

# Gas Turbine CO and NOx Emission Analysis

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## Introduction

The combined cycle power plant, also known as combined cycle gas turbine plant, is an assembly of heat engines that combine to generate electricity (Tüfekci). A combined-cycle power plant (CCPP) is made up of gas turbines, steam turbines, and heat recovery steam generators. The electricity is generated and combined in one cycle by gas and steam turbines and then transferred from one turbine to another.

We are interested in identifying the process variables that impact carbon monoxide emissions. By determining the process variables that impact carbon monoxide emissions we will be able to find opportunities to reduce carbon monoxide emissions.

## Gas Turbine CO and NOx Emission Data Set

The data comes from a gas turbine located in Turkey that studies the flue gas emissions of specifically carbon monoxide (CO) and nitrogen oxide (NOx) gases. The data set provides hourly statistics of 11 sensors. Data points were collected from a gas turbine from Jan 01 2011 to Dec 13 2015.

## Description

The data file `gt_2015.csv` has 7384 observations and 11 variables from the UCI Gas Turbine CO and NOx Emission Data Set. We are going to explore and analyze the following variables:

- AT - Ambient Temperature
- AP - Ambient Pressure
- AH - Ambient Humidity
- AFDP - Air filter difference pressure
- GTEP - Gas turbine exhaust pressure
- TIT - Turbine inlet temperature
- TAT - Turbine after temperature
- TEY - Turbine energy yield
- CDP - Compressor discharge pressure

Here's a quick peek at the data set:

AT	AP	AH	AFDP	GTEP	TIT	TAT	TEY	CDP	CO	NOX
1.95320	1020.1	84.985	2.5304	20.116	1048.7	544.92	116.27	10.799	7.4491	113.250
1.21910	1020.1	87.523	2.3937	18.584	1045.5	548.50	109.18	10.347	6.4684	112.020
0.94915	1022.2	78.335	2.7789	22.264	1068.8	549.95	125.88	11.256	3.6335	88.147
1.00750	1021.7	76.942	2.8170	23.358	1075.2	549.63	132.21	11.702	3.1972	87.078
1.28580	1021.6	76.732	2.8377	23.483	1076.2	549.68	133.58	11.737	2.3833	82.515
1.83190	1021.7	76.411	2.8410	23.495	1076.4	549.92	133.58	11.829	2.0812	81.193

Here's some descriptive statistics of the data set:

```
##          AT            AP            AH            AFDP
##  Min.   :-6.235      Min.   : 989.4      Min.   :24.09      Min.   :2.369
##  1st Qu.:11.073    1st Qu.:1009.7    1st Qu.:59.45    1st Qu.:3.117
##  Median  :17.456    Median  :1014.0    Median  :70.95    Median  :3.538
##  Mean    :17.225    Mean    :1014.5    Mean    :68.65    Mean    :3.599
##  3rd Qu.:23.685    3rd Qu.:1018.3    3rd Qu.:79.65    3rd Qu.:4.195
##  Max.    :37.103    Max.    :1036.6    Max.    :96.67    Max.    :5.239
##          GTEP          TIT           TAT           TEY
##  Min.   :17.70       Min.   :1016       Min.   :516.0      Min.   :100.0
##  1st Qu.:23.15       1st Qu.:1070       1st Qu.:544.7     1st Qu.:126.3
##  Median  :25.33       Median  :1080       Median  :549.7      Median  :131.6
##  Mean    :26.13       Mean    :1079       Mean    :546.6      Mean    :134.0
##  3rd Qu.:30.02       3rd Qu.:1100       3rd Qu.:550.0     3rd Qu.:147.2
##  Max.    :40.72       Max.    :1100       Max.    :550.6      Max.    :179.5
##          CDP           CO            NOX
##  Min.   : 9.871      Min.   : 0.2128      Min.   : 25.91
##  1st Qu.:11.466      1st Qu.: 1.8082      1st Qu.: 52.40
##  Median  :11.933      Median  : 2.5334      Median  : 56.84
##  Mean    :12.097      Mean    : 3.1300      Mean    : 59.89
##  3rd Qu.:13.148      3rd Qu.: 3.7026      3rd Qu.: 65.09
##  Max.    :15.159      Max.    :41.0970      Max.    :119.68
```

## Goals

The goal for this project is to utilize this data set for the purpose of studying flue gas emissions, specifically carbon monoxide(CO) and nitrogen oxides (NOx). Our focus will be to find statistically significant relationships between the ambient and turbine variables and the emissions variables. We will limit the size of our model to more clearly demonstrate these relationships. Ultimately we will suggest which variables make the biggest impact on emission levels in order to decrease emissions overall.

## Exploratory Data Analysis

Relationships between feature variables

Figure 1: Scatterplot Matrices to decide which feature variables have a linear relationship

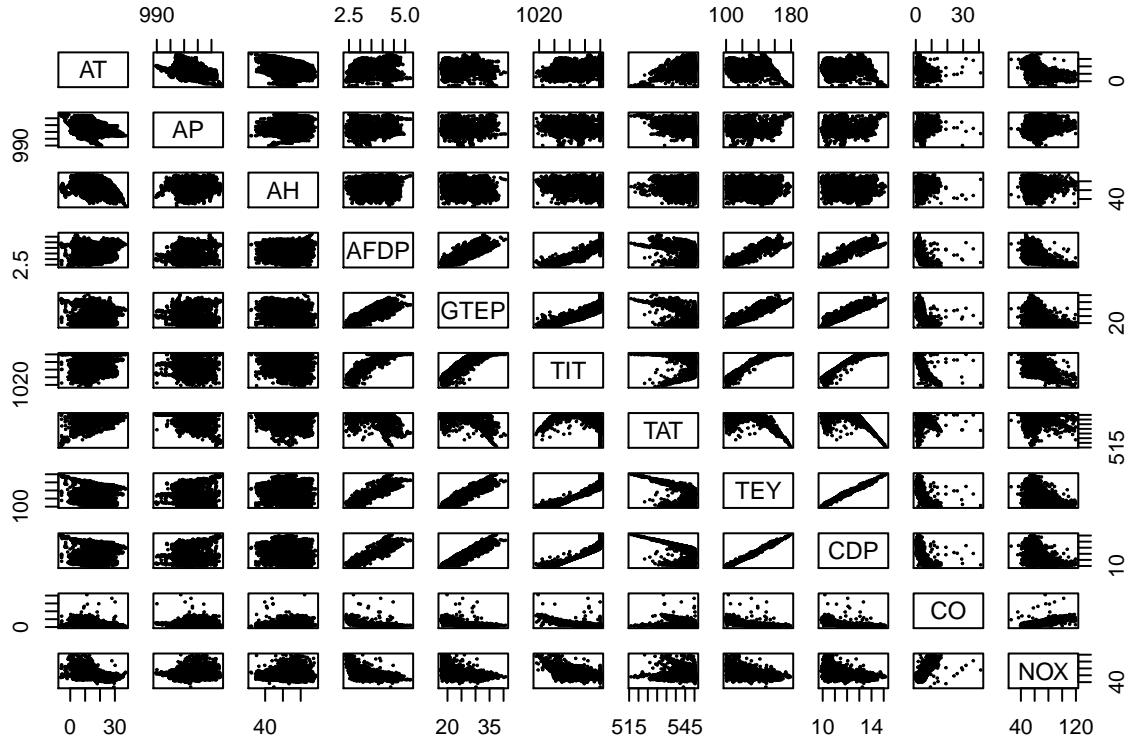


Figure 2:

Table 2: Pairwise Correlation Between Variables

	AT	AP	AH	AFDP	GTEP	TIT	TAT	TEY	CDP	CO	NOX
AT	1.00	-0.49	-0.47	0.47	0.19	0.33	0.21	0.11	0.20	-0.39	-0.59
AP	-0.49	1.00	0.08	-0.09	-0.04	-0.08	-0.29	0.05	0.03	0.20	0.21
AH	-0.47	0.08	1.00	-0.25	-0.30	-0.26	0.03	-0.18	-0.22	0.16	0.07
AFDP	0.47	-0.09	-0.25	1.00	0.84	0.92	-0.52	0.88	0.92	-0.64	-0.58
GTEP	0.19	-0.04	-0.30	0.84	1.00	0.89	-0.62	0.93	0.94	-0.56	-0.37
TIT	0.33	-0.08	-0.26	0.92	0.89	1.00	-0.40	0.95	0.95	-0.74	-0.52
TAT	0.21	-0.29	0.03	-0.52	-0.62	-0.40	1.00	-0.63	-0.66	0.03	0.05
TEY	0.11	0.05	-0.18	0.88	0.93	0.95	-0.63	1.00	0.99	-0.62	-0.40
CDP	0.20	0.03	-0.22	0.92	0.94	0.95	-0.66	0.99	1.00	-0.61	-0.44
CO	-0.39	0.20	0.16	-0.64	-0.56	-0.74	0.03	-0.62	-0.61	1.00	0.68
NOX	-0.59	0.21	0.07	-0.58	-0.37	-0.52	0.05	-0.40	-0.44	0.68	1.00

Remove variables that are highly correlated.

```
##      AT       AP       AH      AFDP      GTEP      TAT 
## 3.866424 1.600597 1.718769 7.412520 5.909197 2.301015
```

Exploratory analysis shows possible linear relationships between the response variable CO and the feature variables CDP, TEY, TIT, GTEP and AFDP. Collinearity between some of the feature variables (TIT, CDP, and TEY) could cause some problems in our analysis and will likely lead to the removal of the redundant variables.

## Methods

## Linear Regression

We will create a multiple linear regression model using all feature variables mentioned in the description of Section 1. The implementation and parameters of this model can be obtained by the following equation where we will find estimates for the parameters  $\beta$  using:

$$\hat{\beta} = (X^T X)^{-1} X^T y$$

Key assumptions are stated as:

- Linearity: can be written as a linear combination of the predictors.
- Independence: the errors are independent of each other (not highly correlated).
- Normality: the distribution of the errors follow a normal distribution.
- Equal Variance: the error variance is the same.<sup>1</sup>

We will then use model selection using backward BIC to tune our model and remove any insignificant predictor variables. This selection prefers smaller models which aligns with our goal of limiting the size of our final model.

```
full_model = lm(CO ~ ., data = gt_2015)
linear_model = lm(CO ~ . - NOX - TIT - CDP - TEY, data = gt_2015)
summary(linear_model)
```

```
##
## Call:
## lm(formula = CO ~ . - NOX - TIT - CDP - TEY, data = gt_2015)
##
## Residuals:
##    Min      1Q Median      3Q     Max
## -6.839 -0.673 -0.132  0.481 34.242
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept) 145.099775   4.408695 32.912 < 2e-16 ***
## AT          0.028276   0.004060  6.965 3.57e-12 ***
## AP          0.001918   0.003067  0.625  0.532
## AH         -0.009753   0.001618 -6.026 1.76e-09 ***
## AFDP        -2.531044   0.074576 -33.939 < 2e-16 ***
## GTEP        -0.186308   0.009082 -20.513 < 2e-16 ***
## TAT         -0.237369   0.004619 -51.387 < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.436 on 7377 degrees of freedom
## Multiple R-squared:  0.5874, Adjusted R-squared:  0.587
## F-statistic: 1750 on 6 and 7377 DF,  p-value: < 2.2e-16
```

```
#picking a new variable to test
AT_model = lm(CO ~ AT, data = gt_2015)
AP_model = lm(CO ~ AP, data = gt_2015)
```

<sup>1</sup>Dalpiaz David, Applied Statistics in R, <https://daviddalpiaz.github.io/appliedstats/model-diagnostics.html>

```

AH_model = lm(CO ~ AH, data = gt_2015)
AFDP_model = lm(CO ~ AFDP, data = gt_2015)
GTEP_model = lm(CO ~ GTEP, data = gt_2015)
TAT_model = lm(CO ~ TAT, data = gt_2015)
BIC(AT_model)

## [1] 31634.69

BIC(AP_model)

## [1] 32553.05

BIC(AH_model)

## [1] 32668.32

BIC(AFDP_model) #second best

## [1] 28953.71

BIC(GTEP_model)

## [1] 30112.68

BIC(TAT_model)

## [1] 32852.49

BIC(linear_model) #this is the best model

## [1] 26365.45

library(MASS)

## Warning: package 'MASS' was built under R version 3.6.2

n = length(resid(linear_model))
BIC_model = step(linear_model, direction = "backward", k = log(n))

## Start: AIC=5401.66
## CO ~ (AT + AP + AH + AFDP + GTEP + TIT + TAT + TEY + CDP + NOX) -
##      NOX - TIT - CDP - TEY
##
##          Df Sum of Sq    RSS    AIC
## - AP     1       0.8 15218 5393.1
## <none>           15217 5401.7
## - AH     1      74.9 15292 5429.0

```

```

## - AT    1    100.1 15317 5441.1
## - GTEP  1     868.0 16085 5802.4
## - AFDP  1    2376.0 17593 6464.1
## - TAT   1    5447.0 20664 7652.1
##
## Step: AIC=5393.14
## CO ~ AT + AH + AFDP + GTEP + TAT
##
##          Df Sum of Sq   RSS   AIC
## <none>            15218 5393.1
## - AH    1      86.8 15304 5426.2
## - AT    1     120.5 15338 5442.5
## - GTEP  1     991.0 16209 5850.1
## - AFDP  1    2564.3 17782 6534.1
## - TAT   1    5608.5 20826 7701.0

coef(BIC_model)

## (Intercept)          AT          AH          AFDP         GTEP          TAT
## 147.33755305  0.02702808 -0.01004686 -2.51758434 -0.18816259 -0.23782668

stepAIC(linear_model, direction = "backward")

## Start: AIC=5353.31
## CO ~ (AT + AP + AH + AFDP + GTEP + TIT + TAT + TEY + CDP + NOX) -
##       NOX - TIT - CDP - TEY
##
##          Df Sum of Sq   RSS   AIC
## - AP    1      0.8 15218 5351.7
## <none>            15217 5353.3
## - AH    1     74.9 15292 5387.6
## - AT    1     100.1 15317 5399.7
## - GTEP  1     868.0 16085 5760.9
## - AFDP  1    2376.0 17593 6422.6
## - TAT   1    5447.0 20664 7610.7
##
## Step: AIC=5351.7
## CO ~ AT + AH + AFDP + GTEP + TAT
##
##          Df Sum of Sq   RSS   AIC
## <none>            15218 5351.7
## - AH    1      86.8 15304 5391.7
## - AT    1     120.5 15338 5408.0
## - GTEP  1     991.0 16209 5815.5
## - AFDP  1    2564.3 17782 6499.6
## - TAT   1    5608.5 20826 7666.5

##
## Call:
## lm(formula = CO ~ AT + AH + AFDP + GTEP + TAT, data = gt_2015)
##
## Coefficients:
## (Intercept)          AT          AH          AFDP         GTEP          TAT
## 147.33755      0.02703     -0.01005     -2.51758     -0.18816     -0.23783

```

```

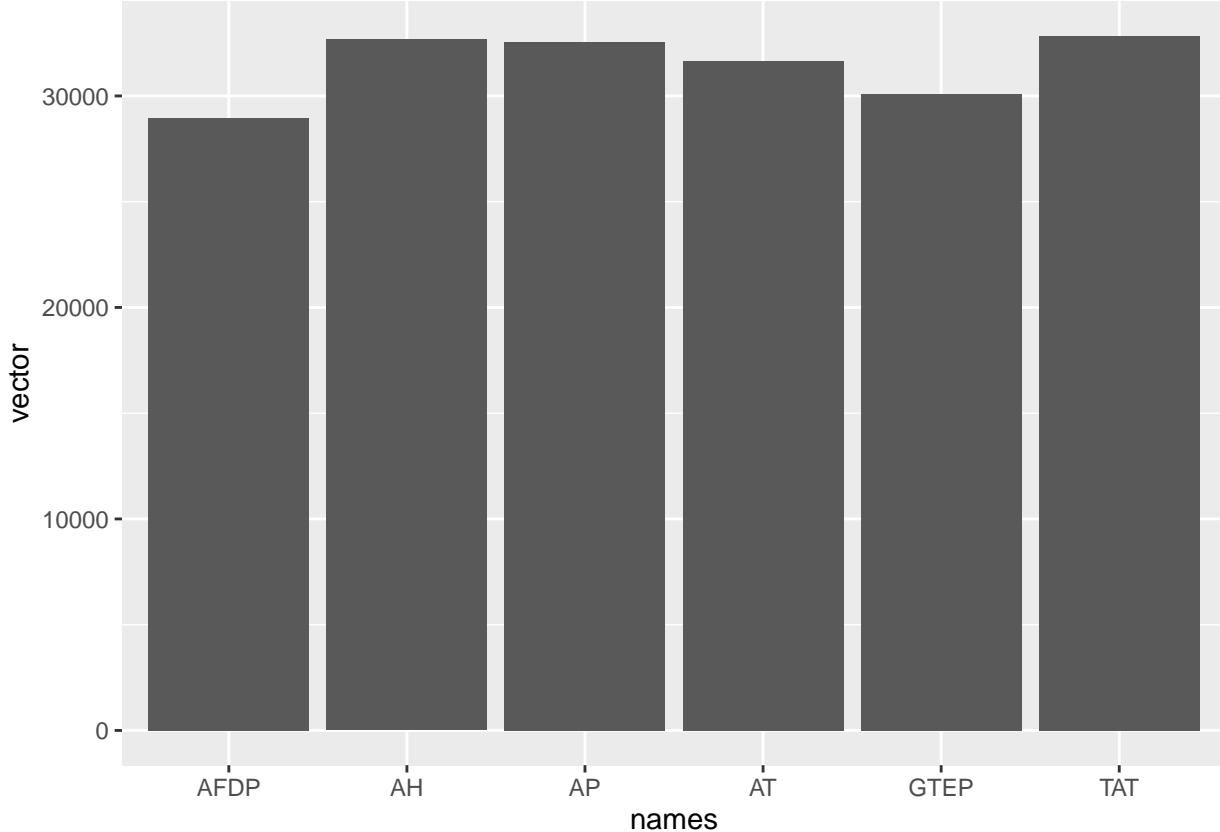
vector <- c(BIC(AT_model), BIC(AP_model), BIC(AH_model), BIC(AFDP_model), BIC(GTEP_model), BIC(TAT_model))

library(ggplot2)

## Warning: package 'ggplot2' was built under R version 3.6.2

df <- data.frame(vector = c(BIC(AT_model), BIC(AP_model), BIC(AH_model), BIC(AFDP_model), BIC(GTEP_model),
ggplot(data = df, aes(x = names, y = vector), ylim = c(0, 50000)) + geom_bar(stat = "identity")

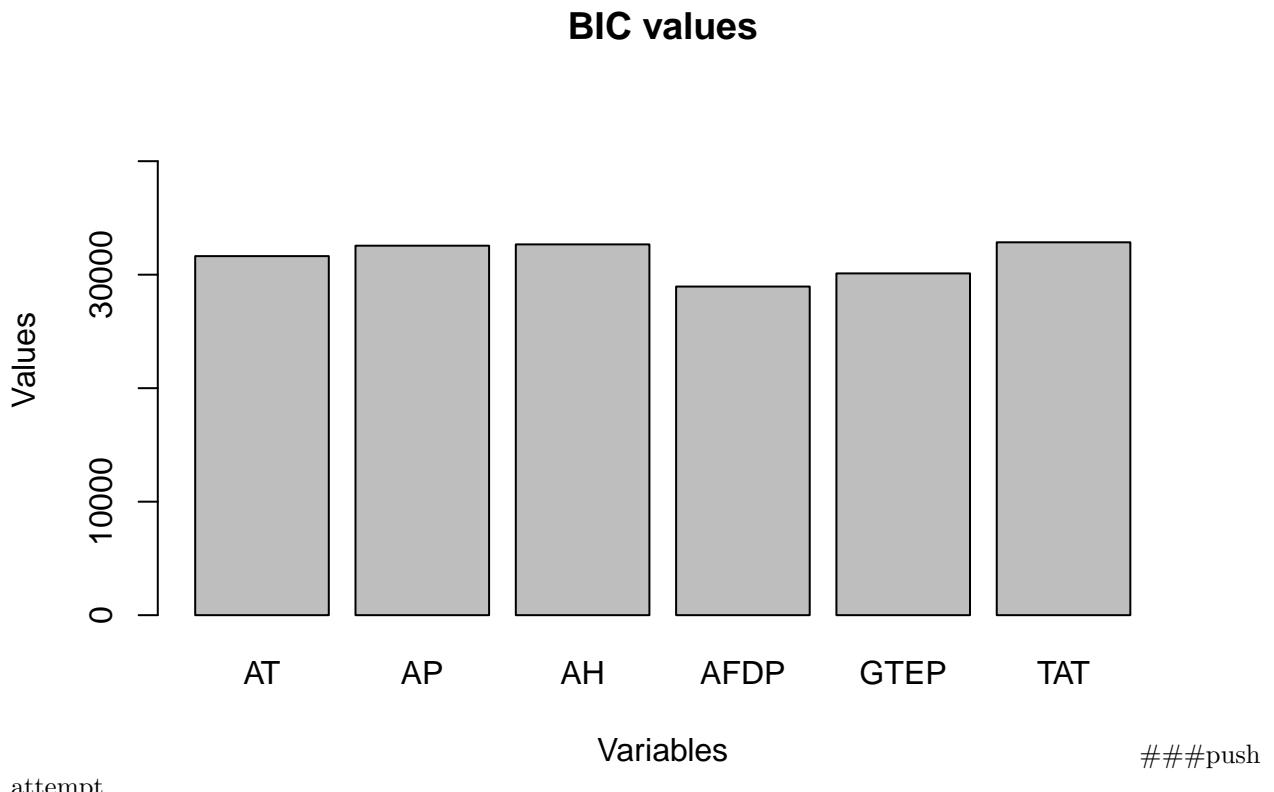
```



```

barplot(vector, main = "BIC values", xlab = "Variables", ylab = "Values", names.arg = c("AT", "AP", "AH"))

```



```
attempt          #####push
```

```
library(caret)
```

```
## Loading required package: lattice
```

```
## Warning: package 'lattice' was built under R version 3.6.2
```

```
##  
## Attaching package: 'lattice'
```

```
## The following object is masked from 'package:faraway':  
##  
##      melanoma
```

```
#simplest linear model  
simple_linear_model <- lm(CO ~ . - TIT - CDP - TEY, data = gt_2015)
```

```
#5-fold cross validation  
cv_5 <- trainControl(method = "cv", number = 5)
```

```
#AIC stepwise selected linear model  
linear_mod <- train(  
  form = CO ~ . - TIT - CDP - TEY - NOX,  
  data = gt_2015,  
  method = "lmStepAIC",  
  trControl = cv_5  
)
```

```

## Start: AIC=4537.97
## .outcome ~ AT + AP + AH + AFDP + GTEP + TAT
##
##          Df Sum of Sq   RSS   AIC
## - AP     1      1.8 12706 4536.8
## <none>            12705 4538.0
## - AH     1      55.9 12760 4561.9
## - AT     1      82.2 12787 4574.1
## - GTEP   1     673.2 13378 4840.9
## - AFDP   1    1874.7 14579 5348.9
## - TAT    1    4200.0 16905 6222.9
##
## Step: AIC=4536.83
## .outcome ~ AT + AH + AFDP + GTEP + TAT
##
##          Df Sum of Sq   RSS   AIC
## <none>            12706 4536.8
## - AH     1      67.8 12774 4566.3
## - AT     1      93.1 12800 4577.9
## - GTEP   1     784.1 13490 4888.5
## - AFDP   1    2010.5 14717 5402.4
## - TAT    1    4344.3 17051 6271.7
## Start: AIC=4544.86
## .outcome ~ AT + AP + AH + AFDP + GTEP + TAT
##
##          Df Sum of Sq   RSS   AIC
## - AP     1      0.7 12721 4543.2
## <none>            12720 4544.9
## - AH     1      61.6 12782 4571.4
## - AT     1      94.2 12815 4586.4
## - GTEP   1     719.4 13440 4867.9
## - AFDP   1    1988.0 14708 5400.8
## - TAT    1    4758.3 17479 6420.3
##
## Step: AIC=4543.2
## .outcome ~ AT + AH + AFDP + GTEP + TAT
##
##          Df Sum of Sq   RSS   AIC
## <none>            12721 4543.2
## - AH     1      71.9 12793 4574.5
## - AT     1     113.8 12835 4593.8
## - GTEP   1     823.0 13544 4911.5
## - AFDP   1    2147.0 14868 5462.6
## - TAT    1    4898.7 17620 6465.8
## Start: AIC=4811.87
## .outcome ~ AT + AP + AH + AFDP + GTEP + TAT
##
##          Df Sum of Sq   RSS   AIC
## - AP     1      0.1 13309 4809.9
## <none>            13308 4811.9
## - AT     1      69.3 13378 4840.5
## - AH     1      79.4 13388 4845.0
## - GTEP   1     754.8 14063 5135.8
## - AFDP   1    1814.9 15123 5565.1

```

```

## - TAT 1 4360.5 17669 6484.2
##
## Step: AIC=4809.93
## .outcome ~ AT + AH + AFDP + GTEP + TAT
##
##          Df Sum of Sq   RSS   AIC
## <none>           13309 4809.9
## - AH 1 84.2 13393 4845.2
## - AT 1 95.2 13404 4850.0
## - GTEP 1 837.9 14147 5168.7
## - AFDP 1 1993.0 15302 5632.4
## - TAT 1 4468.4 17777 6518.3
## Start: AIC=3012.13
## .outcome ~ AT + AP + AH + AFDP + GTEP + TAT
##
##          Df Sum of Sq   RSS   AIC
## <none>           9812.9 3012.1
## - AP 1 5.1 9818.0 3013.2
## - AH 1 41.1 9854.0 3034.8
## - AT 1 88.0 9900.9 3062.9
## - GTEP 1 610.6 10423.5 3366.7
## - AFDP 1 1992.1 11805.0 4101.9
## - TAT 1 4102.2 13915.1 5073.3
## Start: AIC=4344.24
## .outcome ~ AT + AP + AH + AFDP + GTEP + TAT
##
##          Df Sum of Sq   RSS   AIC
## - AP 1 0.0 12295 4342.2
## <none>           12295 4344.2
## - AH 1 65.8 12361 4373.8
## - AT 1 67.6 12363 4374.6
## - GTEP 1 718.0 13013 4677.5
## - AFDP 1 1834.4 14130 5163.7
## - TAT 1 4380.8 16676 6142.5
##
## Step: AIC=4342.25
## .outcome ~ AT + AH + AFDP + GTEP + TAT
##
##          Df Sum of Sq   RSS   AIC
## <none>           12295 4342.2
## - AH 1 71.5 12367 4374.5
## - AT 1 89.5 12385 4383.1
## - GTEP 1 800.9 13096 4713.0
## - AFDP 1 2000.6 14296 5230.8
## - TAT 1 4492.1 16787 6179.8
## Start: AIC=5353.31
## .outcome ~ AT + AP + AH + AFDP + GTEP + TAT
##
##          Df Sum of Sq   RSS   AIC
## - AP 1 0.8 15218 5351.7
## <none>           15217 5353.3
## - AH 1 74.9 15292 5387.6
## - AT 1 100.1 15317 5399.7
## - GTEP 1 868.0 16085 5760.9

```

```

## - AFDP 1    2376.0 17593 6422.6
## - TAT   1    5447.0 20664 7610.7
##
## Step:  AIC=5351.7
## .outcome ~ AT + AH + AFDP + GTEP + TAT
##
##          Df Sum of Sq   RSS   AIC
## <none>      15218 5351.7
## - AH     1      86.8 15304 5391.7
## - AT     1     120.5 15338 5408.0
## - GTEP   1     991.0 16209 5815.5
## - AFDP   1    2564.3 17782 6499.6
## - TAT   1    5608.5 20826 7666.5

#Linear log model
linear_mod_2 <- train(
  form = log(CO) ~ . - TIT - CDP - TEY - NOX,
  data = gt_2015,
  method = "lmStepAIC",
  trControl = cv_5,
  nvmax = 10
)

## Start:  AIC=-13098.9
## .outcome ~ AT + AP + AH + AFDP + GTEP + TAT
##
##          Df Sum of Sq   RSS   AIC
## <none>      641.27 -13099
## - AP     1      0.740 642.01 -13094
## - AT     1      1.137 642.41 -13090
## - AH     1      5.541 646.81 -13050
## - GTEP   1     30.123 671.40 -12830
## - AFDP   1    112.269 753.54 -12148
## - TAT   1    112.967 754.24 -12143
## Start:  AIC=-13138.12
## .outcome ~ AT + AP + AH + AFDP + GTEP + TAT
##
##          Df Sum of Sq   RSS   AIC
## <none>      637.73 -13138
## - AP     1      0.344 638.07 -13137
## - AT     1      1.238 638.96 -13129
## - AH     1      4.833 642.56 -13096
## - GTEP   1     30.994 668.72 -12860
## - AFDP   1    118.130 755.86 -12136
## - TAT   1    124.286 762.01 -12088
## Start:  AIC=-13070.36
## .outcome ~ AT + AP + AH + AFDP + GTEP + TAT
##
##          Df Sum of Sq   RSS   AIC
## <none>      645.08 -13070
## - AP     1      0.563 645.65 -13067
## - AT     1      1.283 646.36 -13061
## - AH     1      7.001 652.08 -13009
## - GTEP   1     31.763 676.85 -12788

