-16 \*\*\*

bbrand b -0.002381 0.096400 -0.025 0.980298

bbrand c 0.146024 0.162598 0.898 0.369266

bbrand d 0.102214 0.162598 0.629 0.529667

aage2 0.213963 0.082064 2.607 0.009199 \*\*

aage3 0.115235 0.130167 0.885 0.376116

aage4 0.503513 0.098537 5.110 3.55e-07 \*\*\*

aage5 0.887742 0.103943 8.541 < 2e-16 \*\*\*

dcday 10 0.169283 0.142059 1.192 0.233554

dcday 2 0.169946 0.160588 1.058 0.290068

dcday 3 0.303225 0.161135 1.882 0.060017 .

dcday 4 0.326283 0.151006 2.161 0.030842 \*

dcday 5 0.522798 0.150095 3.483 0.000507 \*\*\*

dcday 6 0.184160 0.136251 1.352 0.176657

dcday 7 0.223093 0.132219 1.687 0.091712 .

dcday 8 0.442943 0.139932 3.165 0.001573 \*\*

dcday 9 NA NA NA NA

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 1.397 on 1874 degrees of freedom

Multiple R-squared: 0.05078, Adjusted R-squared: 0.04319

F-statistic: 6.684 on 15 and 1874 DF, p-value: 3.111e-14

>

>

> a=lmer(formula = y ~ b + a + (1 | d), data = d)

> summary(a)

Linear mixed model fit by REML ['lmerMod']

Formula: y ~ b + a + (1 | d)

Data: d

REML criterion at convergence: 6653.9

Scaled residuals:

Min 1Q Median 3Q Max

-3.4438 -0.6862 -0.0141 0.6818 2.2227

Random effects:

Groups Name Variance Std.Dev.

d (Intercept) 0.02042 0.1429

Residual 1.95156 1.3970

Number of obs: 1890, groups: d, 10

Fixed effects:

Estimate Std. Error t value

(Intercept) 5.999422 0.105101 57.08

bbrand b -0.002381 0.096401 -0.02

bbrand c 0.077628 0.129179 0.60

bbrand d 0.033818 0.129179 0.26

aage2 0.205903 0.081946 2.51

aage3 0.103431 0.129779 0.80

aage4 0.485163 0.098210 4.94

aage5 0.873768 0.103710 8.43

Correlation of Fixed Effects:

(Intr) bbrndb bbrndc bbrndd aage2 aage3 aage4

bbrand b -0.459

bbrand c -0.674 0.373

bbrand d -0.674 0.373 0.777

aage2 -0.349 0.000 0.018 0.018

aage3 -0.243 0.000 0.037 0.037 0.274

aage4 -0.322 0.000 0.052 0.052 0.364 0.237

aage5 -0.322 0.000 0.072 0.072 0.345 0.226 0.302

> AIC(a)

[1] 6673.888