```

```

## - AFDP 1 115.076 760.16 -12103
## - TAT 1 122.136 767.22 -12048
## Start: AIC=-13034.68
## .outcome ~ AT + AP + AH + AFDP + GTEP + TAT
##
##          Df Sum of Sq    RSS    AIC
## <none>            648.99 -13035
## - AP     1      0.490 649.48 -13032
## - AT     1      0.755 649.75 -13030
## - AH     1      3.706 652.70 -13003
## - GTEP   1      33.773 682.76 -12737
## - AFDP   1     115.779 764.77 -12067
## - TAT    1     128.667 777.66 -11968
## Start: AIC=-13105.63
## .outcome ~ AT + AP + AH + AFDP + GTEP + TAT
##
##          Df Sum of Sq    RSS    AIC
## <none>            640.54 -13106
## - AP     1      0.390 640.93 -13104
## - AT     1      1.621 642.16 -13093
## - AH     1      7.361 647.90 -13040
## - GTEP   1      30.239 670.78 -12835
## - AFDP   1     115.413 755.96 -12129
## - TAT    1     116.271 756.81 -12122
## Start: AIC=-16362.66
## .outcome ~ AT + AP + AH + AFDP + GTEP + TAT
##
##          Df Sum of Sq    RSS    AIC
## <none>            803.69 -16363
## - AP     1      0.617 804.31 -16359
## - AT     1      1.490 805.18 -16351
## - AH     1      7.006 810.70 -16301
## - GTEP   1      39.224 842.91 -16013
## - AFDP   1     144.163 947.85 -15146
## - TAT    1     151.059 954.75 -15093

#Lasso model
lasso_mod <- train(
  form = CO ~ . - TIT - CDP - TEY - NOX,
  data = gt_2015,
  method = "lasso",
  trControl = cv_5
)

#Linear model with 2-way interactions
linear_mod_3 <- train(
  form = log(CO) ~ (AT + AP + AH + AFDP + GTEP + TIT + TAT + TEY + CDP)^2,
  data = gt_2015,
  method = "lmStepAIC",
  trControl = cv_5,
  nvmax = 10
)

## Start: AIC=-14677.74

```

```

## .outcome ~ AT + AP + AH + AFDP + GTEP + TIT + TAT + TEY + CDP +
##   `AT:AP` + `AT:AH` + `AT:AFDP` + `AT:GTEP` + `AT:TIT` + `AT:TAT` +
##   `AT:TEY` + `AT:CDP` + `AP:AH` + `AP:AFDP` + `AP:GTEP` + `AP:TIT` +
##   `AP:TAT` + `AP:TEY` + `AP:CDP` + `AH:AFDP` + `AH:GTEP` +
##   `AH:TIT` + `AH:TAT` + `AH:TEY` + `AH:CDP` + `AFDP:GTEP` +
##   `AFDP:TIT` + `AFDP:TAT` + `AFDP:TEY` + `AFDP:CDP` + `GTEP:TIT` +
##   `GTEP:TAT` + `GTEP:TEY` + `GTEP:CDP` + `TIT:TAT` + `TIT:TEY` +
##   `TIT:CDP` + `TAT:TEY` + `TAT:CDP` + `TEY:CDP`
##
##          Df Sum of Sq    RSS    AIC
## - `AFDP:TIT` 1  0.0023 484.69 -14680
## - `AP:AFDP` 1  0.0043 484.70 -14680
## - `AH:TEY` 1  0.0063 484.70 -14680
## - `TIT:TEY` 1  0.0109 484.70 -14680
## - `TAT:CDP` 1  0.0153 484.71 -14680
## - `AP:CDP` 1  0.0170 484.71 -14680
## - `AH:TAT` 1  0.0212 484.71 -14680
## - `AFDP:CDP` 1  0.0342 484.73 -14679
## - `AT:TAT` 1  0.0382 484.73 -14679
## - AH 1  0.0383 484.73 -14679
## - `AH:CDP` 1  0.0532 484.75 -14679
## - `AH:TIT` 1  0.0568 484.75 -14679
## - `AFDP:TEY` 1  0.0617 484.75 -14679
## - `AFDP:TAT` 1  0.0649 484.76 -14679
## - `AT:CDP` 1  0.0831 484.78 -14679
## - `GTEP:CDP` 1  0.0982 484.79 -14678
## - `AT:AFDP` 1  0.1132 484.81 -14678
## - CDP 1  0.1427 484.84 -14678
## <none> 484.69 -14678
## - `TEY:CDP` 1  0.2009 484.89 -14677
## - `AT:TIT` 1  0.2095 484.90 -14677
## - `TAT:TEY` 1  0.2511 484.94 -14677
## - AFDP 1  0.2814 484.97 -14676
## - AT 1  0.2924 484.98 -14676
## - `GTEP:TAT` 1  0.3108 485.00 -14676
## - `AT:AH` 1  0.3298 485.02 -14676
## - `GTEP:TEY` 1  0.3401 485.03 -14676
## - `AFDP:GTEP` 1  0.3430 485.04 -14676
## - `TIT:CDP` 1  0.3610 485.05 -14675
## - `GTEP:TIT` 1  0.3981 485.09 -14675
## - `AP:GTEP` 1  0.4694 485.16 -14674
## - TEY 1  0.6590 485.35 -14672
## - TIT 1  0.7822 485.47 -14670
## - `AT:GTEP` 1  0.8014 485.49 -14670
## - `AH:AFDP` 1  0.8712 485.56 -14669
## - `AH:GTEP` 1  0.9742 485.67 -14668
## - `AP:TAT` 1  0.9830 485.68 -14668
## - GTEP 1  0.9891 485.68 -14668
## - `AP:AH` 1  1.3716 486.06 -14663
## - `AT:TEY` 1  1.6490 486.34 -14660
## - `AP:TIT` 1  1.7846 486.48 -14658
## - TAT 1  1.8608 486.55 -14657
## - `TIT:TAT` 1  2.4863 487.18 -14650
## - AP 1  3.3014 487.99 -14640

```

```

## - `AP:TEY`      1    4.1708 488.86 -14629
## - `AT:AP`       1    5.5269 490.22 -14613
##
## Step: AIC=-14679.71
## .outcome ~ AT + AP + AH + AFDP + GTEP + TIT + TAT + TEY + CDP +
##   `AT:AP` + `AT:AH` + `AT:AFDP` + `AT:GTEP` + `AT:TIT` + `AT:TAT` +
##   `AT:TEY` + `AT:CDP` + `AP:AH` + `AP:AFDP` + `AP:GTEP` + `AP:TIT` +
##   `AP:TAT` + `AP:TEY` + `AP:CDP` + `AH:AFDP` + `AH:GTEP` +
##   `AH:TIT` + `AH:TAT` + `AH:TEY` + `AH:CDP` + `AFDP:GTEP` +
##   `AFDP:TAT` + `AFDP:TEY` + `AFDP:CDP` + `GTEP:TIT` + `GTEP:TAT` +
##   `GTEP:TEY` + `GTEP:CDP` + `TIT:TAT` + `TIT:TEY` + `TIT:CDP` +
##   `TAT:TEY` + `TAT:CDP` + `TEY:CDP`
##
##                                     Df Sum of Sq    RSS     AIC
## - `AP:AFDP`      1    0.0035 484.70 -14682
## - `AH:TEY`       1    0.0063 484.70 -14682
## - `TIT:TEY`      1    0.0089 484.70 -14682
## - `TAT:CDP`      1    0.0185 484.71 -14682
## - `AP:CDP`       1    0.0208 484.72 -14682
## - `AH:TAT`       1    0.0271 484.72 -14681
## - `AH`            1    0.0385 484.73 -14681
## - `AT:TAT`       1    0.0473 484.74 -14681
## - `AFDP:CDP`     1    0.0487 484.74 -14681
## - `AH:TIT`       1    0.0656 484.76 -14681
## - `AH:CDP`       1    0.0683 484.76 -14681
## - `GTEP:CDP`     1    0.0978 484.79 -14680
## - `AFDP:TEY`     1    0.1156 484.81 -14680
## - `CDP`           1    0.1451 484.84 -14680
## <none>                  484.69 -14680
## - `AT:AFDP`     1    0.1786 484.87 -14680
## - `AT:CDP`       1    0.2361 484.93 -14679
## - `AT`            1    0.2901 484.98 -14678
## - `AT:TIT`       1    0.3045 485.00 -14678
## - `GTEP:TAT`     1    0.3134 485.01 -14678
## - `AT:AH`         1    0.3283 485.02 -14678
## - `GTEP:TEY`     1    0.3410 485.04 -14678
## - `AFDP:GTEP`    1    0.3434 485.04 -14678
## - `AFDP`          1    0.3593 485.05 -14677
## - `GTEP:TIT`     1    0.4007 485.10 -14677
## - `TAT:TEY`       1    0.4078 485.10 -14677
## - `TIT:CDP`       1    0.4672 485.16 -14676
## - `AP:GTEP`       1    0.4720 485.17 -14676
## - `TEY:CDP`       1    0.4780 485.17 -14676
## - `TEY`            1    0.6636 485.36 -14674
## - `AFDP:TAT`     1    0.7624 485.46 -14672
## - `AT:GTEP`       1    0.7991 485.49 -14672
## - `TIT`            1    0.8049 485.50 -14672
## - `AH:AFDP`       1    0.8789 485.57 -14671
## - `AH:GTEP`       1    0.9761 485.67 -14670
## - `AP:TAT`        1    0.9905 485.69 -14670
## - `GTEP`           1    0.9951 485.69 -14670
## - `AP:AH`          1    1.3736 486.07 -14665
## - `AT:TEY`         1    1.6472 486.34 -14662
## - `AP:TIT`         1    1.7901 486.48 -14660

```

```

## - TAT      1  1.8820 486.58 -14659
## - `TIT:TAT` 1  2.6672 487.36 -14649
## - AP       1  3.3373 488.03 -14641
## - `AP:TEY` 1  4.1820 488.88 -14631
## - `AT:AP`   1  5.5430 490.24 -14614
##
## Step: AIC=-14681.67
## .outcome ~ AT + AP + AH + AFDP + GTEP + TIT + TAT + TEY + CDP +
##   `AT:AP` + `AT:AH` + `AT:AFDP` + `AT:GTEP` + `AT:TIT` + `AT:TAT` +
##   `AT:TEY` + `AT:CDP` + `AP:AH` + `AP:GTEP` + `AP:TIT` + `AP:TAT` +
##   `AP:TEY` + `AP:CDP` + `AH:AFDP` + `AH:GTEP` + `AH:TIT` +
##   `AH:TAT` + `AH:TEY` + `AH:CDP` + `AFDP:GTEP` + `AFDP:TAT` +
##   `AFDP:TEY` + `AFDP:CDP` + `GTEP:TIT` + `GTEP:TAT` + `GTEP:TEY` +
##   `GTEP:CDP` + `TIT:TAT` + `TIT:TEY` + `TIT:CDP` + `TAT:TEY` +
##   `TAT:CDP` + `TEY:CDP`
##
##          Df Sum of Sq    RSS    AIC
## - `AH:TEY`  1  0.0054 484.70 -14684
## - `TIT:TEY` 1  0.0102 484.71 -14684
## - `AP:CDP`  1  0.0213 484.72 -14683
## - `TAT:CDP` 1  0.0222 484.72 -14683
## - `AH:TAT`  1  0.0256 484.72 -14683
## - AH       1  0.0505 484.75 -14683
## - `AT:TAT`  1  0.0574 484.76 -14683
## - `AFDP:CDP` 1  0.0582 484.76 -14683
## - `AH:TIT`  1  0.0630 484.76 -14683
## - `AH:CDP`  1  0.0673 484.77 -14683
## - `GTEP:CDP` 1  0.0963 484.79 -14682
## - `AFDP:TEY` 1  0.1208 484.82 -14682
## - CDP      1  0.1474 484.85 -14682
## <none>           484.70 -14682
## - `AT:CDP`  1  0.2335 484.93 -14681
## - `AT:AFDP` 1  0.2547 484.95 -14681
## - AT       1  0.3083 485.01 -14680
## - `AT:AH`   1  0.3267 485.02 -14680
## - `GTEP:TAT` 1  0.3271 485.03 -14680
## - `GTEP:TEY` 1  0.3511 485.05 -14679
## - `AFDP:GTEP` 1  0.3761 485.07 -14679
## - `AT:TIT`  1  0.3771 485.08 -14679
## - `TAT:TEY`  1  0.4064 485.10 -14679
## - `GTEP:TIT` 1  0.4161 485.11 -14679
## - `AP:GTEP`  1  0.4694 485.17 -14678
## - `TEY:CDP`  1  0.4871 485.19 -14678
## - `TIT:CDP`  1  0.5069 485.21 -14678
## - AFDP     1  0.6013 485.30 -14676
## - TEY      1  0.7051 485.40 -14675
## - `AFDP:TAT` 1  0.7591 485.46 -14674
## - `AT:GTEP`  1  0.7971 485.50 -14674
## - `AH:AFDP`  1  0.9060 485.60 -14673
## - TIT      1  0.9552 485.65 -14672
## - `AH:GTEP` 1  0.9884 485.69 -14672
## - GTEP     1  1.0155 485.71 -14671
## - `AP:TAT`  1  1.1853 485.88 -14669
## - `AP:AH`   1  1.5881 486.29 -14664

```

```

## - `AT:TEY`      1    2.0917 486.79 -14658
## - `AP:TIT`      1    2.1671 486.87 -14657
## - TAT          1    2.2202 486.92 -14657
## - `TIT:TAT`     1    2.6960 487.39 -14651
## - AP           1    3.9465 488.64 -14636
## - `AP:TEY`      1    4.8093 489.51 -14625
## - `AT:AP`       1    5.8020 490.50 -14613
##
## Step: AIC=-14683.6
## .outcome ~ AT + AP + AH + AFDP + GTEP + TIT + TAT + TEY + CDP +
##   `AT:AP` + `AT:AH` + `AT:AFDP` + `AT:GTEP` + `AT:TIT` + `AT:TAT` +
##   `AT:TEY` + `AT:CDP` + `AP:AH` + `AP:GTEP` + `AP:TIT` + `AP:TAT` +
##   `AP:TEY` + `AP:CDP` + `AH:AFDP` + `AH:GTEP` + `AH:TIT` +
##   `AH:TAT` + `AH:CDP` + `AFDP:GTEP` + `AFDP:TAT` + `AFDP:TEY` +
##   `AFDP:CDP` + `GTEP:TIT` + `GTEP:TAT` + `GTEP:TEY` + `GTEP:CDP` +
##   `TIT:TAT` + `TIT:TEY` + `TIT:CDP` + `TAT:TEY` + `TAT:CDP` +
##   `TEY:CDP`
##
##             Df Sum of Sq   RSS   AIC
## - `TIT:TEY`     1    0.0109 484.71 -14686
## - `AH:TAT`      1    0.0209 484.72 -14685
## - `AP:CDP`      1    0.0215 484.73 -14685
## - `TAT:CDP`     1    0.0254 484.73 -14685
## - `AFDP:CDP`    1    0.0601 484.76 -14685
## - `AT:TAT`      1    0.0652 484.77 -14685
## - `AH:CDP`      1    0.0709 484.77 -14685
## - `AH:TIT`      1    0.0790 484.78 -14685
## - `GTEP:CDP`    1    0.0933 484.80 -14684
## - `AFDP:TEY`    1    0.1211 484.82 -14684
## - AH            1    0.1367 484.84 -14684
## - CDP           1    0.1493 484.85 -14684
## <none>          484.70 -14684
## - `AT:CDP`      1    0.2355 484.94 -14683
## - `AT:AFDP`     1    0.2928 485.00 -14682
## - AT            1    0.3029 485.01 -14682
## - `GTEP:TAT`    1    0.3515 485.06 -14681
## - `AFDP:GTEP`   1    0.3708 485.07 -14681
## - `TAT:TEY`     1    0.4033 485.11 -14681
## - `GTEP:TEY`    1    0.4059 485.11 -14681
## - `AT:TIT`      1    0.4178 485.12 -14680
## - `GTEP:TIT`    1    0.4535 485.16 -14680
## - `AP:GTEP`     1    0.4650 485.17 -14680
## - `TEY:CDP`     1    0.5033 485.21 -14680
## - `TIT:CDP`     1    0.5352 485.24 -14679
## - AFDP          1    0.6112 485.31 -14678
## - TEY           1    0.7101 485.41 -14677
## - `AT:AH`       1    0.7152 485.42 -14677
## - `AFDP:TAT`    1    0.7741 485.48 -14676
## - `AT:GTEP`     1    0.8635 485.57 -14675
## - TIT           1    0.9600 485.66 -14674
## - `AH:GTEP`     1    0.9846 485.69 -14674
## - GTEP          1    1.0852 485.79 -14672
## - `AP:TAT`      1    1.1892 485.89 -14671
## - `AH:AFDP`     1    1.1902 485.89 -14671

```

```

## - `AP:AH`      1  1.7699 486.47 -14664
## - `AP:TIT`     1  2.1685 486.87 -14659
## - TAT          1  2.2334 486.94 -14658
## - `AT:TEY`     1  2.4449 487.15 -14656
## - `TIT:TAT`    1  2.6978 487.40 -14653
## - AP           1  3.9411 488.64 -14638
## - `AP:TEY`     1  4.8111 489.51 -14627
## - `AT:AP`       1  5.8033 490.51 -14615
##
## Step: AIC=-14685.47
## .outcome ~ AT + AP + AH + AFDP + GTEP + TIT + TAT + TEY + CDP +
##   `AT:AP` + `AT:AH` + `AT:AFDP` + `AT:GTEP` + `AT:TIT` + `AT:TAT` +
##   `AT:TEY` + `AT:CDP` + `AP:AH` + `AP:GTEP` + `AP:TIT` + `AP:TAT` +
##   `AP:TEY` + `AP:CDP` + `AH:AFDP` + `AH:GTEP` + `AH:TIT` +
##   `AH:TAT` + `AH:CDP` + `AFDP:GTEP` + `AFDP:TAT` + `AFDP:TEY` +
##   `AFDP:CDP` + `GTEP:TIT` + `GTEP:TAT` + `GTEP:TEY` + `GTEP:CDP` +
##   `TIT:TAT` + `TIT:CDP` + `TAT:TEY` + `TAT:CDP` + `TEY:CDP`
##
## Df Sum of Sq   RSS   AIC
## - `TAT:CDP`    1  0.0177 484.73 -14687
## - `AP:CDP`     1  0.0193 484.73 -14687
## - `AH:TAT`     1  0.0195 484.73 -14687
## - `AFDP:CDP`   1  0.0531 484.77 -14687
## - `AT:TAT`     1  0.0557 484.77 -14687
## - `AH:CDP`     1  0.0692 484.78 -14687
## - `AH:TIT`     1  0.0767 484.79 -14686
## - `AFDP:TEY`   1  0.1339 484.85 -14686
## - AH           1  0.1383 484.85 -14686
## - CDP          1  0.1431 484.86 -14686
## <none>          484.71 -14686
## - `GTEP:CDP`   1  0.2780 484.99 -14684
## - `AT:CDP`     1  0.2896 485.00 -14684
## - AT           1  0.2996 485.01 -14684
## - `AT:AFDP`    1  0.3125 485.03 -14684
## - `AFDP:GTEP`  1  0.3655 485.08 -14683
## - `GTEP:TEY`   1  0.3962 485.11 -14683
## - `AT:TIT`     1  0.4135 485.13 -14682
## - `AP:GTEP`    1  0.4693 485.18 -14682
## - `GTEP:TAT`   1  0.5014 485.22 -14681
## - `GTEP:TIT`   1  0.5665 485.28 -14681
## - `TIT:CDP`    1  0.5676 485.28 -14681
## - `TEY:CDP`    1  0.6438 485.36 -14680
## - AFDP         1  0.6685 485.38 -14679
## - TEY          1  0.7255 485.44 -14679
## - `AT:AH`      1  0.7529 485.47 -14678
## - `AFDP:TAT`   1  0.8249 485.54 -14677
## - `AT:GTEP`    1  0.8540 485.57 -14677
## - `TAT:TEY`    1  0.8614 485.58 -14677
## - TIT          1  0.9743 485.69 -14676
## - `AH:GTEP`    1  0.9799 485.69 -14676
## - GTEP         1  1.0838 485.80 -14674
## - `AH:AFDP`    1  1.2076 485.92 -14673
## - `AP:TAT`     1  1.2077 485.92 -14673
## - `AP:AH`      1  1.7853 486.50 -14666

```

```

## - `AP:TIT`      1  2.1878 486.90 -14661
## - TAT          1  2.2503 486.96 -14660
## - `AT:TEY`     1  2.6570 487.37 -14655
## - `TIT:TAT`    1  2.6900 487.40 -14655
## - AP           1  3.9357 488.65 -14640
## - `AP:TEY`     1  4.8074 489.52 -14629
## - `AT:AP`       1  5.8019 490.52 -14617
##
## Step: AIC=-14687.25
## .outcome ~ AT + AP + AH + AFDP + GTEP + TIT + TAT + TEY + CDP +
##   `AT:AP` + `AT:AH` + `AT:AFDP` + `AT:GTEP` + `AT:TIT` + `AT:TAT` +
##   `AT:TEY` + `AT:CDP` + `AP:AH` + `AP:GTEP` + `AP:TIT` + `AP:TAT` +
##   `AP:TEY` + `AP:CDP` + `AH:AFDP` + `AH:GTEP` + `AH:TIT` +
##   `AH:TAT` + `AH:CDP` + `AFDP:GTEP` + `AFDP:TAT` + `AFDP:TEY` +
##   `AFDP:CDP` + `GTEP:TIT` + `GTEP:TAT` + `GTEP:TEY` + `GTEP:CDP` +
##   `TIT:TAT` + `TIT:CDP` + `TAT:TEY` + `TEY:CDP`
##
##                                     Df Sum of Sq   RSS   AIC
## - `AP:CDP`      1  0.0179 484.75 -14689
## - `AH:TAT`      1  0.0239 484.76 -14689
## - `AFDP:CDP`    1  0.0373 484.77 -14689
## - `AT:TAT`      1  0.0409 484.77 -14689
## - `AH:CDP`      1  0.0784 484.81 -14688
## - `AH:TIT`      1  0.0866 484.82 -14688
## - `AFDP:TEY`    1  0.1168 484.85 -14688
## - AH           1  0.1348 484.87 -14688
## <none>                  484.73 -14687
## - CDP          1  0.1645 484.90 -14687
## - `GTEP:CDP`   1  0.2640 485.00 -14686
## - `AT:CDP`     1  0.2955 485.03 -14686
## - AT           1  0.2982 485.03 -14686
## - `AT:AFDP`    1  0.2988 485.03 -14686
## - `AT:TIT`     1  0.3977 485.13 -14684
## - `AFDP:GTEP`  1  0.4567 485.19 -14684
## - `GTEP:TEY`   1  0.5467 485.28 -14683
## - `AP:GTEP`    1  0.5792 485.31 -14682
## - AFDP         1  0.6563 485.39 -14681
## - `GTEP:TAT`   1  0.7248 485.46 -14680
## - `AT:AH`       1  0.7488 485.48 -14680
## - TEY          1  0.7936 485.53 -14680
## - `TIT:CDP`    1  0.8001 485.53 -14680
## - `AFDP:TAT`   1  0.8239 485.56 -14679
## - `GTEP:TIT`   1  0.8567 485.59 -14679
## - `TEY:CDP`    1  0.8839 485.62 -14678
## - TIT          1  0.9617 485.69 -14678
## - `AH:GTEP`    1  0.9729 485.71 -14677
## - `AT:GTEP`    1  1.0451 485.78 -14676
## - `AP:TAT`     1  1.1932 485.93 -14675
## - `AH:AFDP`    1  1.2038 485.94 -14675
## - GTEP         1  1.2906 486.02 -14674
## - `TAT:TEY`    1  1.6882 486.42 -14669
## - `AP:AH`       1  1.7884 486.52 -14668
## - `AP:TIT`     1  2.1820 486.91 -14663
## - TAT          1  2.2840 487.02 -14662

```

```

## - `AT:TEY`      1    2.8234 487.56 -14655
## - `TIT:TAT`     1    3.8167 488.55 -14643
## - AP           1    3.9232 488.66 -14642
## - `AP:TEY`     1    4.9113 489.64 -14630
## - `AT:AP`       1    5.9712 490.70 -14617
##
## Step: AIC=-14689.03
## .outcome ~ AT + AP + AH + AFDP + GTEP + TIT + TAT + TEY + CDP +
##   `AT:AP` + `AT:AH` + `AT:AFDP` + `AT:GTEP` + `AT:TIT` + `AT:TAT` +
##   `AT:TEY` + `AT:CDP` + `AP:AH` + `AP:GTEP` + `AP:TIT` + `AP:TAT` +
##   `AP:TEY` + `AH:AFDP` + `AH:GTEP` + `AH:TIT` + `AH:TAT` +
##   `AH:CDP` + `AFDP:GTEP` + `AFDP:TAT` + `AFDP:TEY` + `AFDP:CDP` +
##   `GTEP:TIT` + `GTEP:TAT` + `GTEP:TEY` + `GTEP:CDP` + `TIT:TAT` +
##   `TIT:CDP` + `TAT:TEY` + `TEY:CDP`
##
##             Df Sum of Sq   RSS   AIC
## - `AH:TAT`     1    0.0165 484.77 -14691
## - `AFDP:CDP`    1    0.0550 484.81 -14690
## - `AH:CDP`      1    0.0657 484.82 -14690
## - `AT:TAT`      1    0.0704 484.82 -14690
## - `AH:TIT`      1    0.0737 484.82 -14690
## - AH           1    0.1370 484.89 -14689
## - `AFDP:TEY`    1    0.1514 484.90 -14689
## <none>          484.75 -14689
## - AT           1    0.2852 485.04 -14688
## - `AT:CDP`     1    0.2856 485.04 -14688
## - `GTEP:CDP`    1    0.3233 485.07 -14687
## - `AT:AFDP`     1    0.3401 485.09 -14687
## - `AFDP:GTEP`   1    0.4645 485.21 -14685
## - `GTEP:TEY`    1    0.5425 485.29 -14684
## - `AT:TIT`      1    0.5504 485.30 -14684
## - `AP:GTEP`     1    0.5852 485.34 -14684
## - AFDP          1    0.7151 485.47 -14682
## - `AT:AH`       1    0.7437 485.49 -14682
## - TEY          1    0.7758 485.53 -14682
## - `GTEP:TAT`    1    0.7969 485.55 -14681
## - CDP           1    0.8289 485.58 -14681
## - `TIT:CDP`     1    0.8576 485.61 -14681
## - `AFDP:TAT`    1    0.8834 485.63 -14680
## - `GTEP:TIT`    1    0.9087 485.66 -14680
## - `TEY:CDP`     1    0.9489 485.70 -14680
## - `AH:GTEP`     1    0.9725 485.72 -14679
## - `AT:GTEP`     1    1.0423 485.79 -14678
## - `AH:AFDP`     1    1.2060 485.96 -14676
## - GTEP          1    1.2897 486.04 -14675
## - `AP:AH`       1    1.7889 486.54 -14669
## - `TAT:TEY`     1    1.7892 486.54 -14669
## - TIT          1    1.9974 486.75 -14667
## - `AT:TEY`      1    2.8129 487.56 -14657
## - AP           1    3.9361 488.69 -14643
## - `TIT:TAT`     1    3.9406 488.69 -14643
## - `AP:TAT`      1    4.6224 489.37 -14635
## - `AP:TEY`      1    4.8936 489.64 -14632
## - `AP:TIT`      1    4.9029 489.65 -14632

```

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## - `AT:AP`      1    5.9537 490.70 -14619
## - TAT         1    8.3240 493.07 -14590
##
## Step: AIC=-14690.83
## .outcome ~ AT + AP + AH + AFDP + GTEP + TIT + TAT + TEY + CDP +
##   `AT:AP` + `AT:AH` + `AT:AFDP` + `AT:GTEP` + `AT:TIT` + `AT:TAT` +
##   `AT:TEY` + `AT:CDP` + `AP:AH` + `AP:GTEP` + `AP:TIT` + `AP:TAT` +
##   `AP:TEY` + `AH:AFDP` + `AH:GTEP` + `AH:TIT` + `AH:CDP` +
##   `AFDP:GTEP` + `AFDP:TAT` + `AFDP:TEY` + `AFDP:CDP` + `GTEP:TIT` +
##   `GTEP:TAT` + `GTEP:TEY` + `GTEP:CDP` + `TIT:TAT` + `TIT:CDP` +
##   `TAT:TEY` + `TEY:CDP`
##
##          Df Sum of Sq   RSS   AIC
## - `AFDP:CDP`  1    0.0744 484.84 -14692
## - `AT:TAT`    1    0.1185 484.89 -14691
## - AH          1    0.1357 484.90 -14691
## <none>        484.77 -14691
## - `AFDP:TEY`  1    0.1833 484.95 -14691
## - `AH:CDP`    1    0.2383 485.00 -14690
## - `AT:CDP`    1    0.2753 485.04 -14690
## - AT          1    0.2823 485.05 -14689
## - `GTEP:CDP`  1    0.4051 485.17 -14688
## - `AT:AFDP`   1    0.4074 485.17 -14688
## - `AH:TIT`    1    0.4408 485.21 -14688
## - `AFDP:GTEP` 1    0.4649 485.23 -14687
## - `GTEP:TEY`  1    0.5339 485.30 -14686
## - `AP:GTEP`   1    0.5890 485.36 -14686
## - TEY         1    0.7670 485.53 -14684
## - `AT:TIT`    1    0.7685 485.54 -14684
## - `AT:AH`     1    0.7807 485.55 -14683
## - AFDP        1    0.8038 485.57 -14683
## - `GTEP:TAT`  1    0.8802 485.65 -14682
## - CDP          1    0.8938 485.66 -14682
## - `TIT:CDP`   1    0.8942 485.66 -14682
## - `AH:GTEP`   1    0.9560 485.72 -14681
## - `GTEP:TIT`  1    0.9599 485.73 -14681
## - `AFDP:TAT`  1    0.9831 485.75 -14681
## - `TEY:CDP`   1    0.9866 485.75 -14681
## - `AT:GTEP`   1    1.0335 485.80 -14680
## - GTEP        1    1.2802 486.05 -14677
## - `AH:AFDP`   1    1.2957 486.06 -14677
## - `AP:AH`     1    1.7738 486.54 -14671
## - `TAT:TEY`   1    1.8312 486.60 -14671
## - TIT         1    2.0079 486.77 -14668
## - `AT:TEY`    1    2.8457 487.61 -14658
## - AP          1    3.9324 488.70 -14645
## - `TIT:TAT`   1    3.9916 488.76 -14644
## - `AP:TAT`    1    4.6341 489.40 -14637
## - `AP:TEY`    1    4.8993 489.67 -14633
## - `AP:TIT`    1    4.9080 489.67 -14633
## - `AT:AP`     1    5.9964 490.76 -14620
## - TAT         1    8.5262 493.29 -14590
##
## Step: AIC=-14691.93

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## .outcome ~ AT + AP + AH + AFDP + GTEP + TIT + TAT + TEY + CDP +
##   `AT:AP` + `AT:AH` + `AT:AFDP` + `AT:GTEP` + `AT:TIT` + `AT:TAT` +
##   `AT:TEY` + `AT:CDP` + `AP:AH` + `AP:GTEP` + `AP:TIT` + `AP:TAT` +
##   `AP:TEY` + `AH:AFDP` + `AH:GTEP` + `AH:TIT` + `AH:CDP` +
##   `AFDP:GTEP` + `AFDP:TAT` + `AFDP:TEY` + `GTEP:TIT` + `GTEP:TAT` +
##   `GTEP:TEY` + `GTEP:CDP` + `TIT:TAT` + `TIT:CDP` + `TAT:TEY` +
##   `TEY:CDP` +
##
##              Df Sum of Sq    RSS    AIC
## - `AT:TAT`     1  0.0986 484.94 -14693
## - AH          1  0.1387 484.98 -14692
## <none>          484.84 -14692
## - `AFDP:TEY`   1  0.1788 485.02 -14692
## - `AH:CDP`     1  0.2709 485.11 -14691
## - AT          1  0.2966 485.14 -14690
## - `AT:AFDP`    1  0.3413 485.18 -14690
## - `GTEP:CDP`   1  0.3958 485.24 -14689
## - `AT:CDP`     1  0.4125 485.25 -14689
## - `AH:TIT`     1  0.4559 485.30 -14688
## - `AFDP:GTEP`  1  0.5104 485.35 -14688
## - `AP:GTEP`    1  0.5515 485.39 -14687
## - `AT:TIT`     1  0.7065 485.55 -14685
## - `GTEP:TEY`   1  0.7253 485.57 -14685
## - `GTEP:TAT`   1  0.8093 485.65 -14684
## - `TIT:CDP`    1  0.8201 485.66 -14684
## - CDP          1  0.8201 485.66 -14684
## - AFDP         1  0.8546 485.70 -14684
## - TEY          1  0.8807 485.72 -14683
## - `GTEP:TIT`   1  0.8940 485.74 -14683
## - `TEY:CDP`    1  0.9136 485.75 -14683
## - `AT:AH`       1  0.9142 485.76 -14683
## - `AH:GTEP`    1  0.9420 485.78 -14682
## - `AFDP:TAT`   1  0.9910 485.83 -14682
## - `AT:GTEP`    1  1.2830 486.12 -14678
## - `AH:AFDP`    1  1.3687 486.21 -14677
## - GTEP          1  1.4044 486.25 -14677
## - `TAT:TEY`    1  1.7664 486.61 -14672
## - `AP:AH`       1  1.8128 486.65 -14672
## - TIT           1  2.1227 486.96 -14668
## - `AT:TEY`     1  3.2665 488.11 -14654
## - AP            1  3.9041 488.75 -14647
## - `TIT:TAT`    1  3.9224 488.76 -14646
## - `AP:TAT`     1  4.7673 489.61 -14636
## - `AP:TEY`     1  4.9341 489.78 -14634
## - `AP:TIT`     1  4.9600 489.80 -14634
## - `AT:AP`       1  5.9410 490.78 -14622
## - TAT          1  8.5743 493.42 -14590
##
## Step:  AIC=-14692.73
## .outcome ~ AT + AP + AH + AFDP + GTEP + TIT + TAT + TEY + CDP +
##   `AT:AP` + `AT:AH` + `AT:AFDP` + `AT:GTEP` + `AT:TIT` + `AT:TEY` +
##   `AT:CDP` + `AP:AH` + `AP:GTEP` + `AP:TIT` + `AP:TAT` + `AP:TEY` +
##   `AH:AFDP` + `AH:GTEP` + `AH:TIT` + `AH:CDP` + `AFDP:GTEP` +
##   `AFDP:TAT` + `AFDP:TEY` + `GTEP:TIT` + `GTEP:TAT` + `GTEP:TEY` +

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##      `GTEP:CDP` + `TIT:TAT` + `TIT:CDP` + `TAT:TEY` + `TEY:CDP`
##
##              Df Sum of Sq    RSS   AIC
## - `AFDP:TEY`  1   0.1513 485.09 -14693
## - AH          1   0.1610 485.10 -14693
## <none>          484.94 -14693
## - AT          1   0.2220 485.16 -14692
## - `AH:CDP`    1   0.2267 485.17 -14692
## - `AT:AFDP`   1   0.2486 485.19 -14692
## - `AH:TIT`    1   0.4007 485.34 -14690
## - `AFDP:GTEP` 1   0.4441 485.38 -14689
## - `GTEP:CDP`  1   0.4793 485.42 -14689
## - `AP:GTEP`   1   0.4968 485.44 -14689
## - AFDP        1   0.7583 485.70 -14686
## - TEY         1   0.7872 485.73 -14685
## - `AT:AH`     1   0.8357 485.78 -14685
## - `GTEP:TEY`  1   0.8744 485.81 -14684
## - `AFDP:TAT`  1   0.8925 485.83 -14684
## - `AH:GTEP`   1   0.9512 485.89 -14683
## - `TIT:CDP`   1   1.0127 485.95 -14682
## - CDP         1   1.0127 485.95 -14682
## - `TEY:CDP`   1   1.0952 486.03 -14681
## - `GTEP:TAT`  1   1.1314 486.07 -14681
## - `GTEP:TIT`  1   1.1719 486.11 -14680
## - `AH:AFDP`   1   1.3067 486.25 -14679
## - `AT:GTEP`   1   1.3106 486.25 -14679
## - `AT:TIT`    1   1.4703 486.41 -14677
## - GTEP        1   1.4859 486.43 -14677
## - `AT:CDP`    1   1.5221 486.46 -14676
## - `AP:AH`     1   1.7914 486.73 -14673
## - TIT         1   2.0539 486.99 -14670
## - `TAT:TEY`   1   2.5566 487.50 -14664
## - `AT:TEY`    1   3.3715 488.31 -14654
## - AP          1   3.8193 488.76 -14648
## - `AP:TAT`   1   4.7303 489.67 -14637
## - `AP:TEY`   1   4.8751 489.81 -14636
## - `AP:TIT`   1   4.8815 489.82 -14636
## - `TIT:TAT`  1   5.4231 490.36 -14629
## - `AT:AP`    1   5.8727 490.81 -14624
## - TAT         1   8.4828 493.42 -14592
##
## Step: AIC=-14692.88
## .outcome ~ AT + AP + AH + AFDP + GTEP + TIT + TAT + TEY + CDP +
##           `AT:AP` + `AT:AH` + `AT:AFDP` + `AT:GTEP` + `AT:TIT` + `AT:TEY` +
##           `AT:CDP` + `AP:AH` + `AP:GTEP` + `AP:TIT` + `AP:TAT` + `AP:TEY` +
##           `AH:AFDP` + `AH:GTEP` + `AH:TIT` + `AH:CDP` + `AFDP:GTEP` +
##           `AFDP:TAT` + `GTEP:TIT` + `GTEP:TAT` + `GTEP:TEY` + `GTEP:CDP` +
##           `TIT:TAT` + `TIT:CDP` + `TAT:TEY` + `TEY:CDP`
##
##              Df Sum of Sq    RSS   AIC
## - AH          1   0.1107 485.20 -14694
## - `AT:AFDP`   1   0.1508 485.24 -14693
## <none>          485.09 -14693
## - AT          1   0.2177 485.31 -14692

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## - `AH:CDP`      1  0.2837 485.37 -14691
## - `GTEP:CDP`    1  0.3374 485.43 -14691
## - `AP:GTEP`     1  0.3998 485.49 -14690
## - `AH:TIT`      1  0.4909 485.58 -14689
## - `AFDP:GTEP`   1  0.6054 485.70 -14688
## - AFDP          1  0.7085 485.80 -14686
## - TEY           1  0.7531 485.84 -14686
## - `AFDP:TAT`    1  0.8015 485.89 -14685
## - `GTEP:TEY`    1  0.9032 485.99 -14684
## - `AT:AH`        1  0.9625 486.05 -14683
## - `AH:GTEP`     1  0.9660 486.06 -14683
## - `TEY:CDP`     1  0.9832 486.07 -14683
## - `TIT:CDP`     1  1.0310 486.12 -14682
## - CDP           1  1.0437 486.13 -14682
## - `AT:GTEP`     1  1.1799 486.27 -14680
## - `GTEP:TIT`    1  1.2271 486.32 -14680
## - `GTEP:TAT`    1  1.2446 486.34 -14680
## - GTEP          1  1.4127 486.50 -14678
## - `AH:AFDP`     1  1.4234 486.51 -14678
## - `AT:CDP`      1  1.4443 486.54 -14677
## - `AT:TIT`      1  1.5004 486.59 -14677
## - `AP:AH`        1  1.6783 486.77 -14674
## - TIT           1  2.0503 487.14 -14670
## - `TAT:TEY`     1  2.6942 487.79 -14662
## - `AT:TEY`       1  3.7494 488.84 -14649
## - AP            1  3.8230 488.91 -14648
## - `AP:TAT`      1  4.7293 489.82 -14638
## - `AP:TEY`       1  4.8357 489.93 -14636
## - `AP:TIT`       1  4.8840 489.97 -14636
## - `TIT:TAT`     1  5.4499 490.54 -14629
## - `AT:AP`        1  5.8487 490.94 -14624
## - TAT           1  8.4951 493.59 -14592
##
## Step: AIC=-14693.54
## .outcome ~ AT + AP + AFDP + GTEP + TIT + TAT + TEY + CDP + `AT:AP` +
##           `AT:AH` + `AT:AFDP` + `AT:GTEP` + `AT:TIT` + `AT:TEY` + `AT:CDP` +
##           `AP:AH` + `AP:GTEP` + `AP:TIT` + `AP:TAT` + `AP:TEY` + `AH:AFDP` +
##           `AH:GTEP` + `AH:TIT` + `AH:CDP` + `AFDP:GTEP` + `AFDP:TAT` +
##           `GTEP:TIT` + `GTEP:TAT` + `GTEP:TEY` + `GTEP:CDP` + `TIT:TAT` +
##           `TIT:CDP` + `TAT:TEY` + `TEY:CDP`
##
##                               Df Sum of Sq    RSS    AIC
## <none>                      485.20 -14694
## - `AT:AFDP`      1  0.1666 485.37 -14694
## - AT            1  0.3223 485.52 -14692
## - `GTEP:CDP`    1  0.3261 485.53 -14692
## - `AP:GTEP`     1  0.3341 485.54 -14692
## - `AH:CDP`      1  0.6675 485.87 -14687
## - `AFDP:GTEP`   1  0.7532 485.95 -14686
## - TEY           1  0.7680 485.97 -14686
## - `AH:GTEP`     1  0.9104 486.11 -14684
## - `AT:AH`        1  0.9160 486.12 -14684
## - `GTEP:TEY`    1  0.9298 486.13 -14684
## - AFDP          1  0.9547 486.16 -14684

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## - `TEY:CDP`      1  1.0177 486.22 -14683
## - `TIT:CDP`      1  1.0622 486.26 -14683
## - `AFDP:TAT`     1  1.0656 486.27 -14683
## - CDP            1  1.0661 486.27 -14683
## - `AT:GTEP`       1  1.2120 486.41 -14681
## - `GTEP:TIT`      1  1.2202 486.42 -14681
## - `GTEP:TAT`      1  1.2683 486.47 -14680
## - GTEP            1  1.3213 486.52 -14680
## - `AH:AFDP`       1  1.3732 486.57 -14679
## - `AT:TIT`         1  1.3941 486.60 -14679
## - `AT:CDP`         1  1.6010 486.80 -14676
## - TIT              1  2.0846 487.29 -14670
## - `AP:AH`          1  2.4096 487.61 -14666
## - `AH:TIT`         1  2.5104 487.71 -14665
## - `TAT:TEY`        1  2.6842 487.89 -14663
## - `AT:TEY`         1  3.7231 488.92 -14650
## - AP               1  3.7813 488.98 -14650
## - `AP:TEY`         1  4.8872 490.09 -14636
## - `AP:TAT`         1  4.9284 490.13 -14636
## - `AP:TIT`         1  4.9732 490.17 -14635
## - `TIT:TAT`        1  5.4336 490.64 -14630
## - `AT:AP`          1  6.2076 491.41 -14620
## - TAT              1  8.7120 493.91 -14590
## Start: AIC=-14521.67
## .outcome ~ AT + AP + AH + AFDP + GTEP + TIT + TAT + TEY + CDP +
##   `AT:AP` + `AT:AH` + `AT:AFDP` + `AT:GTEP` + `AT:TIT` + `AT:TAT` +
##   `AT:TEY` + `AT:CDP` + `AP:AH` + `AP:AFDP` + `AP:GTEP` + `AP:TIT` +
##   `AP:TAT` + `AP:TEY` + `AP:CDP` + `AH:AFDP` + `AH:GTEP` +
##   `AH:TIT` + `AH:TAT` + `AH:TEY` + `AH:CDP` + `AFDP:GTEP` +
##   `AFDP:TIT` + `AFDP:TAT` + `AFDP:TEY` + `AFDP:CDP` + `GTEP:TIT` +
##   `GTEP:TAT` + `GTEP:TEY` + `GTEP:CDP` + `TIT:TAT` + `TIT:TEY` +
##   `TIT:CDP` + `TAT:TEY` + `TAT:CDP` + `TEY:CDP`
##
##                                     Df Sum of Sq    RSS    AIC
## - AH                      1  0.0005 497.96 -14524
## - `TAT:TEY`                1  0.0266 497.99 -14523
## - `AP:CDP`                 1  0.0336 497.99 -14523
## - `AT:CDP`                 1  0.0369 498.00 -14523
## - `AFDP:TIT`                1  0.0476 498.01 -14523
## - `GTEP:CDP`                1  0.0660 498.03 -14523
## - `TIT:TEY`                 1  0.0923 498.05 -14523
## - `AP:AFDP`                 1  0.1092 498.07 -14522
## - `AT:TAT`                  1  0.1195 498.08 -14522
## - `AT:AFDP`                 1  0.1349 498.10 -14522
## - `AFDP:TEY`                 1  0.1454 498.11 -14522
## - `AH:CDP`                  1  0.1588 498.12 -14522
## <none>                      497.96 -14522
## - `TEY:CDP`                 1  0.1953 498.16 -14521
## - `TAT:CDP`                 1  0.2047 498.17 -14521
## - `AH:TEY`                  1  0.2137 498.18 -14521
## - `AFDP:CDP`                 1  0.2332 498.19 -14521
## - `AT:TIT`                  1  0.2470 498.21 -14521
## - `GTEP:TAT`                 1  0.2480 498.21 -14521
## - CDP                      1  0.2483 498.21 -14521

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## - `AFDP:TAT` 1 0.2844 498.25 -14520
## - `AH:TAT` 1 0.2957 498.26 -14520
## - `GTEP:TIT` 1 0.3166 498.28 -14520
## - `AP:GTEP` 1 0.3472 498.31 -14520
## - `GTEP:TEY` 1 0.3518 498.31 -14520
## - `AH:TIT` 1 0.3940 498.36 -14519
## - `AH:GTEP` 1 0.4639 498.43 -14518
## - `AH:AFDP` 1 0.4935 498.45 -14518
## - `TIT:CDP` 1 0.5346 498.50 -14517
## - `AT:AH` 1 0.5811 498.54 -14517
## - AT 1 0.6542 498.62 -14516
## - `AFDP:GTEP` 1 0.6888 498.65 -14516
## - GTEP 1 0.7339 498.70 -14515
## - TEY 1 0.8620 498.82 -14514
## - AFDP 1 0.8882 498.85 -14513
## - TIT 1 1.0550 499.02 -14511
## - `AT:GTEP` 1 1.0849 499.05 -14511
## - `AT:TEY` 1 1.1007 499.06 -14511
## - `AP:AH` 1 1.5575 499.52 -14505
## - `AP:TAT` 1 1.6042 499.57 -14505
## - `TIT:TAT` 1 2.0693 500.03 -14499
## - `AP:TIT` 1 2.2668 500.23 -14497
## - TAT 1 2.3426 500.30 -14496
## - AP 1 2.6266 500.59 -14493
## - `AP:TEY` 1 3.9987 501.96 -14476
## - `AT:AP` 1 5.7938 503.76 -14455
##
## Step: AIC=-14523.67
## .outcome ~ AT + AP + AFDP + GTEP + TIT + TAT + TEY + CDP + `AT:AP` +
##   `AT:AH` + `AT:AFDP` + `AT:GTEP` + `AT:TIT` + `AT:TAT` + `AT:TEY` +
##   `AT:CDP` + `AP:AH` + `AP:AFDP` + `AP:GTEP` + `AP:TIT` + `AP:TAT` +
##   `AP:TEY` + `AP:CDP` + `AH:AFDP` + `AH:GTEP` + `AH:TIT` +
##   `AH:TAT` + `AH:TEY` + `AH:CDP` + `AFDP:GTEP` + `AFDP:TIT` +
##   `AFDP:TAT` + `AFDP:TEY` + `AFDP:CDP` + `GTEP:TIT` + `GTEP:TAT` +
##   `GTEP:TEY` + `GTEP:CDP` + `TIT:TAT` + `TIT:TEY` + `TIT:CDP` +
##   `TAT:TEY` + `TAT:CDP` + `TEY:CDP`
##
##                                     Df Sum of Sq    RSS     AIC
## - `TAT:TEY` 1 0.0266 497.99 -14525
## - `AP:CDP` 1 0.0335 498.00 -14525
## - `AT:CDP` 1 0.0370 498.00 -14525
## - `AFDP:TIT` 1 0.0477 498.01 -14525
## - `GTEP:CDP` 1 0.0663 498.03 -14525
## - `TIT:TEY` 1 0.0920 498.05 -14525
## - `AT:TAT` 1 0.1193 498.08 -14524
## - `AP:AFDP` 1 0.1262 498.09 -14524
## - `AT:AFDP` 1 0.1393 498.10 -14524
## - `AFDP:TEY` 1 0.1450 498.11 -14524
## - `AH:CDP` 1 0.1598 498.12 -14524
## <none> 497.96 -14524
## - `TEY:CDP` 1 0.1950 498.16 -14523
## - `TAT:CDP` 1 0.2056 498.17 -14523
## - `AFDP:CDP` 1 0.2327 498.19 -14523
## - CDP 1 0.2478 498.21 -14523

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## - `GTEP:TAT` 1 0.2495 498.21 -14523
## - `AT:TIT` 1 0.2526 498.21 -14523
## - `AFDP:TAT` 1 0.2856 498.25 -14522
## - `GTEP:TIT` 1 0.3217 498.28 -14522
## - `AP:GTEP` 1 0.3468 498.31 -14522
## - `AH:TAT` 1 0.3552 498.32 -14522
## - `GTEP:TEY` 1 0.3586 498.32 -14521
## - `AH:TEY` 1 0.4101 498.37 -14521
## - `AH:GTEP` 1 0.4642 498.43 -14520
## - `TIT:CDP` 1 0.5396 498.50 -14519
## - `AH:AFDP` 1 0.5521 498.51 -14519
## - `AH:TIT` 1 0.5823 498.54 -14519
## - `AFDP:GTEP` 1 0.7092 498.67 -14517
## - AT 1 0.7456 498.71 -14517
## - GTEP 1 0.7747 498.74 -14516
## - `AT:AH` 1 0.7886 498.75 -14516
## - TEY 1 0.8629 498.82 -14515
## - AFDP 1 0.9603 498.92 -14514
## - TIT 1 1.0651 499.03 -14513
## - `AT:GTEP` 1 1.0958 499.06 -14513
## - `AT:TEY` 1 1.2045 499.17 -14511
## - `AP:TAT` 1 1.6186 499.58 -14506
## - `AP:AH` 1 1.7654 499.73 -14505
## - `TIT:TAT` 1 2.0719 500.03 -14501
## - `AP:TIT` 1 2.2930 500.25 -14498
## - TAT 1 2.3752 500.34 -14498
## - AP 1 2.6575 500.62 -14494
## - `AP:TEY` 1 4.0259 501.99 -14478
## - `AT:AP` 1 6.0555 504.02 -14454
##
## Step: AIC=-14525.35
## .outcome ~ AT + AP + AFDP + GTEP + TIT + TAT + TEY + CDP + `AT:AP` +
##   `AT:AH` + `AT:AFDP` + `AT:GTEP` + `AT:TIT` + `AT:TAT` + `AT:TEY` +
##   `AT:CDP` + `AP:AH` + `AP:AFDP` + `AP:GTEP` + `AP:TIT` + `AP:TAT` +
##   `AP:TEY` + `AP:CDP` + `AH:AFDP` + `AH:GTEP` + `AH:TIT` +
##   `AH:TAT` + `AH:TEY` + `AH:CDP` + `AFDP:GTEP` + `AFDP:TIT` +
##   `AFDP:TAT` + `AFDP:TEY` + `AFDP:CDP` + `GTEP:TIT` + `GTEP:TAT` +
##   `GTEP:TEY` + `GTEP:CDP` + `TIT:TAT` + `TIT:TEY` + `TIT:CDP` +
##   `TAT:CDP` + `TEY:CDP`
##
##             Df Sum of Sq    RSS    AIC
## - `AT:CDP` 1  0.0148 498.00 -14527
## - `AP:CDP` 1  0.0327 498.02 -14527
## - `GTEP:CDP` 1  0.0422 498.03 -14527
## - `AT:AFDP` 1  0.1277 498.12 -14526
## - `AP:AFDP` 1  0.1334 498.12 -14526
## - `AFDP:TEY` 1  0.1386 498.13 -14526
## - `AFDP:TIT` 1  0.1397 498.13 -14526
## - `AH:CDP` 1  0.1459 498.13 -14526
## <none>           497.99 -14525
## - `TEY:CDP` 1  0.1790 498.17 -14525
## - CDP 1  0.2212 498.21 -14525
## - `GTEP:TAT` 1  0.2247 498.21 -14525
## - `GTEP:TIT` 1  0.3003 498.29 -14524

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## - `TAT:CDP` 1 0.3235 498.31 -14524
## - `AH:TAT` 1 0.3354 498.32 -14523
## - `AP:GTEP` 1 0.3406 498.33 -14523
## - `AT:TAT` 1 0.3421 498.33 -14523
## - `GTEP:TEY` 1 0.3963 498.38 -14523
## - `AH:TEY` 1 0.4002 498.39 -14523
## - `AT:TIT` 1 0.4339 498.42 -14522
## - `TIT:TEY` 1 0.4364 498.42 -14522
## - `AH:GTEP` 1 0.4706 498.46 -14522
## - `TIT:CDP` 1 0.5246 498.51 -14521
## - `AH:AFDP` 1 0.5427 498.53 -14521
## - `AH:TIT` 1 0.5596 498.55 -14521
## - `AFDP:CDP` 1 0.5911 498.58 -14520
## - `AFDP:TAT` 1 0.6112 498.60 -14520
## - `AFDP:GTEP` 1 0.7321 498.72 -14519
## - `AT:AH` 1 0.7712 498.76 -14518
## - GTEP 1 0.8070 498.80 -14518
## - AFDP 1 0.9397 498.93 -14516
## - `AT:GTEP` 1 1.1741 499.16 -14513
## - `AT:TEY` 1 1.1784 499.17 -14513
## - AT 1 1.2305 499.22 -14513
## - TIT 1 1.2376 499.23 -14513
## - TEY 1 1.4180 499.41 -14511
## - `AP:TAT` 1 1.6686 499.66 -14508
## - `AP:AH` 1 1.7576 499.75 -14506
## - `AP:TIT` 1 2.3361 500.32 -14500
## - TAT 1 2.3513 500.34 -14500
## - AP 1 2.6510 500.64 -14496
## - `TIT:TAT` 1 3.1170 501.11 -14490
## - `AP:TEY` 1 4.1779 502.17 -14478
## - `AT:AP` 1 6.2794 504.27 -14453
##
## Step: AIC=-14527.18
## .outcome ~ AT + AP + AFDP + GTEP + TIT + TAT + TEY + CDP + `AT:AP` +
##   `AT:AH` + `AT:AFDP` + `AT:GTEP` + `AT:TIT` + `AT:TAT` + `AT:TEY` +
##   `AP:AH` + `AP:AFDP` + `AP:GTEP` + `AP:TIT` + `AP:TAT` + `AP:TEY` +
##   `AP:CDP` + `AH:AFDP` + `AH:GTEP` + `AH:TIT` + `AH:TAT` +
##   `AH:TEY` + `AH:CDP` + `AFDP:GTEP` + `AFDP:TIT` + `AFDP:TAT` +
##   `AFDP:TEY` + `AFDP:CDP` + `GTEP:TIT` + `GTEP:TAT` + `GTEP:TEY` +
##   `GTEP:CDP` + `TIT:TAT` + `TIT:TEY` + `TIT:CDP` + `TAT:CDP` +
##   `TEY:CDP`
##
##          Df Sum of Sq    RSS    AIC
## - `GTEP:CDP` 1  0.0677 498.07 -14528
## - `AP:CDP` 1  0.0790 498.08 -14528
## - `AT:AFDP` 1  0.1159 498.12 -14528
## - `AFDP:TEY` 1  0.1264 498.13 -14528
## - `AP:AFDP` 1  0.1356 498.14 -14528
## - `AH:CDP` 1  0.1401 498.14 -14528
## <none>           498.00 -14527
## - `TEY:CDP` 1  0.1716 498.17 -14527
## - `GTEP:TAT` 1  0.2226 498.23 -14526
## - `GTEP:TIT` 1  0.2896 498.29 -14526
## - CDP 1  0.3186 498.32 -14525

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## - `TAT:CDP` 1 0.3289 498.33 -14525
## - `AFDP:TIT` 1 0.3365 498.34 -14525
## - `AH:TAT` 1 0.3434 498.35 -14525
## - `AP:GTEP` 1 0.3604 498.36 -14525
## - `GTEP:TEY` 1 0.3885 498.39 -14525
## - `AH:TEY` 1 0.4060 498.41 -14524
## - `AH:GTEP` 1 0.4676 498.47 -14524
## - `TIT:CDP` 1 0.5256 498.53 -14523
## - `TIT:TEY` 1 0.5275 498.53 -14523
## - `AH:AFDP` 1 0.5343 498.54 -14523
## - `AH:TIT` 1 0.5910 498.59 -14522
## - `AFDP:GTEP` 1 0.7510 498.75 -14520
## - `AT:AH` 1 0.7719 498.78 -14520
## - GTEP 1 0.8113 498.81 -14520
## - AFDP 1 0.9269 498.93 -14518
## - `AT:TEY` 1 1.1824 499.19 -14515
## - `AT:GTEP` 1 1.1911 499.19 -14515
## - `AFDP:CDP` 1 1.2032 499.21 -14515
## - AT 1 1.2412 499.24 -14514
## - `AFDP:TAT` 1 1.3094 499.31 -14514
## - `AT:TAT` 1 1.3102 499.31 -14514
## - TEY 1 1.4124 499.42 -14512
## - TIT 1 1.4475 499.45 -14512
## - `AT:TIT` 1 1.6762 499.68 -14509
## - `AP:AH` 1 1.7568 499.76 -14508
## - `AP:TAT` 1 2.0168 500.02 -14505
## - AP 1 2.6366 500.64 -14498
## - `AP:tit` 1 2.6389 500.64 -14498
## - TAT 1 3.1485 501.15 -14492
## - `TIT:TAT` 1 3.3776 501.38 -14489
## - `AP:TEY` 1 4.1703 502.17 -14480
## - `AT:AP` 1 6.2953 504.30 -14455
##
## Step: AIC=-14528.38
## .outcome ~ AT + AP + AFDP + GTEP + TIT + TAT + TEY + CDP + `AT:AP` +
##           `AT:AH` + `AT:AFDP` + `AT:GTEP` + `AT:TIT` + `AT:TAT` + `AT:TEY` +
##           `AP:AH` + `AP:AFDP` + `AP:GTEP` + `AP:TIT` + `AP:TAT` + `AP:TEY` +
##           `AP:CDP` + `AH:AFDP` + `AH:GTEP` + `AH:TIT` + `AH:TAT` +
##           `AH:TEY` + `AH:CDP` + `AFDP:GTEP` + `AFDP:TIT` + `AFDP:TAT` +
##           `AFDP:TEY` + `AFDP:CDP` + `GTEP:TIT` + `GTEP:TAT` + `GTEP:TEY` +
##           `TIT:TAT` + `TIT:TEY` + `TIT:CDP` + `TAT:CDP` + `TEY:CDP`
##
##                               Df Sum of Sq   RSS   AIC
## - `AP:CDP` 1 0.0646 498.14 -14530
## - `AT:AFDP` 1 0.1157 498.19 -14529
## - `AFDP:TEY` 1 0.1188 498.19 -14529
## - `AP:AFDP` 1 0.1194 498.19 -14529
## - `TEY:CDP` 1 0.1222 498.19 -14529
## - `GTEP:TAT` 1 0.1567 498.23 -14528
## <none> 498.07 -14528
## - `AH:CDP` 1 0.2203 498.29 -14528
## - `GTEP:TIT` 1 0.2223 498.29 -14528
## - `TAT:CDP` 1 0.2771 498.35 -14527
## - `AFDP:TIT` 1 0.2928 498.36 -14527

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## - `AP:GTEP` 1 0.3415 498.41 -14526
## - CDP 1 0.3477 498.42 -14526
## - `GTEP:TEY` 1 0.3744 498.45 -14526
## - `AH:TEY` 1 0.3860 498.46 -14526
## - `AH:TAT` 1 0.4235 498.49 -14525
## - `AH:GTEP` 1 0.4701 498.54 -14525
## - `TIT:CDP` 1 0.5280 498.60 -14524
## - `AH:AFDP` 1 0.5497 498.62 -14524
## - `AH:TIT` 1 0.6885 498.76 -14522
## - `AFDP:GTEP` 1 0.6984 498.77 -14522
## - `AT:AH` 1 0.7571 498.83 -14521
## - GTEP 1 0.7612 498.83 -14521
## - AFDP 1 0.8895 498.96 -14520
## - `TIT:TEY` 1 1.0423 499.11 -14518
## - `AFDP:CDP` 1 1.1361 499.21 -14517
## - `AT:GTEP` 1 1.1450 499.22 -14517
## - AT 1 1.2024 499.27 -14516
## - `AFDP:TAT` 1 1.2422 499.31 -14516
## - `AT:TEY` 1 1.2435 499.31 -14516
## - `AT:TAT` 1 1.2464 499.32 -14516
## - TEY 1 1.3600 499.43 -14514
## - TIT 1 1.3819 499.45 -14514
## - `AT:TIT` 1 1.7113 499.78 -14510
## - `AP:AH` 1 1.7306 499.80 -14510
## - `AP:TAT` 1 1.9555 500.03 -14507
## - `AP:TIT` 1 2.5785 500.65 -14500
## - AP 1 2.6229 500.69 -14499
## - TAT 1 3.1339 501.20 -14493
## - `AP:TEY` 1 4.1130 502.18 -14482
## - `TIT:TAT` 1 4.5836 502.65 -14476
## - `AT:AP` 1 6.2298 504.30 -14457
##
## Step: AIC=-14529.61
## .outcome ~ AT + AP + AFDP + GTEP + TIT + TAT + TEY + CDP + `AT:AP` +
##   `AT:AH` + `AT:AFDP` + `AT:GTEP` + `AT:TIT` + `AT:TAT` + `AT:TEY` +
##   `AP:AH` + `AP:AFDP` + `AP:GTEP` + `AP:TIT` + `AP:TAT` + `AP:TEY` +
##   `AH:AFDP` + `AH:GTEP` + `AH:TIT` + `AH:TAT` + `AH:TEY` +
##   `AH:CDP` + `AFDP:GTEP` + `AFDP:TIT` + `AFDP:TAT` + `AFDP:TEY` +
##   `AFDP:CDP` + `GTEP:TIT` + `GTEP:TAT` + `GTEP:TEY` + `TIT:TAT` +
##   `TIT:TEY` + `TIT:CDP` + `TAT:CDP` + `TEY:CDP`
##
##              Df Sum of Sq    RSS     AIC
## - `TEY:CDP` 1  0.1035 498.24 -14530
## - `AT:AFDP` 1  0.1055 498.24 -14530
## - `AFDP:TEY` 1  0.1080 498.24 -14530
## - `AP:AFDP` 1  0.1115 498.25 -14530
## - `GTEP:TAT` 1  0.1452 498.28 -14530
## <none>                      498.14 -14530
## - `GTEP:TIT` 1  0.2057 498.34 -14529
## - `AH:CDP` 1  0.2216 498.36 -14529
## - `TAT:CDP` 1  0.2578 498.39 -14529
## - `AFDP:TIT` 1  0.3126 498.45 -14528
## - `AP:GTEP` 1  0.3470 498.48 -14528
## - `GTEP:TEY` 1  0.3486 498.48 -14528

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## - `AH:TEY`      1  0.3880 498.52 -14527
## - CDP          1  0.4105 498.55 -14527
## - `AH:TAT`     1  0.4279 498.56 -14526
## - `AH:GTEP`    1  0.4714 498.61 -14526
## - `TIT:CDP`    1  0.4938 498.63 -14526
## - `AH:AFDP`    1  0.5439 498.68 -14525
## - `AFDP:GTEP`  1  0.6738 498.81 -14524
## - `AH:TIT`     1  0.6930 498.83 -14523
## - GTEP         1  0.7271 498.86 -14523
## - `AT:AH`       1  0.7583 498.89 -14523
## - AFDP         1  0.8535 498.99 -14522
## - `TIT:TEY`    1  1.0282 499.16 -14519
## - `AT:GTEP`    1  1.1006 499.24 -14519
## - `AFDP:CDP`   1  1.1494 499.28 -14518
## - `AT:TAT`     1  1.2036 499.34 -14517
## - AT           1  1.2140 499.35 -14517
## - `AT:TEY`     1  1.2440 499.38 -14517
## - `AFDP:TAT`   1  1.2694 499.40 -14517
## - TEY          1  1.4278 499.56 -14515
## - TIT          1  1.5874 499.72 -14513
## - `AT:TIT`     1  1.6731 499.81 -14512
## - `AP:AH`       1  1.7265 499.86 -14511
## - AP            1  2.6258 500.76 -14500
## - `AP:TAT`     1  3.0681 501.20 -14495
## - `AP:TIT`     1  3.2500 501.39 -14493
## - `AP:TEY`     1  4.2125 502.35 -14482
## - `TIT:TAT`    1  4.5781 502.71 -14478
## - TAT          1  5.1831 503.32 -14470
## - `AT:AP`       1  6.2921 504.43 -14458
##
## Step: AIC=-14530.38
## .outcome ~ AT + AP + AFDP + GTEP + TIT + TAT + TEY + CDP + `AT:AP` +
##           `AT:AH` + `AT:AFDP` + `AT:GTEP` + `AT:TIT` + `AT:TAT` + `AT:TEY` +
##           `AP:AH` + `AP:AFDP` + `AP:GTEP` + `AP:TIT` + `AP:TAT` + `AP:TEY` +
##           `AH:AFDP` + `AH:GTEP` + `AH:TIT` + `AH:TAT` + `AH:TEY` +
##           `AH:CDP` + `AFDP:GTEP` + `AFDP:TIT` + `AFDP:TAT` + `AFDP:TEY` +
##           `AFDP:CDP` + `GTEP:TIT` + `GTEP:TAT` + `GTEP:TEY` + `TIT:TAT` +
##           `TIT:TEY` + `TIT:CDP` + `TAT:CDP`
##
##                               Df Sum of Sq   RSS   AIC
## - `AFDP:TEY`    1  0.0353 498.27 -14532
## - `AT:AFDP`     1  0.0407 498.28 -14532
## - `GTEP:TAT`    1  0.0458 498.28 -14532
## - `GTEP:TIT`    1  0.1027 498.34 -14531
## - `AP:AFDP`     1  0.1539 498.39 -14531
## <none>                  498.24 -14530
## - `GTEP:TEY`    1  0.2759 498.51 -14529
## - `AH:CDP`      1  0.2943 498.53 -14529
## - CDP          1  0.3070 498.55 -14529
## - `TAT:CDP`    1  0.3349 498.57 -14528
## - `AH:TEY`      1  0.4172 498.66 -14527
## - `AH:GTEP`    1  0.4601 498.70 -14527
## - `AH:AFDP`    1  0.5240 498.76 -14526
## - `AP:GTEP`    1  0.5314 498.77 -14526

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## - `AH:TAT`      1  0.5412 498.78 -14526
## - GTEP          1  0.6878 498.93 -14524
## - `AFDP:TIT`    1  0.7217 498.96 -14524
## - AFDP          1  0.7549 498.99 -14523
## - `AT:AH`        1  0.7900 499.03 -14523
## - `TIT:CDP`      1  0.8204 499.06 -14523
## - `AH:TIT`       1  0.8384 499.08 -14522
## - `AFDP:GTEP`    1  0.8650 499.10 -14522
## - `AFDP:CDP`     1  1.0858 499.32 -14520
## - `TIT:TEY`       1  1.1055 499.34 -14519
## - AT             1  1.1423 499.38 -14519
## - `AT:GTEP`      1  1.1475 499.39 -14519
## - `AT:TAT`       1  1.1502 499.39 -14519
## - `AT:TEY`       1  1.3173 499.56 -14517
## - TEY            1  1.3519 499.59 -14516
## - TIT            1  1.4909 499.73 -14515
## - `AT:TIT`       1  1.6046 499.84 -14513
## - `AP:AH`         1  1.7945 500.03 -14511
## - `AFDP:TAT`     1  2.0012 500.24 -14509
## - AP              1  2.5269 500.77 -14502
## - `AP:TAT`       1  3.0251 501.26 -14497
## - `AP:TIT`       1  3.1995 501.44 -14495
## - `AP:TEY`       1  4.1386 502.38 -14484
## - `TIT:TAT`      1  4.7734 503.01 -14476
## - TAT             1  5.0808 503.32 -14472
## - `AT:AP`         1  6.2405 504.48 -14459
##
## Step: AIC=-14531.96
## .outcome ~ AT + AP + AFDP + GTEP + TIT + TAT + TEY + CDP + `AT:AP` +
##   `AT:AH` + `AT:AFDP` + `AT:GTEP` + `AT:TIT` + `AT:TAT` + `AT:TEY` +
##   `AP:AH` + `AP:AFDP` + `AP:GTEP` + `AP:TIT` + `AP:TAT` + `AP:TEY` +
##   `AH:AFDP` + `AH:GTEP` + `AH:TIT` + `AH:TAT` + `AH:TEY` +
##   `AH:CDP` + `AFDP:GTEP` + `AFDP:TIT` + `AFDP:TAT` + `AFDP:CDP` +
##   `GTEP:TIT` + `GTEP:TAT` + `GTEP:TEY` + `TIT:TAT` + `TIT:TEY` +
##   `TIT:CDP` + `TAT:CDP`
##
##               Df Sum of Sq   RSS   AIC
## - `AT:AFDP`    1  0.0091 498.28 -14534
## - `AP:AFDP`    1  0.1651 498.44 -14532
## - `GTEP:TAT`   1  0.1675 498.44 -14532
## <none>                   498.27 -14532
## - CDP          1  0.2716 498.55 -14531
## - `AH:CDP`     1  0.2961 498.57 -14530
## - `TAT:CDP`    1  0.3298 498.60 -14530
## - `GTEP:TIT`   1  0.3392 498.61 -14530
## - `AH:TEY`     1  0.4004 498.67 -14529
## - `AH:GTEP`    1  0.4584 498.73 -14528
## - `AP:GTEP`    1  0.4967 498.77 -14528
## - `AH:TAT`     1  0.5249 498.80 -14528
## - `AH:AFDP`    1  0.5507 498.83 -14527
## - `GTEP:TEY`   1  0.7203 498.99 -14525
## - `TIT:CDP`    1  0.8098 499.08 -14524
## - `AH:TIT`     1  0.8206 499.09 -14524
## - AFDP          1  0.8284 499.10 -14524

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## - `AFDP:GTEP` 1 0.8303 499.10 -14524
## - `AT:AH` 1 0.8334 499.11 -14524
## - GTEP 1 1.0240 499.30 -14522
## - `AFDP:CDP` 1 1.0841 499.36 -14521
## - `TIT:TEY` 1 1.1504 499.42 -14520
## - AT 1 1.1873 499.46 -14520
## - `AT:TAT` 1 1.3323 499.61 -14518
## - TEY 1 1.5426 499.82 -14516
## - `AT:TEY` 1 1.5536 499.83 -14516
## - TIT 1 1.5724 499.85 -14515
## - `AFDP:TIT` 1 1.6578 499.93 -14514
## - `AT:TIT` 1 1.6801 499.95 -14514
## - `AT:GTEP` 1 1.7682 500.04 -14513
## - `AP:AH` 1 1.7862 500.06 -14513
## - AP 1 2.5227 500.80 -14504
## - `AFDP:TAT` 1 2.7444 501.02 -14502
## - `AP:TAT` 1 3.1003 501.37 -14497
## - `AP:TIT` 1 3.2407 501.52 -14496
## - `AP:TEY` 1 4.1702 502.44 -14485
## - TAT 1 5.0599 503.33 -14474
## - `TIT:TAT` 1 5.0749 503.35 -14474
## - `AT:AP` 1 6.2070 504.48 -14461
##
## Step: AIC=-14533.86
## .outcome ~ AT + AP + AFDP + GTEP + TIT + TAT + TEY + CDP + `AT:AP` +
##   `AT:AH` + `AT:GTEP` + `AT:TIT` + `AT:TAT` + `AT:TEY` + `AP:AH` +
##   `AP:AFDP` + `AP:GTEP` + `AP:TIT` + `AP:TAT` + `AP:TEY` +
##   `AH:AFDP` + `AH:GTEP` + `AH:TIT` + `AH:TAT` + `AH:TEY` +
##   `AH:CDP` + `AFDP:GTEP` + `AFDP:TIT` + `AFDP:TAT` + `AFDP:CDP` +
##   `GTEP:TIT` + `GTEP:TAT` + `GTEP:TEY` + `TIT:TAT` + `TIT:TEY` +
##   `TIT:CDP` + `TAT:CDP`
##
##          Df Sum of Sq    RSS    AIC
## - `GTEP:TAT` 1  0.1638 498.45 -14534
## <none>           498.28 -14534
## - CDP 1  0.2628 498.55 -14533
## - `AP:AFDP` 1  0.2646 498.55 -14533
## - `AH:CDP` 1  0.2968 498.58 -14532
## - `TAT:CDP` 1  0.3348 498.62 -14532
## - `GTEP:TIT` 1  0.3389 498.62 -14532
## - `AH:TEY` 1  0.4522 498.74 -14530
## - `AH:GTEP` 1  0.4580 498.74 -14530
## - `AP:GTEP` 1  0.4920 498.78 -14530
## - `AH:TAT` 1  0.5968 498.88 -14529
## - `AH:AFDP` 1  0.6789 498.96 -14528
## - `GTEP:TEY` 1  0.7277 499.01 -14527
## - `TIT:CDP` 1  0.8017 499.09 -14526
## - `AT:AH` 1  0.8330 499.12 -14526
## - `AFDP:GTEP` 1  0.8578 499.14 -14526
## - AFDP 1  0.8910 499.17 -14525
## - `AH:TIT` 1  0.9093 499.19 -14525
## - GTEP 1  1.0341 499.32 -14524
## - `AFDP:CDP` 1  1.0757 499.36 -14523
## - `TIT:TEY` 1  1.1417 499.43 -14522

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## - AT          1  1.3476 499.63 -14520
## - TEY         1  1.5571 499.84 -14517
## - `AFDP:TIT` 1  1.6512 499.93 -14516
## - TIT         1  1.6639 499.95 -14516
## - `AT:GTEP`   1  1.8044 500.09 -14514
## - `AP:AH`     1  1.8233 500.11 -14514
## - AP          1  2.5971 500.88 -14505
## - `AFDP:TAT` 1  2.7646 501.05 -14503
## - `AP:TAT`   1  3.4275 501.71 -14495
## - `AP:TIT`   1  3.5101 501.79 -14494
## - `AT:TAT`   1  3.6794 501.96 -14492
## - `AP:TEY`   1  4.3669 502.65 -14484
## - `AT:TEY`   1  4.6235 502.91 -14481
## - `AT:TIT`   1  4.7689 503.05 -14480
## - `TIT:TAT`  1  5.0660 503.35 -14476
## - TAT         1  5.7241 504.01 -14468
## - `AT:AP`    1  6.1980 504.48 -14463
##
## Step: AIC=-14533.91
## .outcome ~ AT + AP + AFDP + GTEP + TIT + TAT + TEY + CDP + `AT:AP` +
##           `AT:AH` + `AT:GTEP` + `AT:TIT` + `AT:TAT` + `AT:TEY` + `AP:AH` +
##           `AP:AFDP` + `AP:GTEP` + `AP:TIT` + `AP:TAT` + `AP:TEY` +
##           `AH:AFDP` + `AH:GTEP` + `AH:TIT` + `AH:TAT` + `AH:TEY` +
##           `AH:CDP` + `AFDP:GTEP` + `AFDP:TIT` + `AFDP:TAT` + `AFDP:CDP` +
##           `GTEP:TIT` + `GTEP:TEY` + `TIT:TAT` + `TIT:TEY` + `TIT:CDP` +
##           `TAT:CDP`
##
##             Df Sum of Sq   RSS   AIC
## - CDP          1  0.1342 498.58 -14534
## <none>          498.45 -14534
## - `TAT:CDP`   1  0.1966 498.64 -14534
## - `GTEP:TIT`  1  0.2718 498.72 -14533
## - `AH:CDP`    1  0.2934 498.74 -14532
## - `AP:AFDP`   1  0.3462 498.79 -14532
## - `AH:GTEP`   1  0.4704 498.92 -14530
## - `AH:TEY`    1  0.5980 499.05 -14529
## - `AH:AFDP`   1  0.6118 499.06 -14529
## - `AH:TAT`    1  0.7020 499.15 -14528
## - `GTEP:TEY`  1  0.7463 499.19 -14527
## - `TIT:CDP`   1  0.7642 499.21 -14527
## - `AP:GTEP`   1  0.8350 499.28 -14526
## - GTEP         1  0.9023 499.35 -14525
## - `AT:AH`     1  0.9680 499.42 -14524
## - AFDP         1  1.0410 499.49 -14524
## - `AH:TIT`   1  1.0576 499.50 -14523
## - `TIT:TEY`   1  1.0699 499.52 -14523
## - `AFDP:CDP`  1  1.0788 499.53 -14523
## - `AFDP:TIT`  1  1.5523 500.00 -14518
## - `AT:GTEP`   1  1.6410 500.09 -14516
## - TIT          1  1.6873 500.13 -14516
## - `AFDP:GTEP` 1  1.8046 500.25 -14515
## - TEY          1  1.9536 500.40 -14513
## - AT           1  1.9717 500.42 -14513
## - `AP:AH`     1  2.0768 500.52 -14511

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## - AP          1  2.5688 501.02 -14506
## - `AFDP:TAT` 1  2.7143 501.16 -14504
## - `AP:TAT`   1  3.2993 501.75 -14497
## - `AP:TIT`   1  3.4083 501.86 -14496
## - `AT:TAT`   1  3.9875 502.43 -14489
## - `AP:TEY`   1  4.3424 502.79 -14485
## - `AT:TEY`   1  4.4715 502.92 -14483
## - `AT:TIT`   1  4.6321 503.08 -14481
## - `TIT:TAT`  1  5.5292 503.98 -14471
## - TAT         1  5.6342 504.08 -14470
## - `AT:AP`    1  6.3315 504.78 -14461
##
## Step: AIC=-14534.32
## .outcome ~ AT + AP + AFDP + GTEP + TIT + TAT + TEY + `AT:AP` +
##   `AT:AH` + `AT:GTEP` + `AT:TIT` + `AT:TAT` + `AT:TEY` + `AP:AH` +
##   `AP:AFDP` + `AP:GTEP` + `AP:TIT` + `AP:TAT` + `AP:TEY` +
##   `AH:AFDP` + `AH:GTEP` + `AH:TIT` + `AH:TAT` + `AH:TEY` +
##   `AH:CDP` + `AFDP:GTEP` + `AFDP:TIT` + `AFDP:TAT` + `AFDP:CDP` +
##   `GTEP:TIT` + `GTEP:TEY` + `TIT:TAT` + `TIT:TEY` + `TIT:CDP` +
##   `TAT:CDP`
##
##                                     Df Sum of Sq   RSS   AIC
## - `GTEP:TIT`  1  0.1385 498.72 -14535
## <none>           498.58 -14534
## - `AP:AFDP`  1  0.2876 498.87 -14533
## - `AH:CDP`   1  0.3734 498.95 -14532
## - `AH:GTEP`  1  0.4652 499.05 -14531
## - `AH:TEY`   1  0.5324 499.11 -14530
## - `AH:AFDP`  1  0.6953 499.28 -14528
## - `GTEP:TEY` 1  0.7118 499.29 -14528
## - `AH:TAT`   1  0.7321 499.31 -14528
## - GTEP       1  0.7946 499.38 -14527
## - `AP:GTEP`  1  0.8527 499.43 -14526
## - `AT:AH`    1  0.9039 499.49 -14526
## - `TAT:CDP`  1  0.9118 499.49 -14526
## - AFDP       1  0.9220 499.50 -14525
## - `AFDP:CDP` 1  1.0200 499.60 -14524
## - `AH:TIT`   1  1.0797 499.66 -14524
## - `TIT:CDP`  1  1.4323 500.01 -14519
## - `AT:GTEP`  1  1.6338 500.22 -14517
## - `AFDP:TIT` 1  1.7440 500.33 -14516
## - `AFDP:GTEP` 1  1.7550 500.34 -14516
## - TIT        1  1.8565 500.44 -14514
## - `AP:AH`    1  1.9895 500.57 -14513
## - AT         1  2.2964 500.88 -14509
## - AP         1  2.4695 501.05 -14507
## - `TIT:TEY`  1  2.5913 501.17 -14506
## - TEY        1  2.8733 501.45 -14502
## - `AP:TIT`   1  3.4699 502.05 -14495
## - `AP:TAT`   1  3.5461 502.13 -14494
## - `AT:TAT`   1  3.8836 502.47 -14490
## - `AFDP:TAT` 1  3.9379 502.52 -14490
## - `AP:TEY`   1  4.4148 503.00 -14484
## - `AT:TEY`   1  4.4809 503.06 -14484

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## - `AT:TIT`      1    4.8792 503.46 -14479
## - TAT          1    5.6259 504.21 -14470
## - `TIT:TAT`     1    5.7157 504.30 -14469
## - `AT:AP`       1    6.2770 504.86 -14462
##
## Step: AIC=-14534.68
## .outcome ~ AT + AP + AFDP + GTEP + TIT + TAT + TEY + `AT:AP` +
##   `AT:AH` + `AT:GTEP` + `AT:TIT` + `AT:TAT` + `AT:TEY` + `AP:AH` +
##   `AP:AFDP` + `AP:GTEP` + `AP:TIT` + `AP:TAT` + `AP:TEY` +
##   `AH:AFDP` + `AH:GTEP` + `AH:TIT` + `AH:TAT` + `AH:TEY` +
##   `AH:CDP` + `AFDP:GTEP` + `AFDP:TIT` + `AFDP:TAT` + `AFDP:CDP` +
##   `GTEP:TEY` + `TIT:TAT` + `TIT:TEY` + `TIT:CDP` + `TAT:CDP`
##
##             Df Sum of Sq    RSS    AIC
## <none>                 498.72 -14535
## - `AP:AFDP`     1    0.3081 499.03 -14533
## - `AH:CDP`      1    0.3305 499.05 -14533
## - `AH:GTEP`     1    0.4536 499.17 -14531
## - `AH:TEY`      1    0.5314 499.25 -14530
## - `GTEP:TEY`    1    0.6434 499.36 -14529
## - `AH:TAT`      1    0.6706 499.39 -14529
## - `AH:AFDP`     1    0.6815 499.40 -14529
## - `AP:GTEP`     1    0.8535 499.57 -14527
## - GTEP          1    0.8671 499.59 -14526
## - `AT:AH`        1    0.9887 499.71 -14525
## - AFDP          1    1.0209 499.74 -14525
## - `AH:TIT`      1    1.0250 499.74 -14525
## - `AFDP:CDP`    1    1.0719 499.79 -14524
## - `TAT:CDP`     1    1.3329 500.05 -14521
## - `AT:GTEP`     1    1.5188 500.24 -14519
## - `AFDP:GTEP`   1    1.7201 500.44 -14516
## - `AFDP:TIT`    1    1.7413 500.46 -14516
## - TIT           1    1.7580 500.48 -14516
## - `TIT:CDP`     1    1.9102 500.63 -14514
## - `AP:AH`        1    2.1441 500.86 -14511
## - AT            1    2.2370 500.96 -14510
## - AP            1    2.3507 501.07 -14509
## - TEY           1    2.7392 501.46 -14504
## - `TIT:TEY`     1    3.1998 501.92 -14499
## - `AP:TIT`      1    3.3633 502.08 -14497
## - `AP:TAT`      1    3.4753 502.20 -14496
## - `AT:TAT`      1    3.9261 502.65 -14490
## - `AFDP:TAT`    1    4.0471 502.77 -14489
## - `AP:TEY`      1    4.2994 503.02 -14486
## - `AT:TEY`      1    4.4919 503.21 -14484
## - `AT:TIT`      1    4.7910 503.51 -14480
## - TAT           1    5.5194 504.24 -14472
## - `TIT:TAT`     1    5.7413 504.46 -14469
## - `AT:AP`       1    6.1386 504.86 -14464
##
## Start: AIC=-14816.56
## .outcome ~ AT + AP + AH + AFDP + GTEP + TIT + TAT + TEY + CDP +
##   `AT:AP` + `AT:AH` + `AT:AFDP` + `AT:GTEP` + `AT:TIT` + `AT:TAT` +
##   `AT:TEY` + `AT:CDP` + `AP:AH` + `AP:AFDP` + `AP:GTEP` + `AP:TIT` +
##   `AP:TAT` + `AP:TEY` + `AP:CDP` + `AH:AFDP` + `AH:GTEP` +

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## `AH:TIT` + `AH:TAT` + `AH:TEY` + `AH:CDP` + `AFDP:GTEP` +
## `AFDP:TIT` + `AFDP:TAT` + `AFDP:TEY` + `AFDP:CDP` + `GTEP:TIT` +
## `GTEP:TAT` + `GTEP:TEY` + `GTEP:CDP` + `TIT:TAT` + `TIT:TEY` +
## `TIT:CDP` + `TAT:TEY` + `TAT:CDP` + `TEY:CDP`
##
##          Df Sum of Sq    RSS    AIC
## - `AH:CDP`  1  0.0002 473.72 -14819
## - AH        1  0.0035 473.72 -14818
## - `AT:AFDP` 1  0.0057 473.72 -14818
## - `TAT:TEY` 1  0.0060 473.72 -14818
## - `GTEP:CDP` 1  0.0111 473.73 -14818
## - `TEY:CDP` 1  0.0170 473.73 -14818
## - `AT:CDP`  1  0.0331 473.75 -14818
## - `TAT:CDP` 1  0.0456 473.76 -14818
## - `AH:TAT`  1  0.0483 473.76 -14818
## - `AFDP:TEY` 1  0.0588 473.78 -14818
## - `AH:TIT`  1  0.1351 473.85 -14817
## - `GTEP:TAT` 1  0.1379 473.85 -14817
## - `AP:AFDP`  1  0.1541 473.87 -14817
## - `AP:CDP`  1  0.1555 473.87 -14817
## - `GTEP:TIT` 1  0.1597 473.88 -14817
## <none>                473.72 -14817
## - `AH:GTEP`  1  0.1978 473.91 -14816
## - `AH:TEY`   1  0.2591 473.98 -14815
## - `AT:TAT`   1  0.2677 473.98 -14815
## - `AFDP:TIT` 1  0.2698 473.99 -14815
## - `GTEP:TEY` 1  0.2778 473.99 -14815
## - `AH:AFDP`  1  0.3214 474.04 -14815
## - `TIT:CDP`  1  0.3359 474.05 -14814
## - `TIT:TEY`  1  0.3620 474.08 -14814
## - `AP:GTEP`  1  0.4566 474.17 -14813
## - GTEP       1  0.4620 474.18 -14813
## - CDP        1  0.4763 474.19 -14813
## - `AT:TIT`   1  0.4942 474.21 -14812
## - `AFDP:CDP` 1  0.5468 474.26 -14812
## - `AT:AH`    1  0.5673 474.28 -14812
## - `AFDP:GTEP` 1  0.5829 474.30 -14811
## - AFDP       1  0.5856 474.30 -14811
## - `AFDP:TAT` 1  0.6278 474.34 -14811
## - TEY        1  0.6339 474.35 -14811
## - AT         1  0.6621 474.38 -14810
## - `AT:TEY`   1  0.7188 474.44 -14810
## - `AT:GTEP`  1  0.8410 474.56 -14808
## - TIT        1  1.3423 475.06 -14802
## - `AP:AH`   1  1.3587 475.08 -14802
## - `AP:TAT`  1  1.8598 475.58 -14795
## - `TIT:TAT` 1  1.9560 475.67 -14794
## - `AP:TIT`  1  2.5540 476.27 -14787
## - AP         1  2.6602 476.38 -14786
## - TAT        1  2.7568 476.47 -14784
## - `AP:TEY`  1  3.8223 477.54 -14771
## - `AT:AP`   1  5.9670 479.68 -14745
##
## Step:  AIC=-14818.56

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```

## .outcome ~ AT + AP + AH + AFDP + GTEP + TIT + TAT + TEY + CDP +
##   `AT:AP` + `AT:AH` + `AT:AFDP` + `AT:GTEP` + `AT:TIT` + `AT:TAT` +
##   `AT:TEY` + `AT:CDP` + `AP:AH` + `AP:AFDP` + `AP:GTEP` + `AP:TIT` +
##   `AP:TAT` + `AP:TEY` + `AP:CDP` + `AH:AFDP` + `AH:GTEP` +
##   `AH:TIT` + `AH:TAT` + `AH:TEY` + `AFDP:GTEP` + `AFDP:TIT` +
##   `AFDP:TAT` + `AFDP:TEY` + `AFDP:CDP` + `GTEP:TIT` + `GTEP:TAT` +
##   `GTEP:TEY` + `GTEP:CDP` + `TIT:TAT` + `TIT:TEY` + `TIT:CDP` +
##   `TAT:TEY` + `TAT:CDP` + `TEY:CDP`
##
##               Df Sum of Sq    RSS     AIC
## - AH          1  0.0035 473.72 -14820
## - `AT:AFDP`   1  0.0056 473.72 -14820
## - `TAT:TEY`   1  0.0057 473.72 -14820
## - `GTEP:CDP`  1  0.0131 473.73 -14820
## - `TEY:CDP`   1  0.0167 473.73 -14820
## - `TAT:CDP`   1  0.0457 473.76 -14820
## - `AT:CDP`    1  0.0494 473.77 -14820
## - `AFDP:TEY`  1  0.0588 473.78 -14820
## - `AH:TAT`    1  0.1038 473.82 -14819
## - `GTEP:TAT`  1  0.1454 473.86 -14819
## - `AP:AFDP`   1  0.1544 473.87 -14819
## <none>           473.72 -14819
## - `GTEP:TIT`  1  0.1654 473.88 -14818
## - `AP:CDP`    1  0.1739 473.89 -14818
## - `AH:GTEP`   1  0.1978 473.91 -14818
## - `AH:TIT`    1  0.2289 473.95 -14818
## - `AH:TEY`    1  0.2625 473.98 -14817
## - `GTEP:TEY`  1  0.2776 473.99 -14817
## - `AFDP:TIT`  1  0.3039 474.02 -14817
## - `AH:AFDP`   1  0.3215 474.04 -14817
## - `TIT:CDP`   1  0.3357 474.05 -14816
## - `AT:TAT`    1  0.3527 474.07 -14816
## - `TIT:TEY`   1  0.3733 474.09 -14816
## - `AP:GTEP`   1  0.4574 474.17 -14815
## - GTEP         1  0.4623 474.18 -14815
## - CDP          1  0.5089 474.23 -14814
## - `AT:AH`     1  0.5703 474.29 -14814
## - `AFDP:GTEP` 1  0.5843 474.30 -14813
## - AFDP         1  0.5855 474.30 -14813
## - TEY          1  0.6350 474.35 -14813
## - `AT:TIT`    1  0.6516 474.37 -14812
## - `AFDP:CDP`  1  0.6522 474.37 -14812
## - AT           1  0.6627 474.38 -14812
## - `AT:TEY`    1  0.7190 474.44 -14812
## - `AFDP:TAT`  1  0.7192 474.44 -14812
## - `AT:GTEP`   1  0.8410 474.56 -14810
## - `AP:AH`     1  1.3600 475.08 -14804
## - TIT          1  1.4364 475.15 -14803
## - `TIT:TAT`   1  1.9577 475.67 -14796
## - `AP:TAT`    1  1.9862 475.70 -14796
## - AP           1  2.6607 476.38 -14788
## - `AP:TIT`    1  2.6768 476.39 -14787
## - TAT          1  2.9807 476.70 -14784
## - `AP:TEY`    1  3.8223 477.54 -14773

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## - `AT:AP`      1    5.9685 479.69 -14747
##
## Step: AIC=-14820.52
## .outcome ~ AT + AP + AFDP + GTEP + TIT + TAT + TEY + CDP + `AT:AP` +
##   `AT:AH` + `AT:AFDP` + `AT:GTEP` + `AT:TIT` + `AT:TAT` + `AT:TEY` +
##   `AT:CDP` + `AP:AH` + `AP:AFDP` + `AP:GTEP` + `AP:TIT` + `AP:TAT` +
##   `AP:TEY` + `AP:CDP` + `AH:AFDP` + `AH:GTEP` + `AH:TIT` +
##   `AH:TAT` + `AH:TEY` + `AFDP:GTEP` + `AFDP:TIT` + `AFDP:TAT` +
##   `AFDP:TEY` + `AFDP:CDP` + `GTEP:TIT` + `GTEP:TAT` + `GTEP:TEY` +
##   `GTEP:CDP` + `TIT:TAT` + `TIT:TEY` + `TIT:CDP` + `TAT:TEY` +
##   `TAT:CDP` + `TEY:CDP`
##
##          Df Sum of Sq   RSS   AIC
## - `TAT:TEY`     1  0.0058 473.73 -14822
## - `AT:AFDP`     1  0.0085 473.73 -14822
## - `GTEP:CDP`    1  0.0127 473.73 -14822
## - `TEY:CDP`     1  0.0185 473.74 -14822
## - `AT:CDP`      1  0.0488 473.77 -14822
## - `TAT:CDP`     1  0.0505 473.77 -14822
## - `AFDP:TEY`    1  0.0609 473.78 -14822
## - `AH:TAT`      1  0.1158 473.84 -14821
## - `AP:AFDP`     1  0.1552 473.88 -14821
## - `GTEP:TAT`    1  0.1559 473.88 -14821
## <none>           473.72 -14820
## - `AP:CDP`      1  0.1744 473.89 -14820
## - `GTEP:TIT`    1  0.1815 473.90 -14820
## - `AH:GTEP`     1  0.2023 473.92 -14820
## - `AFDP:TIT`    1  0.3018 474.02 -14819
## - `GTEP:TEY`    1  0.3036 474.02 -14819
## - `TIT:CDP`     1  0.3543 474.07 -14818
## - `AH:TIT`      1  0.3563 474.08 -14818
## - `AT:TAT`      1  0.3617 474.08 -14818
## - `TIT:TEY`     1  0.3743 474.09 -14818
## - `AH:AFDP`     1  0.3945 474.11 -14818
## - `AH:TEY`      1  0.4015 474.12 -14818
## - `AP:GTEP`     1  0.4609 474.18 -14817
## - CDP           1  0.5143 474.23 -14816
## - GTEP          1  0.5271 474.25 -14816
## - `AFDP:GTEP`   1  0.5837 474.30 -14815
## - AFDP          1  0.6002 474.32 -14815
## - TEY           1  0.6400 474.36 -14814
## - `AFDP:CDP`   1  0.6560 474.38 -14814
## - `AT:AH`       1  0.6889 474.41 -14814
## - `AT:TIT`      1  0.6973 474.42 -14814
## - AT            1  0.7157 474.44 -14814
## - `AFDP:TAT`   1  0.7157 474.44 -14814
## - `AT:TEY`      1  0.8312 474.55 -14812
## - `AT:GTEP`     1  0.8724 474.59 -14812
## - TIT           1  1.4649 475.19 -14804
## - `AP:AH`       1  1.6347 475.36 -14802
## - `TIT:TAT`     1  1.9714 475.69 -14798
## - `AP:TAT`      1  2.0209 475.74 -14797
## - AP            1  2.7107 476.43 -14789
## - `AP:TIT`      1  2.7259 476.45 -14789

```

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## - TAT      1  3.0421 476.76 -14785
## - `AP:TEY` 1  3.8574 477.58 -14775
## - `AT:AP`   1  6.2076 479.93 -14746
##
## Step: AIC=-14822.44
## .outcome ~ AT + AP + AFDP + GTEP + TIT + TAT + TEY + CDP + `AT:AP` +
##   `AT:AH` + `AT:AFDP` + `AT:GTEP` + `AT:TIT` + `AT:TAT` + `AT:TEY` +
##   `AT:CDP` + `AP:AH` + `AP:AFDP` + `AP:GTEP` + `AP:TIT` + `AP:TAT` +
##   `AP:TEY` + `AP:CDP` + `AH:AFDP` + `AH:GTEP` + `AH:TIT` +
##   `AH:TAT` + `AH:TEY` + `AFDP:GTEP` + `AFDP:TIT` + `AFDP:TAT` +
##   `AFDP:TEY` + `AFDP:CDP` + `GTEP:TIT` + `GTEP:TAT` + `GTEP:TEY` +
##   `GTEP:CDP` + `TIT:TAT` + `TIT:TEY` + `TIT:CDP` + `TAT:CDP` +
##   `TEY:CDP`
##
##                                     Df Sum of Sq    RSS    AIC
## - `AT:AFDP`   1  0.0072 473.73 -14824
## - `GTEP:CDP`  1  0.0073 473.73 -14824
## - `TEY:CDP`   1  0.0127 473.74 -14824
## - `AFDP:TEY`  1  0.0589 473.79 -14824
## - `TAT:CDP`   1  0.0796 473.81 -14824
## - `AT:CDP`   1  0.1068 473.83 -14823
## - `AH:TAT`   1  0.1129 473.84 -14823
## - `GTEP:TAT` 1  0.1517 473.88 -14823
## - `AP:AFDP`   1  0.1600 473.89 -14822
## <none>                  473.73 -14822
## - `AP:CDP`   1  0.1713 473.90 -14822
## - `GTEP:TIT` 1  0.1758 473.90 -14822
## - `AH:GTEP`  1  0.2060 473.93 -14822
## - `GTEP:TEY` 1  0.3248 474.05 -14820
## - `TIT:CDP`  1  0.3493 474.08 -14820
## - `AH:TIT`   1  0.3520 474.08 -14820
## - `AH:AFDP`  1  0.3913 474.12 -14820
## - `AH:TEY`   1  0.3961 474.12 -14820
## - `AP:GTEP`  1  0.4582 474.18 -14819
## - `AFDP:TIT` 1  0.4954 474.22 -14818
## - GTEP       1  0.5422 474.27 -14818
## - CDP        1  0.5511 474.28 -14818
## - `AFDP:GTEP` 1  0.5943 474.32 -14817
## - AFDP       1  0.5948 474.32 -14817
## - `AT:AH`   1  0.6831 474.41 -14816
## - `AT:TAT`  1  0.7481 474.47 -14815
## - `AT:TEY`  1  0.8260 474.55 -14814
## - `AT:GTEP` 1  0.9173 474.64 -14813
## - TEY        1  0.9671 474.69 -14812
## - `AT:TIT`  1  0.9732 474.70 -14812
## - `TIT:TEY` 1  1.0337 474.76 -14812
## - AT         1  1.0935 474.82 -14811
## - `AFDP:TAT` 1  1.1903 474.92 -14810
## - `AFDP:CDP` 1  1.2478 474.97 -14809
## - TIT        1  1.5904 475.32 -14805
## - `AP:AH`   1  1.6299 475.36 -14804
## - `AP:TAT`  1  2.0366 475.76 -14799
## - AP         1  2.7066 476.43 -14791
## - `AP:TIT`  1  2.7363 476.46 -14790

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## - TAT      1  3.0552 476.78 -14786
## - `TIT:TAT` 1  3.2325 476.96 -14784
## - `AP:TEY`  1  3.9538 477.68 -14775
## - `AT:AP`   1  6.3827 480.11 -14745
##
## Step: AIC=-14824.35
## .outcome ~ AT + AP + AFDP + GTEP + TIT + TAT + TEY + CDP + `AT:AP` +
##   `AT:AH` + `AT:GTEP` + `AT:TIT` + `AT:TAT` + `AT:TEY` + `AT:CDP` +
##   `AP:AH` + `AP:AFDP` + `AP:GTEP` + `AP:TIT` + `AP:TAT` + `AP:TEY` +
##   `AP:CDP` + `AH:AFDP` + `AH:GTEP` + `AH:TIT` + `AH:TAT` +
##   `AH:TEY` + `AFDP:GTEP` + `AFDP:TIT` + `AFDP:TAT` + `AFDP:TEY` +
##   `AFDP:CDP` + `GTEP:TIT` + `GTEP:TAT` + `GTEP:TEY` + `GTEP:CDP` +
##   `TIT:TAT` + `TIT:TEY` + `TIT:CDP` + `TAT:CDP` + `TEY:CDP`
##
##          Df Sum of Sq    RSS    AIC
## - `TEY:CDP` 1  0.0068 473.74 -14826
## - `GTEP:CDP` 1  0.0083 473.74 -14826
## - `TAT:CDP`  1  0.0744 473.81 -14825
## - `AFDP:TEY` 1  0.0820 473.82 -14825
## - `AT:CDP`   1  0.1241 473.86 -14825
## - `AH:TAT`   1  0.1281 473.86 -14825
## - `GTEP:TAT` 1  0.1481 473.88 -14824
## <none>           473.73 -14824
## - `GTEP:TIT` 1  0.1721 473.91 -14824
## - `AP:CDP`   1  0.1746 473.91 -14824
## - `AH:GTEP`  1  0.2043 473.94 -14824
## - `AP:AFDP`  1  0.2263 473.96 -14824
## - `GTEP:TEY` 1  0.3184 474.05 -14822
## - `AH:TIT`   1  0.3797 474.11 -14822
## - `AH:AFDP`  1  0.3962 474.13 -14821
## - `AH:TEY`   1  0.4175 474.15 -14821
## - `TIT:CDP`  1  0.4378 474.17 -14821
## - `AP:GTEP`  1  0.4539 474.19 -14821
## - GTEP       1  0.5356 474.27 -14820
## - CDP        1  0.5532 474.29 -14820
## - `AFDP:GTEP` 1  0.6035 474.34 -14819
## - AFDP       1  0.6370 474.37 -14818
## - `AT:AH`    1  0.6801 474.41 -14818
## - `AT:TAT`   1  0.7460 474.48 -14817
## - `AFDP:TIT` 1  0.8382 474.57 -14816
## - `AT:TEY`   1  0.8462 474.58 -14816
## - `AT:GTEP`  1  0.9129 474.65 -14815
## - TEY        1  0.9611 474.69 -14814
## - `AT:TIT`   1  0.9829 474.72 -14814
## - `TIT:TEY`  1  1.0327 474.77 -14814
## - AT         1  1.1230 474.86 -14812
## - `AFDP:CDP` 1  1.2455 474.98 -14811
## - `AFDP:TAT` 1  1.5083 475.24 -14808
## - TIT        1  1.5892 475.32 -14807
## - `AP:AH`    1  1.6556 475.39 -14806
## - `AP:TAT`   1  2.0578 475.79 -14801
## - `AP:TIT`   1  2.8027 476.54 -14792
## - AP         1  2.8127 476.55 -14791
## - TAT        1  3.0901 476.82 -14788

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## - `TIT:TAT`      1    3.2511 476.98 -14786
## - `AP:TEY`       1    4.1204 477.85 -14775
## - `AT:AP`        1    6.4899 480.22 -14746
##
## Step: AIC=-14826.27
## .outcome ~ AT + AP + AFDP + GTEP + TIT + TAT + TEY + CDP + `AT:AP` +
##   `AT:AH` + `AT:GTEP` + `AT:TIT` + `AT:TAT` + `AT:TEY` + `AT:CDP` +
##   `AP:AH` + `AP:AFDP` + `AP:GTEP` + `AP:TIT` + `AP:TAT` + `AP:TEY` +
##   `AP:CDP` + `AH:AFDP` + `AH:GTEP` + `AH:TIT` + `AH:TAT` +
##   `AH:TEY` + `AFDP:GTEP` + `AFDP:TIT` + `AFDP:TAT` + `AFDP:TEY` +
##   `AFDP:CDP` + `GTEP:TIT` + `GTEP:TAT` + `GTEP:TEY` + `GTEP:CDP` +
##   `TIT:TAT` + `TIT:TEY` + `TIT:CDP` + `TAT:CDP`
##
##              Df Sum of Sq   RSS   AIC
## - `GTEP:CDP`  1    0.0061 473.75 -14828
## - `AFDP:TEY`  1    0.0753 473.82 -14827
## - `AH:TAT`    1    0.1269 473.87 -14827
## <none>          473.74 -14826
## - `AP:CDP`    1    0.1839 473.92 -14826
## - `AT:CDP`    1    0.1953 473.94 -14826
## - `AH:GTEP`   1    0.2036 473.94 -14826
## - `GTEP:TAT`  1    0.2176 473.96 -14826
## - `AP:AFDP`   1    0.2209 473.96 -14826
## - `TAT:CDP`   1    0.2677 474.01 -14825
## - `GTEP:TIT`  1    0.3173 474.06 -14824
## - `AH:TIT`    1    0.3786 474.12 -14824
## - `AH:AFDP`   1    0.4083 474.15 -14823
## - `AH:TEY`    1    0.4173 474.16 -14823
## - `AP:GTEP`   1    0.5525 474.29 -14821
## - CDP         1    0.5543 474.29 -14821
## - AFDP        1    0.6375 474.38 -14820
## - `GTEP:TEY`  1    0.6412 474.38 -14820
## - `AFDP:GTEP` 1    0.6490 474.39 -14820
## - `AT:AH`     1    0.6895 474.43 -14820
## - `AT:TAT`    1    0.8093 474.55 -14818
## - GTEP        1    0.8606 474.60 -14818
## - `AT:TEY`    1    0.9694 474.71 -14816
## - TEY         1    0.9803 474.72 -14816
## - `TIT:CDP`   1    0.9823 474.72 -14816
## - `AFDP:TIT`  1    1.1741 474.91 -14814
## - `AT:TIT`    1    1.1757 474.92 -14814
## - AT          1    1.2666 475.01 -14812
## - `AFDP:CDP`  1    1.3963 475.14 -14811
## - `TIT:TEY`   1    1.4104 475.15 -14811
## - `AT:GTEP`   1    1.4787 475.22 -14810
## - TIT         1    1.5851 475.33 -14808
## - `AP:AH`     1    1.6615 475.40 -14808
## - `AFDP:TAT`  1    1.9974 475.74 -14803
## - `AP:TAT`    1    2.0524 475.79 -14803
## - `AP:TIT`    1    2.7959 476.54 -14794
## - AP          1    2.8169 476.56 -14793
## - TAT         1    3.2072 476.95 -14788
## - `TIT:TAT`   1    3.9565 477.70 -14779
## - `AP:TEY`    1    4.1516 477.89 -14777

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## - `AT:AP`      1    6.6772 480.42 -14746
##
## Step: AIC=-14828.19
## .outcome ~ AT + AP + AFDP + GTEP + TIT + TAT + TEY + CDP + `AT:AP` +
##   `AT:AH` + `AT:GTEP` + `AT:TIT` + `AT:TAT` + `AT:TEY` + `AT:CDP` +
##   `AP:AH` + `AP:AFDP` + `AP:GTEP` + `AP:TIT` + `AP:TAT` + `AP:TEY` +
##   `AP:CDP` + `AH:AFDP` + `AH:GTEP` + `AH:TIT` + `AH:TAT` +
##   `AH:TEY` + `AFDP:GTEP` + `AFDP:TIT` + `AFDP:TAT` + `AFDP:TEY` +
##   `AFDP:CDP` + `GTEP:TIT` + `GTEP:TAT` + `GTEP:TEY` + `TIT:TAT` +
##   `TIT:TEY` + `TIT:CDP` + `TAT:CDP`
##
##          Df Sum of Sq   RSS   AIC
## - `AFDP:TEY`  1  0.0774 473.82 -14829
## - `AH:TAT`    1  0.1257 473.87 -14829
## <none>          473.75 -14828
## - `AP:CDP`    1  0.1777 473.92 -14828
## - `AT:CDP`    1  0.1911 473.94 -14828
## - `AH:GTEP`   1  0.2039 473.95 -14828
## - `AP:AFDP`   1  0.2180 473.96 -14828
## - `GTEP:TAT`  1  0.2863 474.03 -14827
## - `TAT:CDP`   1  0.2897 474.04 -14827
## - `GTEP:TIT`  1  0.3609 474.11 -14826
## - `AH:TIT`    1  0.3760 474.12 -14826
## - `AH:AFDP`   1  0.4085 474.15 -14825
## - `AH:TEY`    1  0.4146 474.16 -14825
## - `AP:GTEP`   1  0.5497 474.30 -14823
## - CDP         1  0.5641 474.31 -14823
## - AFDP        1  0.6359 474.38 -14822
## - `AFDP:GTEP` 1  0.6482 474.39 -14822
## - `AT:AH`     1  0.6870 474.43 -14822
## - `GTEP:TEY`  1  0.7717 474.52 -14821
## - `AT:TAT`    1  0.8343 474.58 -14820
## - GTEP        1  0.8786 474.62 -14819
## - `AT:TEY`    1  0.9691 474.72 -14818
## - TEY         1  1.0081 474.75 -14818
## - `AT:TIT`    1  1.1792 474.93 -14816
## - AT          1  1.3118 475.06 -14814
## - `TIT:CDP`   1  1.3435 475.09 -14814
## - `AFDP:TIT`  1  1.3529 475.10 -14813
## - `AFDP:CDP`  1  1.5424 475.29 -14811
## - `AT:GTEP`   1  1.5484 475.29 -14811
## - TIT         1  1.6122 475.36 -14810
## - `AP:AH`     1  1.6557 475.40 -14810
## - `TIT:TEY`   1  1.8178 475.56 -14808
## - `AP:TAT`    1  2.0693 475.82 -14804
## - `AFDP:TAT`  1  2.3762 476.12 -14801
## - `AP:TIT`    1  2.8114 476.56 -14795
## - AP          1  2.8168 476.56 -14795
## - TAT         1  3.2109 476.96 -14790
## - `AP:TEY`    1  4.1461 477.89 -14779
## - `TIT:TAT`   1  4.5142 478.26 -14774
## - `AT:AP`     1  6.6770 480.42 -14748
##
## Step: AIC=-14829.23

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## .outcome ~ AT + AP + AFDP + GTEP + TIT + TAT + TEY + CDP + `AT:AP` +
##   `AT:AH` + `AT:GTEP` + `AT:TIT` + `AT:TAT` + `AT:TEY` + `AT:CDP` +
##   `AP:AH` + `AP:AFDP` + `AP:GTEP` + `AP:TIT` + `AP:TAT` + `AP:TEY` +
##   `AP:CDP` + `AH:AFDP` + `AH:GTEP` + `AH:TIT` + `AH:TAT` +
##   `AH:TEY` + `AFDP:GTEP` + `AFDP:TIT` + `AFDP:TAT` + `AFDP:CDP` +
##   `GTEP:TIT` + `GTEP:TAT` + `GTEP:TEY` + `TIT:TAT` + `TIT:TEY` +
##   `TIT:CDP` + `TAT:CDP`
##
##          Df Sum of Sq    RSS    AIC
## - `AH:TAT`     1  0.0784 473.90 -14830
## - `AP:AFDP`     1  0.1582 473.98 -14829
## <none>          473.82 -14829
## - `AP:CDP`     1  0.1663 473.99 -14829
## - `AT:CDP`     1  0.1704 473.99 -14829
## - `AH:GTEP`     1  0.2054 474.03 -14829
## - `TAT:CDP`     1  0.2748 474.10 -14828
## - `AH:TIT`      1  0.3117 474.14 -14827
## - `AH:TEY`      1  0.3565 474.18 -14827
## - `AP:GTEP`     1  0.5002 474.32 -14825
## - CDP           1  0.5194 474.34 -14825
## - `GTEP:TAT`    1  0.5221 474.35 -14825
## - AFDP          1  0.5810 474.40 -14824
## - `AFDP:GTEP`   1  0.5902 474.41 -14824
## - `GTEP:TIT`    1  0.6746 474.50 -14823
## - `AH:AFDP`     1  0.7356 474.56 -14822
## - `AT:AH`        1  0.8349 474.66 -14821
## - GTEP          1  1.1205 474.94 -14817
## - `GTEP:TEY`    1  1.2399 475.06 -14816
## - AT             1  1.2565 475.08 -14816
## - `TIT:CDP`     1  1.2669 475.09 -14816
## - `AT:TAT`      1  1.2679 475.09 -14815
## - TEY            1  1.3429 475.17 -14814
## - `AFDP:CDP`    1  1.4653 475.29 -14813
## - `AP:AH`        1  1.6118 475.44 -14811
## - `AT:TIT`      1  1.6614 475.49 -14810
## - `TIT:TEY`      1  1.7575 475.58 -14809
## - TIT            1  1.8662 475.69 -14808
## - `AT:GTEP`     1  1.8889 475.71 -14808
## - `AFDP:TIT`    1  2.0341 475.86 -14806
## - `AP:TAT`       1  2.2711 476.09 -14803
## - `AFDP:TAT`    1  2.9523 476.78 -14794
## - AP             1  3.0645 476.89 -14793
## - `AP:TIT`       1  3.0826 476.91 -14793
## - TAT            1  3.3895 477.21 -14789
## - `TIT:TAT`      1  4.4879 478.31 -14776
## - `AP:TEY`       1  4.6342 478.46 -14774
## - `AT:TEY`       1  4.6902 478.51 -14773
## - `AT:AP`         1  6.6664 480.49 -14749
##
## Step:  AIC=-14830.25
## .outcome ~ AT + AP + AFDP + GTEP + TIT + TAT + TEY + CDP + `AT:AP` +
##   `AT:AH` + `AT:GTEP` + `AT:TIT` + `AT:TAT` + `AT:TEY` + `AT:CDP` +
##   `AP:AH` + `AP:AFDP` + `AP:GTEP` + `AP:TIT` + `AP:TAT` + `AP:TEY` +
##   `AP:CDP` + `AH:AFDP` + `AH:GTEP` + `AH:TIT` + `AH:TEY` +

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## `AFDP:GTEP` + `AFDP:TIT` + `AFDP:TAT` + `AFDP:CDP` + `GTEP:TIT` +
## `GTEP:TAT` + `GTEP:TEY` + `TIT:TAT` + `TIT:TEY` + `TIT:CDP` +
## `TAT:CDP` +
##
##          Df Sum of Sq    RSS     AIC
## - `AH:GTEP`   1  0.1516 474.05 -14830
## <none>           473.90 -14830
## - `AP:CDP`   1  0.1744 474.08 -14830
## - `AT:CDP`   1  0.1953 474.10 -14830
## - `AP:AFDP`   1  0.2626 474.16 -14829
## - `TAT:CDP`   1  0.2804 474.18 -14829
## - `AP:GTEP`   1  0.4380 474.34 -14827
## - `CDP`       1  0.5388 474.44 -14826
## - `AFDP:GTEP` 1  0.5707 474.47 -14825
## - `GTEP:TAT` 1  0.6688 474.57 -14824
## - `GTEP:TIT` 1  0.7978 474.70 -14822
## - `AFDP`      1  0.8180 474.72 -14822
## - `AT:AH`     1  0.9309 474.83 -14821
## - `GTEP`      1  1.0707 474.97 -14819
## - `AH:TEY`    1  1.1046 475.01 -14818
## - `AH:AFDP`   1  1.1574 475.06 -14818
## - `TEY`        1  1.3010 475.20 -14816
## - `TIT:CDP`   1  1.3019 475.20 -14816
## - `AT`         1  1.3637 475.27 -14815
## - `AT:TAT`    1  1.3958 475.30 -14815
## - `GTEP:TEY`  1  1.4315 475.33 -14814
## - `AFDP:CDP`  1  1.5380 475.44 -14813
## - `AT:TIT`    1  1.7560 475.66 -14810
## - `TIT:TEY`   1  1.7876 475.69 -14810
## - `TIT`        1  1.8263 475.73 -14810
## - `AT:GTEP`   1  2.0337 475.94 -14807
## - `AFDP:TIT`  1  2.0924 475.99 -14806
## - `AP:TAT`    1  2.2416 476.14 -14804
## - `AH:TIT`    1  2.2617 476.16 -14804
## - `AP:AH`     1  2.2793 476.18 -14804
## - `AP`         1  2.9891 476.89 -14795
## - `AP:TIT`    1  3.0221 476.92 -14795
## - `AFDP:TAT`  1  3.1236 477.03 -14793
## - `TAT`        1  3.3842 477.29 -14790
## - `TIT:TAT`   1  4.5311 478.43 -14776
## - `AP:TEY`    1  4.5579 478.46 -14776
## - `AT:TEY`    1  4.8612 478.76 -14772
## - `AT:AP`     1  6.7825 480.68 -14748
##
## Step:  AIC=-14830.36
## .outcome ~ AT + AP + AFDP + GTEP + TIT + TAT + TEY + CDP + `AT:AP` +
## `AT:AH` + `AT:GTEP` + `AT:TIT` + `AT:TAT` + `AT:TEY` + `AT:CDP` +
## `AP:AH` + `AP:AFDP` + `AP:GTEP` + `AP:TIT` + `AP:TAT` + `AP:TEY` +
## `AP:CDP` + `AH:AFDP` + `AH:TIT` + `AH:TEY` + `AFDP:GTEP` +
## `AFDP:TIT` + `AFDP:TAT` + `AFDP:CDP` + `GTEP:TIT` + `GTEP:TAT` +
## `GTEP:TEY` + `TIT:TAT` + `TIT:TEY` + `TIT:CDP` + `TAT:CDP`
##
##          Df Sum of Sq    RSS     AIC
## <none>           474.05 -14830

```

```

## - `AP:CDP`    1  0.1686 474.22 -14830
## - `AT:CDP`    1  0.1874 474.24 -14830
## - `AP:AFDP`    1  0.2374 474.29 -14829
## - `TAT:CDP`    1  0.3082 474.36 -14828
## - `AP:GTEP`    1  0.3486 474.40 -14828
## - `CDP`        1  0.5271 474.58 -14826
## - `AFDP:GTEP`  1  0.5732 474.63 -14825
## - `GTEP:TAT`   1  0.6522 474.71 -14824
## - `AFDP`       1  0.7490 474.80 -14823
## - `GTEP:TIT`   1  0.7715 474.83 -14823
## - `GTEP`       1  0.9530 475.01 -14820
## - `AT:AH`      1  1.0330 475.09 -14820
## - `AH:AFDP`   1  1.1742 475.23 -14818
## - `TEY`        1  1.2609 475.31 -14817
## - `AT`         1  1.2676 475.32 -14817
## - `TIT:CDP`   1  1.3158 475.37 -14816
## - `GTEP:TEY`  1  1.4091 475.46 -14815
## - `AT:TAT`    1  1.4533 475.51 -14814
## - `AFDP:CDP`  1  1.5326 475.59 -14813
## - `TIT`        1  1.8080 475.86 -14810
## - `TIT:TEY`   1  1.8272 475.88 -14810
## - `AT:TIT`   1  1.8613 475.92 -14809
## - `AFDP:TIT`  1  2.0920 476.15 -14806
## - `AP:TAT`    1  2.2376 476.29 -14804
## - `AP:AH`     1  2.2756 476.33 -14804
## - `AH:TIT`   1  2.3064 476.36 -14804
## - `AH:TEY`   1  2.3293 476.38 -14803
## - `AT:GTEP`  1  2.6542 476.71 -14799
## - `AP`        1  2.9794 477.03 -14795
## - `AP:TIT`   1  3.0127 477.07 -14795
## - `AFDP:TAT` 1  3.0770 477.13 -14794
## - `TAT`       1  3.3980 477.45 -14790
## - `AP:TEY`   1  4.5134 478.57 -14776
## - `TIT:TAT`  1  4.6679 478.72 -14774
## - `AT:TEY`   1  5.0333 479.09 -14770
## - `AT:AP`    1  6.7109 480.76 -14749
## Start: AIC=-14418.95
## .outcome ~ AT + AP + AH + AFDP + GTEP + TIT + TAT + TEY + CDP +
##   `AT:AP` + `AT:AH` + `AT:AFDP` + `AT:GTEP` + `AT:TIT` + `AT:TAT` +
##   `AT:TEY` + `AT:CDP` + `AP:AH` + `AP:AFDP` + `AP:GTEP` + `AP:TIT` +
##   `AP:TAT` + `AP:TEY` + `AP:CDP` + `AH:AFDP` + `AH:GTEP` +
##   `AH:TIT` + `AH:TAT` + `AH:TEY` + `AH:CDP` + `AFDP:GTEP` +
##   `AFDP:TIT` + `AFDP:TAT` + `AFDP:TEY` + `AFDP:CDP` + `GTEP:TIT` +
##   `GTEP:TAT` + `GTEP:TEY` + `GTEP:CDP` + `TIT:TAT` + `TIT:TEY` +
##   `TIT:CDP` + `TAT:TEY` + `TAT:CDP` + `TEY:CDP`
##
##                               Df Sum of Sq   RSS   AIC
## - AH                  1  0.0095 506.41 -14421
## - `GTEP:TEY`          1  0.0108 506.41 -14421
## - `AFDP:TIT`          1  0.0181 506.42 -14421
## - `AP:CDP`             1  0.0221 506.42 -14421
## - `AT:TAT`             1  0.0238 506.42 -14421
## - `TIT:TEY`            1  0.0277 506.43 -14421
## - `TAT:CDP`            1  0.0308 506.43 -14421

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## - `GTEP:TIT` 1 0.0426 506.44 -14420
## - `AT:CDP` 1 0.0479 506.45 -14420
## - `AP:AFDP` 1 0.0524 506.45 -14420
## - `GTEP:TAT` 1 0.0778 506.48 -14420
## - `TEY:CDP` 1 0.0786 506.48 -14420
## - GTEP 1 0.1001 506.50 -14420
## - AT 1 0.1011 506.50 -14420
## - `AFDP:CDP` 1 0.1198 506.52 -14420
## - `AFDP:TEY` 1 0.1240 506.52 -14420
## - `GTEP:CDP` 1 0.1469 506.55 -14419
## - `AH:TEY` 1 0.1561 506.56 -14419
## - `TIT:CDP` 1 0.1655 506.56 -14419
## <none> 506.40 -14419
## - `AH:CDP` 1 0.1749 506.57 -14419
## - TEY 1 0.1794 506.58 -14419
## - `AT:GTEP` 1 0.1798 506.58 -14419
## - `AT:TIT` 1 0.1988 506.60 -14419
## - `AT:AFDP` 1 0.1991 506.60 -14419
## - `AH:TAT` 1 0.2266 506.63 -14418
## - `AFDP:TAT` 1 0.2283 506.63 -14418
## - `AH:TIT` 1 0.3266 506.73 -14417
## - CDP 1 0.3698 506.77 -14417
## - `TAT:TEY` 1 0.4058 506.80 -14416
## - `AH:GTEP` 1 0.4299 506.83 -14416
## - TIT 1 0.4576 506.86 -14416
## - `AT:AH` 1 0.5776 506.98 -14414
## - `AP:GTEP` 1 0.6053 507.00 -14414
## - `AH:AFDP` 1 0.7038 507.10 -14413
## - `AFDP:GTEP` 1 0.8631 507.26 -14411
## - AFDP 1 0.8944 507.29 -14410
## - `AP:AH` 1 1.0030 507.40 -14409
## - AP 1 1.2409 507.64 -14406
## - `AP:TAT` 1 1.2655 507.66 -14406
## - `AT:TEY` 1 1.4674 507.87 -14404
## - `AP:TIT` 1 1.5297 507.93 -14403
## - TAT 1 2.6070 509.01 -14391
## - `AP:TEY` 1 2.9502 509.35 -14387
## - `TIT:TAT` 1 3.7478 510.15 -14377
## - `AT:AP` 1 4.0665 510.47 -14374
##
## Step: AIC=-14420.84
## .outcome ~ AT + AP + AFDP + GTEP + TIT + TAT + TEY + CDP + `AT:AP` +
## `AT:AH` + `AT:AFDP` + `AT:GTEP` + `AT:TIT` + `AT:TAT` + `AT:TEY` +
## `AT:CDP` + `AP:AH` + `AP:AFDP` + `AP:GTEP` + `AP:TIT` + `AP:TAT` +
## `AP:TEY` + `AP:CDP` + `AH:AFDP` + `AH:GTEP` + `AH:TIT` +
## `AH:TAT` + `AH:TEY` + `AH:CDP` + `AFDP:GTEP` + `AFDP:TIT` +
## `AFDP:TAT` + `AFDP:TEY` + `AFDP:CDP` + `GTEP:TIT` + `GTEP:TAT` +
## `GTEP:TEY` + `GTEP:CDP` + `TIT:TAT` + `TIT:TEY` + `TIT:CDP` +
## `TAT:TEY` + `TAT:CDP` + `TEY:CDP`
##
## Df Sum of Sq RSS AIC
## - `GTEP:TEY` 1 0.0161 506.42 -14423
## - `AFDP:TIT` 1 0.0174 506.43 -14423
## - `AP:CDP` 1 0.0220 506.43 -14423

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## - `TAT:CDP` 1 0.0262 506.43 -14422
## - `AT:TAT` 1 0.0276 506.44 -14422
## - `TIT:TEY` 1 0.0285 506.44 -14422
## - `AP:AFDP` 1 0.0436 506.45 -14422
## - `AT:CDP` 1 0.0477 506.46 -14422
## - `GTEP:TIT` 1 0.0528 506.46 -14422
## - `TEY:CDP` 1 0.0847 506.49 -14422
## - `GTEP:TAT` 1 0.0886 506.50 -14422
## - AT 1 0.0916 506.50 -14422
## - `AFDP:CDP` 1 0.1233 506.53 -14421
## - GTEP 1 0.1285 506.54 -14421
## - `AFDP:TEY` 1 0.1293 506.54 -14421
## - `GTEP:CDP` 1 0.1450 506.55 -14421
## <none> 506.41 -14421
## - `AH:CDP` 1 0.1719 506.58 -14421
## - `TIT:CDP` 1 0.1816 506.59 -14421
## - TEY 1 0.1885 506.60 -14421
## - `AT:GTEP` 1 0.1973 506.61 -14420
## - `AH:TEY` 1 0.1988 506.61 -14420
## - `AFDP:TAT` 1 0.2243 506.63 -14420
## - `AH:TAT` 1 0.2244 506.63 -14420
## - `AT:TIT` 1 0.2253 506.63 -14420
## - `AT:AFDP` 1 0.2360 506.64 -14420
## - CDP 1 0.3735 506.78 -14418
## - `AH:TIT` 1 0.3805 506.79 -14418
## - `TAT:TEY` 1 0.4033 506.81 -14418
## - `AH:GTEP` 1 0.4396 506.85 -14418
## - TIT 1 0.4819 506.89 -14417
## - `AP:GTEP` 1 0.6117 507.02 -14416
## - `AT:AH` 1 0.6813 507.09 -14415
## - `AFDP:GTEP` 1 0.8552 507.26 -14413
## - `AH:AFDP` 1 0.8629 507.27 -14413
## - AFDP 1 0.9034 507.31 -14412
## - `AP:AH` 1 1.2289 507.64 -14408
## - AP 1 1.2968 507.71 -14408
## - `AP:TAT` 1 1.3036 507.71 -14408
## - `AP:TIT` 1 1.5827 507.99 -14404
## - `AT:TEY` 1 1.7027 508.11 -14403
## - TAT 1 2.6773 509.09 -14392
## - `AP:TEY` 1 3.0228 509.43 -14388
## - `TIT:TAT` 1 3.7549 510.16 -14379
## - `AT:AP` 1 4.1331 510.54 -14375
##
## Step: AIC=-14422.65
## .outcome ~ AT + AP + AFDP + GTEP + TIT + TAT + TEY + CDP + `AT:AP` +
##   `AT:AH` + `AT:AFDP` + `AT:GTEP` + `AT:TIT` + `AT:TAT` + `AT:TEY` +
##   `AT:CDP` + `AP:AH` + `AP:AFDP` + `AP:GTEP` + `AP:TIT` + `AP:TAT` +
##   `AP:TEY` + `AP:CDP` + `AH:AFDP` + `AH:GTEP` + `AH:TIT` +
##   `AH:TAT` + `AH:TEY` + `AH:CDP` + `AFDP:GTEP` + `AFDP:TIT` +
##   `AFDP:TAT` + `AFDP:TEY` + `AFDP:CDP` + `GTEP:TIT` + `GTEP:TAT` +
##   `GTEP:CDP` + `TIT:TAT` + `TIT:TEY` + `TIT:CDP` + `TAT:TEY` +
##   `TAT:CDP` + `TEY:CDP`
##
## Df Sum of Sq RSS AIC

```

```

## - `AFDP:TIT` 1 0.0180 506.44 -14424
## - `AT:TAT` 1 0.0237 506.45 -14424
## - `TIT:TEY` 1 0.0246 506.45 -14424
## - `AP:CDP` 1 0.0250 506.45 -14424
## - `AT:CDP` 1 0.0397 506.46 -14424
## - `AP:AFDP` 1 0.0463 506.47 -14424
## - `GTEP:TIT` 1 0.0478 506.47 -14424
## - `TEY:CDP` 1 0.0699 506.49 -14424
## - `GTEP:TAT` 1 0.0829 506.51 -14424
## - AT 1 0.0852 506.51 -14424
## - `AFDP:CDP` 1 0.1171 506.54 -14423
## - `TAT:CDP` 1 0.1191 506.54 -14423
## - `AFDP:TEY` 1 0.1247 506.55 -14423
## - `GTEP:CDP` 1 0.1613 506.59 -14423
## - `AH:CDP` 1 0.1707 506.60 -14423
## <none> 506.42 -14423
## - TEY 1 0.1795 506.60 -14423
## - `AT:TIT` 1 0.2178 506.64 -14422
## - GTEP 1 0.2231 506.65 -14422
## - `AFDP:TAT` 1 0.2247 506.65 -14422
## - `AH:TEY` 1 0.2300 506.65 -14422
## - `AT:AFDP` 1 0.2300 506.65 -14422
## - `AH:TAT` 1 0.2400 506.66 -14422
## - `TIT:CDP` 1 0.2581 506.68 -14422
## - CDP 1 0.3574 506.78 -14420
## - `AH:TIT` 1 0.4042 506.83 -14420
## - `TAT:TEY` 1 0.4298 506.85 -14420
## - `AH:GTEP` 1 0.4392 506.86 -14420
## - TIT 1 0.4711 506.90 -14419
## - `AT:GTEP` 1 0.5144 506.94 -14419
## - `AT:AH` 1 0.7143 507.14 -14416
## - `AH:AFDP` 1 0.8507 507.28 -14415
## - AFDP 1 0.8961 507.32 -14414
## - `AFDP:GTEP` 1 0.9647 507.39 -14413
## - `AP:GTEP` 1 0.9994 507.42 -14413
## - AP 1 1.2840 507.71 -14410
## - `AP:TAT` 1 1.2879 507.71 -14410
## - `AP:AH` 1 1.2997 507.72 -14410
## - `AP:TIT` 1 1.5697 507.99 -14406
## - `AT:TEY` 1 1.6949 508.12 -14405
## - TAT 1 2.6654 509.09 -14394
## - `AP:TEY` 1 3.0468 509.47 -14389
## - `TIT:TAT` 1 3.8194 510.24 -14380
## - `AT:AP` 1 4.1686 510.59 -14376
##
## Step: AIC=-14424.44
## .outcome ~ AT + AP + AFDP + GTEP + TIT + TAT + TEY + CDP + `AT:AP` +
## `AT:AH` + `AT:AFDP` + `AT:GTEP` + `AT:TIT` + `AT:TAT` + `AT:TEY` +
## `AT:CDP` + `AP:AH` + `AP:AFDP` + `AP:GTEP` + `AP:TIT` + `AP:TAT` +
## `AP:TEY` + `AP:CDP` + `AH:AFDP` + `AH:GTEP` + `AH:TIT` +
## `AH:TAT` + `AH:TEY` + `AH:CDP` + `AFDP:GTEP` + `AFDP:TAT` +
## `AFDP:TEY` + `AFDP:CDP` + `GTEP:TIT` + `GTEP:TAT` + `GTEP:CDP` +
## `TIT:TAT` + `TIT:TEY` + `TIT:CDP` + `TAT:TEY` + `TAT:CDP` +
## `TEY:CDP`

```

```

##  

##          Df Sum of Sq    RSS     AIC  

## - `AT:TAT` 1  0.0075 506.45 -14426  

## - `TIT:TEY` 1  0.0093 506.45 -14426  

## - `AP:CDP` 1  0.0174 506.46 -14426  

## - `AP:AFDP` 1  0.0395 506.48 -14426  

## - `GTEP:TIT` 1  0.0503 506.49 -14426  

## - AT       1  0.0792 506.52 -14426  

## - `GTEP:TAT` 1  0.0866 506.53 -14425  

## - `TAT:CDP` 1  0.1029 506.55 -14425  

## - `AFDP:CDP` 1  0.1315 506.57 -14425  

## - `GTEP:CDP` 1  0.1607 506.60 -14425  

## - TEY      1  0.1655 506.61 -14424  

## <none>           506.44 -14424  

## - `AT:CDP` 1  0.2018 506.64 -14424  

## - `AH:CDP` 1  0.2246 506.67 -14424  

## - GTEP     1  0.2295 506.67 -14424  

## - `AH:TEY` 1  0.2298 506.67 -14424  

## - `AT:TIT` 1  0.2471 506.69 -14424  

## - `AFDP:TEY` 1  0.2936 506.74 -14423  

## - `AH:TAT` 1  0.2956 506.74 -14423  

## - CDP      1  0.3684 506.81 -14422  

## - `AT:AFDP` 1  0.4204 506.86 -14422  

## - `AH:GTEP` 1  0.4414 506.88 -14421  

## - TIT      1  0.4539 506.90 -14421  

## - `TEY:CDP` 1  0.4557 506.90 -14421  

## - `AH:TIT` 1  0.4760 506.92 -14421  

## - `AT:GTEP` 1  0.4969 506.94 -14421  

## - `TIT:CDP` 1  0.5753 507.02 -14420  

## - `AT:AH`   1  0.7061 507.15 -14418  

## - `TAT:TEY` 1  0.7958 507.24 -14417  

## - `AH:AFDP` 1  0.8585 507.30 -14416  

## - `AFDP:GTEP` 1  0.9473 507.39 -14415  

## - `AP:GTEP` 1  1.0151 507.46 -14415  

## - AFDP     1  1.2300 507.67 -14412  

## - `AP:TAT` 1  1.2714 507.71 -14412  

## - `AP:AH`   1  1.2989 507.74 -14411  

## - AP       1  1.3144 507.76 -14411  

## - `AP:TIT` 1  1.5517 507.99 -14408  

## - `AT:TEY` 1  1.6783 508.12 -14407  

## - `AFDP:TAT` 1  2.1751 508.62 -14401  

## - TAT      1  2.6575 509.10 -14396  

## - `AP:TEY` 1  3.0672 509.51 -14391  

## - `TIT:TAT` 1  4.2145 510.66 -14378  

## - `AT:AP`   1  4.2177 510.66 -14377  

##  

## Step: AIC=-14426.35  

## .outcome ~ AT + AP + AFDP + GTEP + TIT + TAT + TEY + CDP + `AT:AP` +  

##          `AT:AH` + `AT:AFDP` + `AT:GTEP` + `AT:TIT` + `AT:TEY` + `AT:CDP` +  

##          `AP:AH` + `AP:AFDP` + `AP:GTEP` + `AP:TIT` + `AP:TAT` + `AP:TEY` +  

##          `AP:CDP` + `AH:AFDP` + `AH:GTEP` + `AH:TIT` + `AH:TAT` +  

##          `AH:TEY` + `AH:CDP` + `AFDP:GTEP` + `AFDP:TAT` + `AFDP:TEY` +  

##          `AFDP:CDP` + `GTEP:TIT` + `GTEP:TAT` + `GTEP:CDP` + `TIT:TAT` +  

##          `TIT:TEY` + `TIT:CDP` + `TAT:TEY` + `TAT:CDP` + `TEY:CDP`

```

```

## 
##          Df Sum of Sq    RSS     AIC
## - `TIT:TEY`   1  0.0057 506.46 -14428
## - `AP:CDP`    1  0.0126 506.46 -14428
## - `AP:AFDP`   1  0.0488 506.50 -14428
## - `GTEP:TIT`  1  0.0514 506.50 -14428
## - AT         1  0.0723 506.52 -14428
## - `GTEP:TAT`  1  0.0870 506.54 -14427
## - `AFDP:CDP`  1  0.1337 506.58 -14427
## - TEY        1  0.1602 506.61 -14426
## - `GTEP:CDP`  1  0.1633 506.61 -14426
## - `TAT:CDP`   1  0.1635 506.61 -14426
## <none>           506.45 -14426
## - GTEP       1  0.2323 506.68 -14426
## - `AH:TEY`   1  0.2479 506.70 -14426
## - `AH:CDP`   1  0.3015 506.75 -14425
## - `AFDP:TEY`  1  0.3191 506.77 -14425
## - CDP        1  0.3611 506.81 -14424
## - `AH:TAT`   1  0.4248 506.88 -14423
## - `AH:GTEP`  1  0.4482 506.90 -14423
## - `TEY:CDP`  1  0.4602 506.91 -14423
## - `AT:GTEP`  1  0.4915 506.94 -14423
## - TIT        1  0.5054 506.96 -14422
## - `AT:AFDP`  1  0.5544 507.00 -14422
## - `TIT:CDP`  1  0.5980 507.05 -14421
## - `AH:TIT`   1  0.6462 507.10 -14421
## - `AT:AH`    1  0.7113 507.16 -14420
## - `AT:CDP`   1  0.8149 507.27 -14419
## - `AH:AFDP`  1  0.8550 507.31 -14418
## - `AFDP:GTEP` 1  0.9497 507.40 -14417
## - `AP:GTEP`  1  1.0104 507.46 -14417
## - `AT:TIT`   1  1.0419 507.49 -14416
## - `TAT:TEY`  1  1.0552 507.51 -14416
## - AFDP       1  1.2414 507.69 -14414
## - AP         1  1.3127 507.76 -14413
## - `AP:AH`   1  1.3211 507.77 -14413
## - `AP:TAT`  1  1.4441 507.89 -14412
## - `AP:TIT`  1  1.7201 508.17 -14408
## - `AT:TEY`  1  1.7221 508.17 -14408
## - `AFDP:TAT` 1  2.5598 509.01 -14399
## - TAT        1  2.8597 509.31 -14395
## - `AP:TEY`  1  3.1596 509.61 -14392
## - `AT:AP`   1  4.2784 510.73 -14379
## - `TIT:TAT` 1  4.8444 511.29 -14372
## 
## Step:  AIC=-14428.29
## .outcome ~ AT + AP + AFDP + GTEP + TIT + TAT + TEY + CDP + `AT:AP` +
## `AT:AH` + `AT:AFDP` + `AT:GTEP` + `AT:TIT` + `AT:TEY` + `AT:CDP` +
## `AP:AH` + `AP:AFDP` + `AP:GTEP` + `AP:TIT` + `AP:TAT` + `AP:TEY` +
## `AP:CDP` + `AH:AFDP` + `AH:GTEP` + `AH:TIT` + `AH:TAT` +
## `AH:TEY` + `AH:CDP` + `AFDP:GTEP` + `AFDP:TAT` + `AFDP:TEY` +
## `AFDP:CDP` + `GTEP:TIT` + `GTEP:TAT` + `GTEP:CDP` + `TIT:TAT` +
## `TIT:CDP` + `TAT:TEY` + `TAT:CDP` + `TEY:CDP`
## 
```

```

##          Df Sum of Sq   RSS   AIC
## - `AP:CDP`    1  0.0157 506.47 -14430
## - `AP:AFDP`    1  0.0499 506.51 -14430
## - AT         1  0.0754 506.53 -14429
## - `AFDP:CDP`  1  0.1515 506.61 -14428
## - `GTEP:TIT`  1  0.1583 506.61 -14428
## <none>           506.46 -14428
## - TEY        1  0.1738 506.63 -14428
## - `TAT:CDP`   1  0.1894 506.65 -14428
## - `GTEP:TAT`  1  0.2249 506.68 -14428
## - `AH:TEY`    1  0.2470 506.70 -14427
## - GTEP       1  0.2478 506.70 -14427
## - `AH:CDP`   1  0.2958 506.75 -14427
## - CDP        1  0.3582 506.81 -14426
## - `AFDP:TEY`  1  0.4053 506.86 -14426
## - `AH:TAT`   1  0.4199 506.88 -14425
## - `GTEP:CDP`  1  0.4231 506.88 -14425
## - `AH:GTEP`   1  0.4446 506.90 -14425
## - `AT:GTEP`   1  0.5074 506.96 -14424
## - TIT        1  0.5371 506.99 -14424
## - `AT:AFDP`   1  0.5961 507.05 -14423
## - `AH:TIT`   1  0.6421 507.10 -14423
## - `TIT:CDP`   1  0.6975 507.15 -14422
## - `AT:AH`     1  0.7316 507.19 -14422
## - `AT:CDP`   1  0.8657 507.32 -14420
## - `AH:AFDP`   1  0.8747 507.33 -14420
## - `AFDP:GTEP` 1  0.9454 507.40 -14419
## - `TEY:CDP`   1  0.9607 507.42 -14419
## - `AP:GTEP`   1  1.0085 507.46 -14418
## - `AT:TIT`   1  1.0371 507.49 -14418
## - AFDP       1  1.2611 507.72 -14416
## - AP         1  1.3130 507.77 -14415
## - `AP:AH`    1  1.3221 507.78 -14415
## - `AP:TAT`   1  1.5157 507.97 -14413
## - `TAT:TEY`   1  1.7737 508.23 -14410
## - `AP:TIT`   1  1.7783 508.23 -14410
## - `AT:TEY`   1  1.8561 508.31 -14409
## - `AFDP:TAT` 1  2.7155 509.17 -14399
## - TAT        1  2.9102 509.37 -14396
## - `AP:TEY`   1  3.1746 509.63 -14393
## - `AT:AP`    1  4.2766 510.73 -14381
## - `TIT:TAT`  1  4.8984 511.35 -14373
##
## Step:  AIC=-14430.1
## .outcome ~ AT + AP + AFDP + GTEP + TIT + TAT + TEY + CDP + `AT:AP` +
##   `AT:AH` + `AT:AFDP` + `AT:GTEP` + `AT:TIT` + `AT:TEY` + `AT:CDP` +
##   `AP:AH` + `AP:AFDP` + `AP:GTEP` + `AP:TIT` + `AP:TAT` + `AP:TEY` +
##   `AH:AFDP` + `AH:GTEP` + `AH:TIT` + `AH:TAT` + `AH:TEY` +
##   `AH:CDP` + `AFDP:GTEP` + `AFDP:TAT` + `AFDP:TEY` + `AFDP:CDP` +
##   `GTEP:TIT` + `GTEP:TAT` + `GTEP:CDP` + `TIT:TAT` + `TIT:CDP` +
##   `TAT:TEY` + `TAT:CDP` + `TEY:CDP`
##
##          Df Sum of Sq   RSS   AIC
## - `AP:AFDP`  1  0.0453 506.52 -14432

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## - AT          1  0.0911 506.56 -14431
## - `AFDP:CDP` 1  0.1445 506.62 -14430
## - `GTEP:TIT` 1  0.1465 506.62 -14430
## <none>           506.47 -14430
## - `TAT:CDP`   1  0.1763 506.65 -14430
## - `GTEP:TAT`  1  0.2123 506.68 -14430
## - TEY         1  0.2232 506.69 -14430
## - `AH:TEY`    1  0.2409 506.71 -14429
## - GTEP        1  0.2457 506.72 -14429
## - `AH:CDP`    1  0.3158 506.79 -14428
## - `AFDP:TEY`  1  0.3919 506.86 -14428
## - `GTEP:CDP`  1  0.4074 506.88 -14427
## - `AH:TAT`    1  0.4297 506.90 -14427
## - `AH:GTEP`   1  0.4430 506.91 -14427
## - `AT:GTEP`   1  0.5062 506.98 -14426
## - `AT:AFDP`   1  0.6031 507.07 -14425
## - TIT         1  0.6194 507.09 -14425
## - `AH:TIT`    1  0.6544 507.13 -14424
## - `TIT:CDP`   1  0.6818 507.15 -14424
## - `AT:AH`     1  0.7388 507.21 -14424
## - CDP         1  0.8449 507.32 -14422
## - `AH:AFDP`   1  0.8961 507.37 -14422
## - `AFDP:GTEP` 1  0.9327 507.40 -14421
## - `TEY:CDP`   1  0.9480 507.42 -14421
## - `AT:CDP`   1  1.0068 507.48 -14420
## - `AP:GTEP`   1  1.0085 507.48 -14420
## - `AT:TIT`    1  1.0269 507.50 -14420
## - AFDP        1  1.2457 507.72 -14418
## - AP          1  1.3180 507.79 -14417
## - `AP:AH`     1  1.3216 507.79 -14417
## - `TAT:TEY`   1  1.8212 508.29 -14411
## - `AT:TEY`    1  1.9440 508.42 -14410
## - `AP:TIT`    1  2.4725 508.94 -14403
## - `AFDP:TAT`  1  2.7019 509.17 -14401
## - `AP:TAT`   1  2.8597 509.33 -14399
## - `AP:TEY`   1  3.3244 509.80 -14394
## - `AT:AP`    1  4.3483 510.82 -14382
## - `TIT:TAT`  1  5.0690 511.54 -14373
## - TAT         1  5.9329 512.40 -14363
##
## Step: AIC=-14431.57
## .outcome ~ AT + AP + AFDP + GTEP + TIT + TAT + TEY + CDP + `AT:AP` +
##           `AT:AH` + `AT:AFDP` + `AT:GTEP` + `AT:TIT` + `AT:TEY` + `AT:CDP` +
##           `AP:AH` + `AP:GTEP` + `AP:TIT` + `AP:TAT` + `AP:TEY` + `AH:AFDP` +
##           `AH:GTEP` + `AH:TIT` + `AH:TAT` + `AH:TEY` + `AH:CDP` + `AFDP:GTEP` +
##           `AFDP:TAT` + `AFDP:TEY` + `AFDP:CDP` + `GTEP:TIT` + `GTEP:TAT` +
##           `GTEP:CDP` + `TIT:TAT` + `TIT:CDP` + `TAT:TEY` + `TAT:CDP` +
##           `TEY:CDP`
##
##              Df Sum of Sq   RSS   AIC
## - AT          1  0.0571 506.57 -14433
## - `TAT:CDP`  1  0.1680 506.68 -14432
## - `AFDP:CDP` 1  0.1690 506.69 -14432
## <none>           506.52 -14432

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## - `GTEP:TIT` 1 0.1725 506.69 -14432
## - GTEP 1 0.2402 506.76 -14431
## - TEY 1 0.2460 506.76 -14431
## - `GTEP:TAT` 1 0.2485 506.77 -14431
## - `AH:TEY` 1 0.2870 506.80 -14430
## - `AH:CDP` 1 0.3326 506.85 -14430
## - `AFDP:TEY` 1 0.3788 506.90 -14429
## - `GTEP:CDP` 1 0.4036 506.92 -14429
## - `AH:GTEP` 1 0.4558 506.97 -14428
## - `AT:GTEP` 1 0.4626 506.98 -14428
## - `AH:TAT` 1 0.4836 507.00 -14428
## - `AH:TIT` 1 0.7430 507.26 -14425
## - `TIT:CDP` 1 0.7796 507.30 -14424
## - `AT:AH` 1 0.8240 507.34 -14424
## - `AT:AFDP` 1 0.8284 507.35 -14424
## - TIT 1 0.8755 507.39 -14423
## - `AH:AFDP` 1 0.8930 507.41 -14423
## - CDP 1 0.8978 507.41 -14423
## - `AFDP:GTEP` 1 0.9171 507.43 -14423
## - `TEY:CDP` 1 0.9851 507.50 -14422
## - `AP:GTEP` 1 0.9911 507.51 -14422
## - `AT:CDP` 1 1.1069 507.62 -14421
## - `AT:TIT` 1 1.2752 507.79 -14419
## - `AP:AH` 1 1.5588 508.08 -14415
## - AP 1 1.6567 508.17 -14414
## - `TAT:TEY` 1 1.9762 508.49 -14411
## - AFDP 1 2.3056 508.82 -14407
## - `AT:TEY` 1 2.4462 508.96 -14405
## - `AFDP:TAT` 1 2.6661 509.18 -14403
## - `AP:TIT` 1 3.5893 510.11 -14392
## - `AP:TEY` 1 3.8692 510.39 -14389
## - `AT:AP` 1 4.3897 510.91 -14383
## - `AP:TAT` 1 4.5919 511.11 -14380
## - `TIT:TAT` 1 5.3722 511.89 -14371
## - TAT 1 9.2641 515.78 -14326
##
## Step: AIC=-14432.91
## .outcome ~ AP + AFDP + GTEP + TIT + TAT + TEY + CDP + `AT:AP` +
##   `AT:AH` + `AT:AFDP` + `AT:GTEP` + `AT:TIT` + `AT:TEY` + `AT:CDP` +
##   `AP:AH` + `AP:GTEP` + `AP:TIT` + `AP:TAT` + `AP:TEY` + `AH:AFDP` +
##   `AH:GTEP` + `AH:TIT` + `AH:TAT` + `AH:TEY` + `AH:CDP` + `AFDP:GTEP` +
##   `AFDP:TAT` + `AFDP:TEY` + `AFDP:CDP` + `GTEP:TIT` + `GTEP:TAT` +
##   `GTEP:CDP` + `TIT:TAT` + `TIT:CDP` + `TAT:TEY` + `TAT:CDP` +
##   `TEY:CDP`
##
##              Df Sum of Sq    RSS     AIC
## - `AFDP:CDP` 1  0.1668 506.74 -14433
## <none>                      506.57 -14433
## - `GTEP:TIT` 1  0.1942 506.77 -14433
## - GTEP 1  0.1954 506.77 -14433
## - TEY 1  0.2670 506.84 -14432
## - `AH:TEY` 1  0.2730 506.85 -14432
## - `GTEP:TAT` 1  0.2841 506.86 -14432
## - `AH:CDP` 1  0.3052 506.88 -14431

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## - `TAT:CDP` 1 0.3370 506.91 -14431
## - `AFDP:TEY` 1 0.3783 506.95 -14430
## - `AH:GTEP` 1 0.4208 506.99 -14430
## - `GTEP:CDP` 1 0.4396 507.01 -14430
## - `AH:TAT` 1 0.4397 507.01 -14430
## - `AT:GTEP` 1 0.4873 507.06 -14429
## - `AH:TIT` 1 0.6931 507.27 -14427
## - `AT:AH` 1 0.8777 507.45 -14425
## - `AFDP:GTEP` 1 0.9097 507.48 -14424
## - `AP:GTEP` 1 0.9366 507.51 -14424
## - `TIT:CDP` 1 0.9971 507.57 -14423
## - `AH:AFDP` 1 1.0077 507.58 -14423
## - `AT:AFDP` 1 1.0082 507.58 -14423
## - `AT:CDP` 1 1.0764 507.65 -14422
## - TIT 1 1.0850 507.66 -14422
## - `TEY:CDP` 1 1.2482 507.82 -14420
## - `AP:AH` 1 1.5148 508.09 -14417
## - AP 1 1.6635 508.24 -14416
## - CDP 1 1.8395 508.41 -14414
## - AFDP 1 2.2660 508.84 -14408
## - `AFDP:TAT` 1 2.6300 509.20 -14404
## - `AT:TEY` 1 3.1774 509.75 -14398
## - `AP:TIT` 1 4.1207 510.69 -14387
## - `AP:TEY` 1 4.5855 511.16 -14382
## - `AT:TIT` 1 4.9968 511.57 -14377
## - `TAT:TEY` 1 5.5046 512.08 -14371
## - `AP:TAT` 1 5.5087 512.08 -14371
## - `AT:AP` 1 5.9421 512.52 -14366
## - TAT 1 9.2072 515.78 -14328
## - `TIT:TAT` 1 14.2908 520.86 -14271
##
## Step: AIC=-14432.96
## .outcome ~ AP + AFDP + GTEP + TIT + TAT + TEY + CDP + `AT:AP` +
##   `AT:AH` + `AT:AFDP` + `AT:GTEP` + `AT:TIT` + `AT:TEY` + `AT:CDP` +
##   `AP:AH` + `AP:GTEP` + `AP:TIT` + `AP:TAT` + `AP:TEY` + `AH:AFDP` +
##   `AH:GTEP` + `AH:TIT` + `AH:TAT` + `AH:TEY` + `AH:CDP` + `AFDP:GTEP` +
##   `AFDP:TAT` + `AFDP:TEY` + `GTEP:TIT` + `GTEP:TAT` + `GTEP:CDP` +
##   `TIT:TAT` + `TIT:CDP` + `TAT:TEY` + `TAT:CDP` + `TEY:CDP`
##
##          Df Sum of Sq    RSS    AIC
## - `GTEP:TIT` 1  0.0358 506.78 -14434
## - `GTEP:TAT` 1  0.1179 506.86 -14434
## <none>           506.74 -14433
## - GTEP 1  0.1860 506.93 -14433
## - `AH:TEY` 1  0.2583 507.00 -14432
## - `GTEP:CDP` 1  0.2851 507.03 -14432
## - `AFDP:TEY` 1  0.3350 507.08 -14431
## - TEY 1  0.3901 507.13 -14430
## - `AH:GTEP` 1  0.4077 507.15 -14430
## - `AH:CDP` 1  0.4253 507.17 -14430
## - `AH:TAT` 1  0.5288 507.27 -14429
## - `AT:GTEP` 1  0.5943 507.34 -14428
## - `TAT:CDP` 1  0.7478 507.49 -14426
## - `AH:TIT` 1  0.8113 507.55 -14426

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## - `AT:AFDP` 1 0.8607 507.60 -14425
## - `AP:GTEP` 1 0.9571 507.70 -14424
## - `AT:AH` 1 0.9838 507.72 -14424
## - `AH:AFDP` 1 1.0909 507.83 -14422
## - `AFDP:GTEP` 1 1.1521 507.89 -14422
## - `TIT:CDP` 1 1.2430 507.98 -14420
## - TIT 1 1.2474 507.99 -14420
## - `AT:CDP` 1 1.3859 508.13 -14419
## - `TEY:CDP` 1 1.4359 508.18 -14418
## - `AP:AH` 1 1.5705 508.31 -14417
## - AP 1 1.6516 508.39 -14416
## - CDP 1 1.6730 508.41 -14416
## - AFDP 1 2.4451 509.19 -14406
## - `AFDP:TAT` 1 2.6174 509.36 -14404
## - `AP:TIT` 1 4.1733 510.91 -14386
## - `AT:TEY` 1 4.4886 511.23 -14383
## - `AP:TEY` 1 4.6653 511.41 -14381
## - `AT:TIT` 1 4.8796 511.62 -14378
## - `TAT:TEY` 1 5.3379 512.08 -14373
## - `AP:TAT` 1 5.6403 512.38 -14370
## - `AT:AP` 1 5.8472 512.59 -14367
## - TAT 1 9.3445 516.09 -14327
## - `TIT:TAT` 1 14.2193 520.96 -14272
##
## Step: AIC=-14434.55
## .outcome ~ AP + AFDP + GTEP + TIT + TAT + TEY + CDP + `AT:AP` +
##   `AT:AH` + `AT:AFDP` + `AT:GTEP` + `AT:TIT` + `AT:TEY` + `AT:CDP` +
##   `AP:AH` + `AP:GTEP` + `AP:TIT` + `AP:TAT` + `AP:TEY` + `AH:AFDP` +
##   `AH:GTEP` + `AH:TIT` + `AH:TAT` + `AH:TEY` + `AH:CDP` + `AFDP:GTEP` +
##   `AFDP:TAT` + `AFDP:TEY` + `GTEP:TAT` + `GTEP:CDP` + `TIT:TAT` +
##   `TIT:CDP` + `TAT:TEY` + `TAT:CDP` + `TEY:CDP`
##
##          Df Sum of Sq    RSS     AIC
## - `GTEP:TAT` 1  0.1391 506.92 -14435
## - GTEP       1  0.1636 506.94 -14435
## <none>           506.78 -14434
## - `AH:TEY` 1  0.2435 507.02 -14434
## - `AFDP:TEY` 1  0.3453 507.12 -14432
## - TEY        1  0.3984 507.18 -14432
## - `AH:GTEP` 1  0.4120 507.19 -14432
## - `GTEP:CDP` 1  0.4736 507.25 -14431
## - `AH:CDP` 1  0.5351 507.31 -14430
## - `AT:GTEP` 1  0.5899 507.37 -14430
## - `AH:TAT` 1  0.6087 507.39 -14430
## - `TAT:CDP` 1  0.7321 507.51 -14428
## - `AT:AFDP` 1  0.8505 507.63 -14427
## - `AH:TIT` 1  0.9064 507.68 -14426
## - `AP:GTEP` 1  0.9404 507.72 -14426
## - `AT:AH` 1  0.9539 507.73 -14425
## - `AH:AFDP` 1  1.0772 507.85 -14424
## - `AFDP:GTEP` 1  1.1926 507.97 -14423
## - `TIT:CDP` 1  1.2079 507.98 -14422
## - TIT       1  1.2151 507.99 -14422
## - `AT:CDP` 1  1.3644 508.14 -14421

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## - `TEY:CDP` 1 1.4000 508.18 -14420
## - `AP:AH` 1 1.5651 508.34 -14418
## - AP 1 1.6181 508.39 -14418
## - CDP 1 1.6524 508.43 -14417
## - AFDP 1 2.4750 509.25 -14408
## - `AFDP:TAT` 1 2.6442 509.42 -14406
## - `AP:TIT` 1 4.1384 510.92 -14388
## - `AT:TEY` 1 4.4529 511.23 -14385
## - `AP:TEY` 1 4.6302 511.41 -14383
## - `AT:TIT` 1 4.8579 511.63 -14380
## - `TAT:TEY` 1 5.3465 512.12 -14375
## - `AP:TAT` 1 5.6055 512.38 -14372
## - `AT:AP` 1 5.8550 512.63 -14369
## - TAT 1 9.4499 516.23 -14327
## - `TIT:TAT` 1 14.3315 521.11 -14272
##
## Step: AIC=-14434.92
## .outcome ~ AP + AFDP + GTEP + TIT + TAT + TEY + CDP + `AT:AP` +
##   `AT:AH` + `AT:AFDP` + `AT:GTEP` + `AT:TIT` + `AT:TEY` + `AT:CDP` +
##   `AP:AH` + `AP:GTEP` + `AP:TIT` + `AP:TAT` + `AP:TEY` + `AH:AFDP` +
##   `AH:GTEP` + `AH:TIT` + `AH:TAT` + `AH:TEY` + `AH:CDP` + `AFDP:GTEP` +
##   `AFDP:TAT` + `AFDP:TEY` + `GTEP:CDP` + `TIT:TAT` + `TIT:CDP` +
##   `TAT:TEY` + `TAT:CDP` + `TEY:CDP`
##
##          Df Sum of Sq    RSS    AIC
## <none>              506.92 -14435
## - `AH:TEY` 1 0.3450 507.26 -14433
## - TEY 1 0.3678 507.28 -14433
## - `AH:GTEP` 1 0.4375 507.35 -14432
## - `AFDP:TEY` 1 0.4650 507.38 -14432
## - `GTEP:CDP` 1 0.5081 507.42 -14431
## - `AH:CDP` 1 0.5260 507.44 -14431
## - `AH:TAT` 1 0.7215 507.64 -14428
## - `AT:AFDP` 1 0.8815 507.80 -14427
## - `AT:GTEP` 1 0.9278 507.84 -14426
## - GTEP 1 0.9946 507.91 -14425
## - `AT:AH` 1 0.9961 507.91 -14425
## - `AH:AFDP` 1 1.0066 507.92 -14425
## - `AP:GTEP` 1 1.0141 507.93 -14425
## - `AH:TIT` 1 1.0374 507.95 -14425
## - `TAT:CDP` 1 1.0539 507.97 -14425
## - TIT 1 1.2031 508.12 -14423
## - `TIT:CDP` 1 1.2784 508.19 -14422
## - `AT:CDP` 1 1.3984 508.31 -14421
## - `AFDP:GTEP` 1 1.4479 508.36 -14420
## - `TEY:CDP` 1 1.4945 508.41 -14420
## - `AP:AH` 1 1.6359 508.55 -14418
## - AP 1 1.7979 508.71 -14416
## - CDP 1 2.1716 509.09 -14412
## - AFDP 1 2.5986 509.51 -14407
## - `AFDP:TAT` 1 2.7867 509.70 -14404
## - `AP:TIT` 1 4.1207 511.04 -14389
## - `AT:TEY` 1 4.3419 511.26 -14386
## - `AP:TEY` 1 4.6070 511.52 -14384

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## - `AT:TIT`      1  4.9099 511.83 -14380
## - `AP:TAT`      1  5.4682 512.38 -14374
## - `TAT:TEY`     1  5.4758 512.39 -14374
## - `AT:AP`       1  5.9605 512.88 -14368
## - TAT           1  9.3108 516.23 -14329
## - `TIT:TAT`     1 14.2170 521.13 -14274
## Start: AIC=-14297
## .outcome ~ AT + AP + AH + AFDP + GTEP + TIT + TAT + TEY + CDP +
##   `AT:AP` + `AT:AH` + `AT:AFDP` + `AT:GTEP` + `AT:TIT` + `AT:TAT` +
##   `AT:TEY` + `AT:CDP` + `AP:AH` + `AP:AFDP` + `AP:GTEP` + `AP:TIT` +
##   `AP:TAT` + `AP:TEY` + `AP:CDP` + `AH:AFDP` + `AH:GTEP` +
##   `AH:TIT` + `AH:TAT` + `AH:TEY` + `AH:CDP` + `AFDP:GTEP` +
##   `AFDP:TIT` + `AFDP:TAT` + `AFDP:TEY` + `AFDP:CDP` + `GTEP:TIT` +
##   `GTEP:TAT` + `GTEP:TEY` + `GTEP:CDP` + `TIT:TAT` + `TIT:TEY` +
##   `TIT:CDP` + `TAT:TEY` + `TAT:CDP` + `TEY:CDP`
##
##          Df Sum of Sq    RSS    AIC
## - AH          1  0.0002 516.66 -14299
## - `TAT:CDP`   1  0.0007 516.66 -14299
## - `AT:CDP`   1  0.0012 516.66 -14299
## - `AP:CDP`   1  0.0132 516.67 -14299
## - `AFDP:TEY` 1  0.0339 516.70 -14299
## - `TEY:CDP`  1  0.0383 516.70 -14299
## - `AH:CDP`  1  0.0457 516.71 -14298
## - `AH:TAT`  1  0.0656 516.73 -14298
## - `AP:AFDP` 1  0.0787 516.74 -14298
## - `AT:AFDP` 1  0.0887 516.75 -14298
## - `GTEP:CDP` 1  0.1120 516.77 -14298
## - `AH:GTEP` 1  0.1136 516.78 -14298
## - `TAT:TEY` 1  0.1205 516.78 -14298
## - `AH:TEY` 1  0.1300 516.79 -14298
## - `AH:TIT` 1  0.1468 516.81 -14297
## <none>          516.66 -14297
## - `GTEP:TAT` 1  0.1756 516.84 -14297
## - `TIT:TEY` 1  0.1760 516.84 -14297
## - `GTEP:TIT` 1  0.1839 516.85 -14297
## - `GTEP:TEY` 1  0.1845 516.85 -14297
## - `AP:GTEP` 1  0.1899 516.85 -14297
## - `AFDP:TIT` 1  0.2150 516.88 -14296
## - AT          1  0.2330 516.89 -14296
## - `TIT:CDP` 1  0.2552 516.92 -14296
## - `AT:TAT` 1  0.2581 516.92 -14296
## - GTEP        1  0.2918 516.95 -14296
## - TEY         1  0.3320 516.99 -14295
## - CDP         1  0.3387 517.00 -14295
## - `AFDP:CDP` 1  0.3809 517.04 -14295
## - `AT:AH`    1  0.5380 517.20 -14293
## - `AT:TIT` 1  0.5886 517.25 -14292
## - `AFDP:TAT` 1  0.6593 517.32 -14292
## - TIT         1  0.6640 517.33 -14291
## - `AH:AFDP` 1  0.7103 517.37 -14291
## - AFDP        1  0.7505 517.41 -14290
## - `AFDP:GTEP` 1  0.9777 517.64 -14288
## - `AT:GTEP` 1  1.0374 517.70 -14287

```

```

## - `AP:AH`      1  1.2346 517.90 -14285
## - `AP:TAT`     1  1.2530 517.91 -14285
## - `AT:TEY`     1  1.4066 518.07 -14283
## - `AP:TIT`     1  1.7263 518.39 -14279
## - AP          1  1.8835 518.55 -14278
## - TAT         1  2.3977 519.06 -14272
## - `TIT:TAT`    1  3.0760 519.74 -14264
## - `AP:TEY`     1  3.1833 519.84 -14263
## - `AT:AP`      1  4.7791 521.44 -14245
##
## Step: AIC=-14299
## .outcome ~ AT + AP + AFDP + GTEP + TIT + TAT + TEY + CDP + `AT:AP` +
##   `AT:AH` + `AT:AFDP` + `AT:GTEP` + `AT:TIT` + `AT:TAT` + `AT:TEY` +
##   `AT:CDP` + `AP:AH` + `AP:AFDP` + `AP:GTEP` + `AP:TIT` + `AP:TAT` +
##   `AP:TEY` + `AP:CDP` + `AH:AFDP` + `AH:GTEP` + `AH:TIT` +
##   `AH:TAT` + `AH:TEY` + `AH:CDP` + `AFDP:GTEP` + `AFDP:TIT` +
##   `AFDP:TAT` + `AFDP:TEY` + `AFDP:CDP` + `GTEP:TIT` + `GTEP:TAT` +
##   `GTEP:TEY` + `GTEP:CDP` + `TIT:TAT` + `TIT:TEY` + `TIT:CDP` +
##   `TAT:TEY` + `TAT:CDP` + `TEY:CDP`
##
##             Df Sum of Sq   RSS   AIC
## - `TAT:CDP`  1  0.0006 516.66 -14301
## - `AT:CDP`   1  0.0012 516.66 -14301
## - `AP:CDP`   1  0.0132 516.67 -14301
## - `AFDP:TEY` 1  0.0342 516.70 -14301
## - `TEY:CDP`  1  0.0392 516.70 -14301
## - `AH:CDP`   1  0.0456 516.71 -14300
## - `AH:TAT`   1  0.0731 516.73 -14300
## - `AP:AFDP`  1  0.0856 516.75 -14300
## - `AT:AFDP`  1  0.0964 516.76 -14300
## - `GTEP:CDP` 1  0.1119 516.77 -14300
## - `AH:GTEP`  1  0.1151 516.78 -14300
## - `TAT:TEY`  1  0.1204 516.78 -14300
## <none>           516.66 -14299
## - `TIT:TEY`  1  0.1763 516.84 -14299
## - `GTEP:TAT` 1  0.1819 516.84 -14299
## - `AP:GTEP`  1  0.1904 516.85 -14299
## - `GTEP:TIT` 1  0.1936 516.86 -14299
## - `GTEP:TEY` 1  0.1960 516.86 -14299
## - `AH:TIT`   1  0.1990 516.86 -14299
## - `AFDP:TIT` 1  0.2149 516.88 -14298
## - `AH:TEY`   1  0.2263 516.89 -14298
## - AT        1  0.2572 516.92 -14298
## - `AT:TAT`  1  0.2619 516.92 -14298
## - `TIT:CDP` 1  0.2631 516.92 -14298
## - GTEP       1  0.3214 516.98 -14297
## - TEY        1  0.3345 517.00 -14297
## - CDP        1  0.3400 517.00 -14297
## - `AFDP:CDP` 1  0.3824 517.04 -14297
## - `AT:TIT`   1  0.6143 517.28 -14294
## - `AFDP:TAT` 1  0.6596 517.32 -14294
## - TIT        1  0.6763 517.34 -14293
## - `AT:AH`    1  0.7040 517.37 -14293
## - AFDP       1  0.8001 517.46 -14292

```

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## - `AH:AFDP`    1  0.8072 517.47 -14292
## - `AFDP:GTEP`  1  0.9944 517.66 -14290
## - `AT:GTEP`    1  1.0666 517.73 -14289
## - `AP:TAT`     1  1.2733 517.94 -14286
## - `AP:AH`       1  1.4374 518.10 -14285
## - `AT:TEY`     1  1.5742 518.24 -14283
## - `AP:TIT`     1  1.7573 518.42 -14281
## - AP           1  1.9164 518.58 -14279
## - TAT          1  2.4443 519.11 -14273
## - `TIT:TAT`    1  3.0844 519.75 -14266
## - `AP:TEY`     1  3.2190 519.88 -14264
## - `AT:AP`      1  4.9773 521.64 -14244
##
## Step: AIC=-14300.99
## .outcome ~ AT + AP + AFDP + GTEP + TIT + TAT + TEY + CDP + `AT:AP` +
##   `AT:AH` + `AT:AFDP` + `AT:GTEP` + `AT:TIT` + `AT:TAT` + `AT:TEY` +
##   `AT:CDP` + `AP:AH` + `AP:AFDP` + `AP:GTEP` + `AP:TIT` + `AP:TAT` +
##   `AP:TEY` + `AP:CDP` + `AH:AFDP` + `AH:GTEP` + `AH:TIT` +
##   `AH:TAT` + `AH:TEY` + `AH:CDP` + `AFDP:GTEP` + `AFDP:TIT` +
##   `AFDP:TAT` + `AFDP:TEY` + `AFDP:CDP` + `GTEP:TIT` + `GTEP:TAT` +
##   `GTEP:TEY` + `GTEP:CDP` + `TIT:TAT` + `TIT:TEY` + `TIT:CDP` +
##   `TAT:TEY` + `TEY:CDP`
##
##             Df Sum of Sq   RSS   AIC
## - `AT:CDP`    1  0.0010 516.66 -14303
## - `AP:CDP`    1  0.0128 516.68 -14303
## - `AH:CDP`    1  0.0455 516.71 -14302
## - `AFDP:TEY`  1  0.0485 516.71 -14302
## - `TEY:CDP`   1  0.0566 516.72 -14302
## - `AH:TAT`    1  0.0726 516.73 -14302
## - `AP:AFDP`   1  0.0853 516.75 -14302
## - `GTEP:CDP`  1  0.1116 516.77 -14302
## - `AH:GTEP`   1  0.1159 516.78 -14302
## - `AT:AFDP`   1  0.1166 516.78 -14302
## - `TAT:TEY`   1  0.1357 516.80 -14301
## <none>          516.66 -14301
## - `TIT:TEY`   1  0.1823 516.84 -14301
## - `AH:TIT`    1  0.1984 516.86 -14301
## - `AP:GTEP`   1  0.2037 516.87 -14301
## - `AFDP:TIT`  1  0.2201 516.88 -14300
## - `AH:TEY`    1  0.2259 516.89 -14300
## - `GTEP:TAT`  1  0.2449 516.91 -14300
## - `AT:TAT`    1  0.2737 516.94 -14300
## - `GTEP:TIT`  1  0.2860 516.95 -14300
## - AT          1  0.3070 516.97 -14300
## - CDP         1  0.3403 517.00 -14299
## - `GTEP:TEY`  1  0.3911 517.05 -14298
## - `AFDP:CDP`  1  0.4003 517.06 -14298
## - TEY         1  0.4014 517.06 -14298
## - GTEP        1  0.4533 517.12 -14298
## - `TIT:CDP`   1  0.5825 517.24 -14296
## - `AT:TIT`   1  0.6174 517.28 -14296
## - `AFDP:TAT` 1  0.6733 517.34 -14295
## - TIT         1  0.6973 517.36 -14295

```

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## - `AT:AH`      1  0.7050 517.37 -14295
## - `AH:AFDP`    1  0.8102 517.47 -14294
## - AFDP        1  0.8297 517.49 -14294
## - `AFDP:GTEP`  1  1.0983 517.76 -14290
## - `AP:TAT`     1  1.3036 517.97 -14288
## - `AP:AH`      1  1.4425 518.10 -14286
## - `AT:GTEP`    1  1.4830 518.15 -14286
## - `AT:TEY`     1  1.5986 518.26 -14285
## - `AP:TIT`     1  1.8050 518.47 -14282
## - AP          1  1.9770 518.64 -14280
## - TAT         1  2.4484 519.11 -14275
## - `AP:TEY`     1  3.4303 520.09 -14264
## - `TIT:TAT`    1  3.5321 520.19 -14263
## - `AT:AP`      1  5.2668 521.93 -14243
##
## Step: AIC=-14302.98
## .outcome ~ AT + AP + AFDP + GTEP + TIT + TAT + TEY + CDP + `AT:AP` +
##   `AT:AH` + `AT:AFDP` + `AT:GTEP` + `AT:TIT` + `AT:TAT` + `AT:TEY` +
##   `AP:AH` + `AP:AFDP` + `AP:GTEP` + `AP:TIT` + `AP:TAT` + `AP:TEY` +
##   `AP:CDP` + `AH:AFDP` + `AH:GTEP` + `AH:TIT` + `AH:TAT` +
##   `AH:TEY` + `AH:CDP` + `AFDP:GTEP` + `AFDP:TIT` + `AFDP:TAT` +
##   `AFDP:TEY` + `AFDP:CDP` + `GTEP:TIT` + `GTEP:TAT` + `GTEP:TEY` +
##   `GTEP:CDP` + `TIT:TAT` + `TIT:TEY` + `TIT:CDP` + `TAT:TEY` +
##   `TEY:CDP`
##
##             Df Sum of Sq   RSS   AIC
## - `AP:CDP`    1  0.0120 516.68 -14305
## - `AFDP:TEY`  1  0.0527 516.72 -14304
## - `AH:CDP`    1  0.0727 516.74 -14304
## - `AP:AFDP`   1  0.0844 516.75 -14304
## - `AH:TAT`    1  0.1015 516.76 -14304
## - `GTEP:CDP`  1  0.1121 516.78 -14304
## - `AH:GTEP`   1  0.1155 516.78 -14304
## - `TEY:CDP`   1  0.1217 516.79 -14304
## - `AT:AFDP`   1  0.1268 516.79 -14304
## <none>           516.66 -14303
## - `AP:GTEP`   1  0.2028 516.87 -14303
## - `AH:TEY`    1  0.2262 516.89 -14302
## - `GTEP:TAT`  1  0.2506 516.91 -14302
## - `TIT:TEY`   1  0.2527 516.92 -14302
## - `AH:TIT`    1  0.2602 516.92 -14302
## - `TAT:TEY`   1  0.2697 516.93 -14302
## - `GTEP:TIT`  1  0.2955 516.96 -14302
## - AT          1  0.3108 516.97 -14301
## - CDP         1  0.3401 517.00 -14301
## - `GTEP:TEY`  1  0.4056 517.07 -14300
## - TEY         1  0.4123 517.08 -14300
## - `AFDP:TIT`  1  0.4414 517.10 -14300
## - GTEP        1  0.4705 517.13 -14300
## - `TIT:CDP`   1  0.6961 517.36 -14297
## - `AT:AH`     1  0.7100 517.37 -14297
## - TIT         1  0.7982 517.46 -14296
## - `AH:AFDP`   1  0.8174 517.48 -14296
## - AFDP        1  0.8622 517.53 -14295

```

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## - `AFDP:CDP` 1 0.9775 517.64 -14294
## - `AFDP:GTEP` 1 1.0992 517.76 -14292
## - `AT:TAT` 1 1.2405 517.90 -14291
## - `AP:TAT` 1 1.4403 518.10 -14288
## - `AP:AH` 1 1.4471 518.11 -14288
## - `AT:GTEP` 1 1.5033 518.17 -14288
## - `AFDP:TAT` 1 1.5229 518.19 -14288
## - `AT:TEY` 1 1.6166 518.28 -14286
## - `AP:TIT` 1 1.9143 518.58 -14283
## - AP 1 1.9924 518.66 -14282
## - `AT:TIT` 1 2.1647 518.83 -14280
## - TAT 1 2.6605 519.32 -14275
## - `AP:TEY` 1 3.4322 520.10 -14266
## - `TIT:TAT` 1 3.9639 520.63 -14260
## - `AT:AP` 1 5.2674 521.93 -14245
##
## Step: AIC=-14304.84
## .outcome ~ AT + AP + AFDP + GTEP + TIT + TAT + TEY + CDP + `AT:AP` +
##   `AT:AH` + `AT:AFDP` + `AT:GTEP` + `AT:TIT` + `AT:TAT` + `AT:TEY` +
##   `AP:AH` + `AP:AFDP` + `AP:GTEP` + `AP:TIT` + `AP:TAT` + `AP:TEY` +
##   `AH:AFDP` + `AH:GTEP` + `AH:TIT` + `AH:TAT` + `AH:TEY` +
##   `AH:CDP` + `AFDP:GTEP` + `AFDP:TIT` + `AFDP:TAT` + `AFDP:TEY` +
##   `AFDP:CDP` + `GTEP:TIT` + `GTEP:TAT` + `GTEP:TEY` + `GTEP:CDP` +
##   `TIT:TAT` + `TIT:TEY` + `TIT:CDP` + `TAT:TEY` + `TEY:CDP`
##
##          Df Sum of Sq    RSS    AIC
## - `AFDP:TEY` 1  0.0483 516.72 -14306
## - `AH:CDP` 1  0.0811 516.76 -14306
## - `AP:AFDP` 1  0.0818 516.76 -14306
## - `GTEP:CDP` 1  0.1004 516.78 -14306
## - `AH:TAT` 1  0.1092 516.78 -14306
## - `TEY:CDP` 1  0.1099 516.79 -14306
## - `AH:GTEP` 1  0.1160 516.79 -14306
## - `AT:AFDP` 1  0.1215 516.80 -14306
## <none>           516.68 -14305
## - `AP:GTEP` 1  0.2035 516.88 -14304
## - `AH:TEY` 1  0.2249 516.90 -14304
## - `GTEP:TAT` 1  0.2394 516.91 -14304
## - `TAT:TEY` 1  0.2623 516.94 -14304
## - `AH:TIT` 1  0.2726 516.95 -14304
## - `GTEP:TIT` 1  0.2844 516.96 -14304
## - `TIT:TEY` 1  0.2959 516.97 -14304
## - AT 1  0.3290 517.00 -14303
## - `GTEP:TEY` 1  0.3964 517.07 -14302
## - TEY 1  0.4519 517.13 -14302
## - GTEP 1  0.4601 517.14 -14302
## - `AFDP:TIT` 1  0.4757 517.15 -14301
## - CDP 1  0.6575 517.33 -14299
## - `TIT:CDP` 1  0.6869 517.36 -14299
## - `AT:AH` 1  0.7088 517.38 -14299
## - `AH:AFDP` 1  0.8142 517.49 -14298
## - AFDP 1  0.8504 517.53 -14297
## - `AFDP:CDP` 1  1.0108 517.69 -14295
## - TIT 1  1.0159 517.69 -14295

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## - `AFDP:GTEP` 1 1.0942 517.77 -14294
## - `AT:TAT` 1 1.2367 517.91 -14293
## - `AP:AH` 1 1.4487 518.12 -14290
## - `AT:GTEP` 1 1.4914 518.17 -14290
## - `AFDP:TAT` 1 1.5933 518.27 -14289
## - `AT:TEY` 1 1.6190 518.29 -14288
## - AP 1 1.9901 518.67 -14284
## - `AT:TIT` 1 2.1527 518.83 -14282
## - `AP:TIT` 1 2.8096 519.48 -14275
## - `AP:TAT` 1 2.8378 519.51 -14274
## - `AP:TEY` 1 3.4947 520.17 -14267
## - `TIT:TAT` 1 3.9827 520.66 -14262
## - TAT 1 5.2795 521.95 -14247
## - `AT:AP` 1 5.2993 521.97 -14247
##
## Step: AIC=-14306.29
## .outcome ~ AT + AP + AFDP + GTEP + TIT + TAT + TEY + CDP + `AT:AP` +
##   `AT:AH` + `AT:AFDP` + `AT:GTEP` + `AT:TIT` + `AT:TAT` + `AT:TEY` +
##   `AP:AH` + `AP:AFDP` + `AP:GTEP` + `AP:TIT` + `AP:TAT` + `AP:TEY` +
##   `AH:AFDP` + `AH:GTEP` + `AH:TIT` + `AH:TAT` + `AH:TEY` +
##   `AH:CDP` + `AFDP:GTEP` + `AFDP:TIT` + `AFDP:TAT` + `AFDP:CDP` +
##   `GTEP:TIT` + `GTEP:TAT` + `GTEP:TEY` + `GTEP:CDP` + `TIT:TAT` +
##   `TIT:TEY` + `TIT:CDP` + `TAT:TEY` + `TEY:CDP`
##
##              Df Sum of Sq    RSS     AIC
## - `AT:AFDP` 1  0.0765 516.80 -14307
## - `TEY:CDP` 1  0.0795 516.80 -14307
## - `AP:AFDP` 1  0.0906 516.81 -14307
## - `AH:CDP` 1  0.0910 516.81 -14307
## - `GTEP:CDP` 1  0.0981 516.82 -14307
## - `AH:TAT` 1  0.1100 516.83 -14307
## - `AH:GTEP` 1  0.1147 516.84 -14307
## - `AP:GTEP` 1  0.1693 516.89 -14306
## <none>          516.72 -14306
## - `AH:TEY` 1  0.2136 516.94 -14306
## - `TAT:TEY` 1  0.2253 516.95 -14306
## - `TIT:TEY` 1  0.2619 516.99 -14305
## - `AH:TIT` 1  0.2746 517.00 -14305
## - `GTEP:TAT` 1  0.3210 517.04 -14305
## - AT 1  0.3734 517.10 -14304
## - `GTEP:TIT` 1  0.4013 517.12 -14304
## - GTEP 1  0.5692 517.29 -14302
## - `GTEP:TEY` 1  0.6079 517.33 -14301
## - TEY 1  0.6088 517.33 -14301
## - CDP 1  0.6448 517.37 -14301
## - `TIT:CDP` 1  0.6791 517.40 -14300
## - `AT:AH` 1  0.7673 517.49 -14300
## - `AH:AFDP` 1  0.8528 517.58 -14299
## - `AFDP:CDP` 1  0.9626 517.69 -14297
## - AFDP 1  0.9774 517.70 -14297
## - `AFDP:GTEP` 1  1.0461 517.77 -14296
## - TIT 1  1.1095 517.83 -14296
## - `AFDP:TIT` 1  1.2703 517.99 -14294
## - `AT:TAT` 1  1.3700 518.09 -14293

```

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## - `AP:AH`      1  1.4455 518.17 -14292
## - `AT:GTEP`    1  1.8091 518.53 -14288
## - `AT:TEY`     1  1.8989 518.62 -14287
## - AP          1  1.9645 518.69 -14286
## - `AT:TIT`     1  2.1664 518.89 -14284
## - `AFDP:TAT`   1  2.3570 519.08 -14281
## - `AP:TIT`     1  2.8317 519.56 -14276
## - `AP:TAT`     1  2.9087 519.63 -14275
## - `AP:TEY`     1  3.5154 520.24 -14268
## - `TIT:TAT`    1  4.1936 520.92 -14261
## - TAT         1  5.2387 521.96 -14249
## - `AT:AP`      1  5.2549 521.98 -14248
##
## Step: AIC=-14307.42
## .outcome ~ AT + AP + AFDP + GTEP + TIT + TAT + TEY + CDP + `AT:AP` +
##   `AT:AH` + `AT:GTEP` + `AT:TIT` + `AT:TAT` + `AT:TEY` + `AP:AH` +
##   `AP:AFDP` + `AP:GTEP` + `AP:TIT` + `AP:TAT` + `AP:TEY` +
##   `AH:AFDP` + `AH:GTEP` + `AH:TIT` + `AH:TAT` + `AH:TEY` +
##   `AH:CDP` + `AFDP:GTEP` + `AFDP:TIT` + `AFDP:TAT` + `AFDP:CDP` +
##   `GTEP:TIT` + `GTEP:TAT` + `GTEP:TEY` + `GTEP:CDP` + `TIT:TAT` +
##   `TIT:TEY` + `TIT:CDP` + `TAT:TEY` + `TEY:CDP`
##
##             Df Sum of Sq   RSS   AIC
## - `TEY:CDP`  1  0.0687 516.87 -14309
## - `AH:CDP`   1  0.0940 516.89 -14308
## - `GTEP:CDP` 1  0.1005 516.90 -14308
## - `AH:GTEP`   1  0.1155 516.92 -14308
## - `AP:GTEP`   1  0.1608 516.96 -14308
## - `AH:TAT`    1  0.1717 516.97 -14308
## <none>           516.80 -14307
## - `TAT:TEY`   1  0.2095 517.01 -14307
## - `TIT:TEY`   1  0.2574 517.06 -14306
## - `AP:AFDP`   1  0.2590 517.06 -14306
## - `AH:TEY`    1  0.2920 517.09 -14306
## - `GTEP:TAT`  1  0.3079 517.11 -14306
## - `AH:TIT`    1  0.3653 517.17 -14305
## - `GTEP:TIT`  1  0.3936 517.19 -14305
## - AT          1  0.5088 517.31 -14304
## - TEY         1  0.5556 517.36 -14303
## - GTEP        1  0.5733 517.37 -14303
## - CDP          1  0.5886 517.39 -14303
## - `GTEP:TEY`  1  0.6038 517.40 -14302
## - `TIT:CDP`   1  0.6220 517.42 -14302
## - `AT:AH`     1  0.6983 517.50 -14301
## - `AH:AFDP`   1  0.8536 517.65 -14300
## - `AFDP:CDP`  1  0.9325 517.73 -14299
## - TIT          1  1.0362 517.84 -14298
## - `AFDP:GTEP` 1  1.1390 517.94 -14296
## - AFDP         1  1.1607 517.96 -14296
## - `AFDP:TIT`  1  1.2826 518.08 -14295
## - `AP:AH`      1  1.5079 518.31 -14292
## - `AT:GTEP`   1  1.8518 518.65 -14288
## - AP          1  1.8957 518.70 -14288
## - `AT:TAT`    1  2.1923 518.99 -14284

```

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## - `AFDP:TAT` 1 2.3035 519.10 -14283
## - `AP:TIT` 1 2.8687 519.67 -14277
## - `AP:TAT` 1 3.0015 519.80 -14275
## - `AP:TEY` 1 3.5035 520.30 -14270
## - `TIT:TAT` 1 4.1317 520.93 -14262
## - `AT:TEY` 1 4.5548 521.36 -14258
## - `AT:TIT` 1 4.6090 521.41 -14257
## - `AT:AP` 1 5.2119 522.01 -14250
## - TAT 1 5.6472 522.45 -14245
##
## Step: AIC=-14308.63
## .outcome ~ AT + AP + AFDP + GTEP + TIT + TAT + TEY + CDP + `AT:AP` +
##   `AT:AH` + `AT:GTEP` + `AT:TIT` + `AT:TAT` + `AT:TEY` + `AP:AH` +
##   `AP:AFDP` + `AP:GTEP` + `AP:TIT` + `AP:TAT` + `AP:TEY` +
##   `AH:AFDP` + `AH:GTEP` + `AH:TIT` + `AH:TAT` + `AH:TEY` +
##   `AH:CDP` + `AFDP:GTEP` + `AFDP:TIT` + `AFDP:TAT` + `AFDP:CDP` +
##   `GTEP:TIT` + `GTEP:TAT` + `GTEP:TEY` + `GTEP:CDP` + `TIT:TAT` +
##   `TIT:TEY` + `TIT:CDP` + `TAT:TEY`
##
##             Df Sum of Sq    RSS    AIC
## - `GTEP:CDP` 1  0.0403 516.91 -14310
## - `AH:GTEP` 1  0.1197 516.99 -14309
## - `AH:CDP` 1  0.1599 517.03 -14309
## <none>          516.87 -14309
## - `AP:GTEP` 1  0.2075 517.08 -14308
## - `AH:TAT` 1  0.2479 517.12 -14308
## - `TAT:TEY` 1  0.2507 517.12 -14308
## - `AP:AFDP` 1  0.2589 517.13 -14308
## - `AH:TEY` 1  0.2910 517.16 -14307
## - `GTEP:TAT` 1  0.2992 517.17 -14307
## - `GTEP:TIT` 1  0.4473 517.32 -14306
## - `AH:TIT` 1  0.4726 517.34 -14305
## - GTEP 1  0.5059 517.37 -14305
## - CDP 1  0.5386 517.41 -14304
## - `GTEP:TEY` 1  0.5475 517.42 -14304
## - `TIT:CDP` 1  0.5923 517.46 -14304
## - AT 1  0.6057 517.47 -14304
## - TEY 1  0.6814 517.55 -14303
## - `AT:AH` 1  0.6898 517.56 -14303
## - `AH:AFDP` 1  0.8537 517.72 -14301
## - `TIT:TEY` 1  0.8684 517.74 -14301
## - TIT 1  1.0830 517.95 -14298
## - AFDP 1  1.1188 517.99 -14298
## - `AFDP:CDP` 1  1.1593 518.03 -14297
## - `AFDP:GTEP` 1  1.1639 518.03 -14297
## - `AP:AH` 1  1.5212 518.39 -14293
## - `AFDP:TIT` 1  1.5786 518.45 -14293
## - AP 1  1.8395 518.71 -14290
## - `AT:GTEP` 1  1.8473 518.72 -14290
## - `AT:TAT` 1  2.1349 519.00 -14286
## - `AFDP:TAT` 1  2.6278 519.50 -14281
## - `AP:TIT` 1  2.8170 519.69 -14278
## - `AP:TAT` 1  2.9617 519.83 -14277
## - `AP:TEY` 1  3.4674 520.34 -14271

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## - `TIT:TAT`      1    4.1658 521.03 -14263
## - `AT:TEY`       1    4.5318 521.40 -14259
## - `AT:TIT`       1    4.7693 521.64 -14256
## - `AT:AP`        1    5.1691 522.04 -14252
## - TAT            1    5.5787 522.45 -14247
##
## Step: AIC=-14310.17
## .outcome ~ AT + AP + AFDP + GTEP + TIT + TAT + TEY + CDP + `AT:AP` +
##   `AT:AH` + `AT:GTEP` + `AT:TIT` + `AT:TAT` + `AT:TEY` + `AP:AH` +
##   `AP:AFDP` + `AP:GTEP` + `AP:TIT` + `AP:TAT` + `AP:TEY` +
##   `AH:AFDP` + `AH:GTEP` + `AH:TIT` + `AH:TAT` + `AH:TEY` +
##   `AH:CDP` + `AFDP:GTEP` + `AFDP:TIT` + `AFDP:TAT` + `AFDP:CDP` +
##   `GTEP:TIT` + `GTEP:TAT` + `GTEP:TEY` + `TIT:TAT` + `TIT:TEY` +
##   `TIT:CDP` + `TAT:TEY`
##
##          Df Sum of Sq   RSS   AIC
## - `AH:GTEP`     1    0.1259 517.04 -14311
## <none>           516.91 -14310
## - `AP:GTEP`     1    0.1821 517.09 -14310
## - `AH:CDP`      1    0.2052 517.11 -14310
## - `TAT:TEY`     1    0.2471 517.16 -14309
## - `AP:AFDP`     1    0.2555 517.16 -14309
## - `AH:TEY`      1    0.2709 517.18 -14309
## - `AH:TAT`      1    0.2749 517.18 -14309
## - `GTEP:TAT`    1    0.3221 517.23 -14308
## - `GTEP:TIT`    1    0.4277 517.34 -14307
## - `AH:TIT`      1    0.5049 517.41 -14306
## - AT            1    0.5663 517.48 -14306
## - GTEP          1    0.5734 517.48 -14306
## - TEY           1    0.6412 517.55 -14305
## - `AT:AH`        1    0.6687 517.58 -14304
## - `GTEP:TEY`    1    0.8260 517.74 -14303
## - `AH:AFDP`     1    0.8600 517.77 -14302
## - CDP           1    0.8715 517.78 -14302
## - `TIT:CDP`     1    0.9981 517.91 -14301
## - TIT            1    1.0535 517.96 -14300
## - AFDP          1    1.1321 518.04 -14299
## - `AFDP:GTEP`   1    1.1339 518.04 -14299
## - `AFDP:CDP`    1    1.1384 518.05 -14299
## - `TIT:TEY`     1    1.3468 518.26 -14297
## - `AP:AH`        1    1.4966 518.41 -14295
## - `AFDP:TIT`    1    1.5916 518.50 -14294
## - AP             1    1.8610 518.77 -14291
## - `AT:GTEP`     1    2.1032 519.01 -14288
## - `AT:TAT`      1    2.1386 519.05 -14288
## - `AFDP:TAT`    1    2.6819 519.59 -14282
## - `AP:TIT`       1    2.8168 519.73 -14280
## - `AP:TAT`       1    2.9478 519.86 -14279
## - `AP:TEY`       1    3.4481 520.36 -14273
## - `AT:TEY`       1    4.5703 521.48 -14260
## - `TIT:TAT`     1    4.5825 521.49 -14260
## - `AT:AP`        1    5.1399 522.05 -14254
## - `AT:TIT`       1    5.2601 522.17 -14252
## - TAT            1    5.6381 522.55 -14248

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## Step: AIC=-14310.73
## .outcome ~ AT + AP + AFDP + GTEP + TIT + TAT + TEY + CDP + `AT:AP` +
##   `AT:AH` + `AT:GTEP` + `AT:TIT` + `AT:TAT` + `AT:TEY` + `AP:AH` +
##   `AP:AFDP` + `AP:GTEP` + `AP:TIT` + `AP:TAT` + `AP:TEY` +
##   `AH:AFDP` + `AH:TIT` + `AH:TAT` + `AH:TEY` + `AH:CDP` + `AFDP:GTEP` +
##   `AFDP:TIT` + `AFDP:TAT` + `AFDP:CDP` + `GTEP:TIT` + `GTEP:TAT` +
##   `GTEP:TEY` + `TIT:TAT` + `TIT:TEY` + `TIT:CDP` + `TAT:TEY`
##
##          Df Sum of Sq    RSS     AIC
## - `AP:GTEP`     1   0.1136 517.15 -14311
## <none>           517.04 -14311
## - `AH:CDP`     1   0.2121 517.25 -14310
## - `AH:TAT`     1   0.2214 517.26 -14310
## - `AH:TEY`     1   0.2375 517.27 -14310
## - `TAT:TEY`     1   0.2552 517.29 -14310
## - `AP:AFDP`     1   0.2712 517.31 -14310
## - `GTEP:TAT`     1   0.3237 517.36 -14309
## - `GTEP:TIT`     1   0.4236 517.46 -14308
## - `AH:TIT`     1   0.4314 517.47 -14308
## - GTEP           1   0.4884 517.52 -14307
## - AT             1   0.5186 517.55 -14307
## - TEY            1   0.5958 517.63 -14306
## - `AT:AH`         1   0.6121 517.65 -14306
## - `GTEP:TEY`     1   0.8440 517.88 -14303
## - CDP            1   0.8802 517.92 -14303
## - `AH:AFDP`     1   0.9663 518.00 -14302
## - `TIT:CDP`     1   1.0084 518.04 -14301
## - TIT             1   1.0144 518.05 -14301
## - AFDP           1   1.1339 518.17 -14300
## - `AFDP:CDP`     1   1.1471 518.18 -14300
## - `AFDP:GTEP`     1   1.1784 518.21 -14299
## - `AP:AH`         1   1.3800 518.42 -14297
## - `TIT:TEY`       1   1.3879 518.42 -14297
## - `AFDP:TIT`     1   1.6220 518.66 -14294
## - AP              1   1.8042 518.84 -14292
## - `AT:TAT`        1   2.4150 519.45 -14285
## - `AFDP:TAT`      1   2.7043 519.74 -14282
## - `AT:GTEP`        1   2.7436 519.78 -14282
## - `AP:TIT`         1   2.7639 519.80 -14281
## - `AP:TAT`         1   2.9087 519.94 -14280
## - `AP:TEY`         1   3.3667 520.40 -14274
## - `TIT:TAT`        1   4.7382 521.77 -14259
## - `AT:TEY`         1   4.7537 521.79 -14259
## - `AT:AP`           1   5.0871 522.12 -14255
## - TAT              1   5.6525 522.69 -14248
## - `AT:TIT`         1   6.1534 523.19 -14243
##
## Step: AIC=-14311.44
## .outcome ~ AT + AP + AFDP + GTEP + TIT + TAT + TEY + CDP + `AT:AP` +
##   `AT:AH` + `AT:GTEP` + `AT:TIT` + `AT:TAT` + `AT:TEY` + `AP:AH` +
##   `AP:AFDP` + `AP:TIT` + `AP:TAT` + `AP:TEY` + `AH:AFDP` +
##   `AH:TIT` + `AH:TAT` + `AH:TEY` + `AH:CDP` + `AFDP:GTEP` +
##   `AFDP:TIT` + `AFDP:TAT` + `AFDP:CDP` + `GTEP:TIT` + `GTEP:TAT` +

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##      `GTEP:TEY` + `TIT:TAT` + `TIT:TEY` + `TIT:CDP` + `TAT:TEY`
##
##              Df Sum of Sq    RSS     AIC
## <none>                  517.15 -14311
## - `AH:TEY`      1   0.1903 517.34 -14311
## - `AH:TAT`      1   0.1942 517.34 -14311
## - `AH:CDP`      1   0.2110 517.36 -14311
## - `AP:AFDP`      1   0.2579 517.41 -14310
## - `TAT:TEY`      1   0.2988 517.45 -14310
## - `AH:TIT`      1   0.3844 517.53 -14309
## - GTEP          1   0.3853 517.53 -14309
## - AT            1   0.4126 517.56 -14309
## - TEY           1   0.4837 517.63 -14308
## - `GTEP:TAT`    1   0.5193 517.67 -14308
## - `AT:AH`        1   0.5340 517.68 -14307
## - `GTEP:TIT`    1   0.6217 517.77 -14306
## - TIT           1   0.9127 518.06 -14303
## - `AH:AFDP`     1   0.9707 518.12 -14302
## - `GTEP:TEY`    1   1.0600 518.21 -14301
## - `AFDP:GTEP`   1   1.0996 518.25 -14301
## - AFDP          1   1.1195 518.27 -14301
## - CDP           1   1.1315 518.28 -14300
## - `AP:AH`        1   1.2745 518.42 -14299
## - `TIT:CDP`      1   1.2921 518.44 -14299
## - `AFDP:CDP`    1   1.4464 518.60 -14297
## - `TIT:TEY`      1   1.6519 518.80 -14295
## - AP             1   1.6912 518.84 -14294
## - `AFDP:TIT`    1   1.8736 519.02 -14292
## - `AT:TAT`       1   2.3922 519.54 -14286
## - `AP:TIT`       1   2.6513 519.80 -14283
## - `AP:TAT`       1   2.8103 519.96 -14281
## - `AFDP:TAT`    1   3.0262 520.17 -14279
## - `AT:GTEP`      1   3.2075 520.36 -14277
## - `AP:TEY`       1   3.3169 520.47 -14276
## - `AT:TEY`       1   4.7392 521.89 -14260
## - `AT:AP`         1   5.1687 522.32 -14255
## - `TIT:TAT`      1   5.3057 522.45 -14253
## - TAT            1   5.6100 522.76 -14250
## - `AT:TIT`       1   6.5536 523.70 -14239
## Start:  AIC=-18186.66
## .outcome ~ AT + AP + AH + AFDP + GTEP + TIT + TAT + TEY + CDP +
##   `AT:AP` + `AT:AH` + `AT:AFDP` + `AT:GTEP` + `AT:TIT` + `AT:TAT` +
##   `AT:TEY` + `AT:CDP` + `AP:AH` + `AP:AFDP` + `AP:GTEP` + `AP:TIT` +
##   `AP:TAT` + `AP:TEY` + `AP:CDP` + `AH:AFDP` + `AH:GTEP` +
##   `AH:TIT` + `AH:TAT` + `AH:TEY` + `AH:CDP` + `AFDP:GTEP` +
##   `AFDP:TIT` + `AFDP:TAT` + `AFDP:TEY` + `AFDP:CDP` + `GTEP:TIT` +
##   `GTEP:TAT` + `GTEP:TEY` + `GTEP:CDP` + `TIT:TAT` + `TIT:TEY` +
##   `TIT:CDP` + `TAT:TEY` + `TAT:CDP` + `TEY:CDP`
##
##              Df Sum of Sq    RSS     AIC
## - AH          1   0.0004 621.19 -18189
## - `AT:CDP`    1   0.0100 621.19 -18188
## - `TAT:CDP`   1   0.0215 621.21 -18188
## - `AP:CDP`    1   0.0275 621.21 -18188

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## - `AH:CDP`      1  0.0795 621.26 -18188
## - `AP:AFDP`     1  0.0799 621.26 -18188
## - `GTEP:CDP`    1  0.0972 621.28 -18188
## - `AFDP:TIT`    1  0.0980 621.28 -18188
## - `AFDP:TEY`    1  0.0998 621.28 -18188
## - `TEY:CDP`     1  0.1111 621.30 -18187
## - `AT:AFDP`     1  0.1184 621.30 -18187
## - `TIT:TEY`     1  0.1295 621.31 -18187
## - `AH:TAT`      1  0.1338 621.32 -18187
## - `TAT:TEY`     1  0.1365 621.32 -18187
## - `AH:TEY`      1  0.1606 621.35 -18187
## - `AT:TAT`      1  0.1616 621.35 -18187
## <none>          621.18 -18187
## - `GTEP:TAT`    1  0.2263 621.41 -18186
## - `AH:TIT`      1  0.2364 621.42 -18186
## - `GTEP:TEY`    1  0.2473 621.43 -18186
## - `GTEP:TIT`    1  0.2476 621.43 -18186
## - `AFDP:CDP`    1  0.2848 621.47 -18185
## - `CDP`          1  0.3713 621.56 -18184
## - `TIT:CDP`     1  0.3972 621.58 -18184
## - `AFDP:TAT`    1  0.4184 621.60 -18184
## - `AT:TIT`      1  0.4276 621.61 -18184
## - `AT`           1  0.4655 621.65 -18183
## - `AH:GTEP`     1  0.4880 621.67 -18183
## - `AP:GTEP`     1  0.4975 621.68 -18183
## - `GTEP`         1  0.5662 621.75 -18182
## - `AT:AH`        1  0.6359 621.82 -18181
## - `TEY`          1  0.6689 621.85 -18181
## - `AH:AFDP`     1  0.7510 621.94 -18180
## - `AFDP`         1  0.8133 622.00 -18179
## - `AFDP:GTEP`   1  0.8607 622.05 -18178
## - `AT:GTEP`     1  0.9350 622.12 -18178
## - `TIT`          1  1.0885 622.27 -18176
## - `AT:TEY`       1  1.5675 622.75 -18170
## - `AP:AH`        1  1.6365 622.82 -18169
## - `AP:TAT`       1  1.7687 622.95 -18168
## - `AP:TIT`       1  2.5056 623.69 -18159
## - `AP`            1  2.9082 624.09 -18154
## - `TAT`          1  3.0165 624.20 -18153
## - `TIT:TAT`     1  3.2306 624.42 -18150
## - `AP:TEY`       1  4.5933 625.78 -18134
## - `AT:AP`        1  6.5855 627.77 -18111
##
## Step: AIC=-18188.66
## .outcome ~ AT + AP + AFDP + GTEP + TIT + TAT + TEY + CDP + `AT:AP` +
##   `AT:AH` + `AT:AFDP` + `AT:GTEP` + `AT:TIT` + `AT:TAT` + `AT:TEY` +
##   `AT:CDP` + `AP:AH` + `AP:AFDP` + `AP:GTEP` + `AP:TIT` + `AP:TAT` +
##   `AP:TEY` + `AP:CDP` + `AH:AFDP` + `AH:GTEP` + `AH:TIT` +
##   `AH:TAT` + `AH:TEY` + `AH:CDP` + `AFDP:GTEP` + `AFDP:TIT` +
##   `AFDP:TAT` + `AFDP:TEY` + `AFDP:CDP` + `GTEP:TIT` + `GTEP:TAT` +
##   `GTEP:TEY` + `GTEP:CDP` + `TIT:TAT` + `TIT:TEY` + `TIT:CDP` +
##   `TAT:TEY` + `TAT:CDP` + `TEY:CDP`
##
##               Df Sum of Sq    RSS    AIC

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## - `AT:CDP`      1  0.0100 621.20 -18190
## - `TAT:CDP`     1  0.0212 621.21 -18190
## - `AP:CDP`      1  0.0275 621.21 -18190
## - `AH:CDP`      1  0.0800 621.27 -18190
## - `AP:AFDP`     1  0.0925 621.28 -18190
## - `GTEP:CDP`    1  0.0975 621.28 -18190
## - `AFDP:TIT`    1  0.0983 621.28 -18190
## - `AFDP:TEY`    1  0.0994 621.28 -18190
## - `TEY:CDP`     1  0.1108 621.30 -18189
## - `AT:AFDP`     1  0.1224 621.31 -18189
## - `TIT:TEY`     1  0.1292 621.31 -18189
## - `TAT:TEY`     1  0.1366 621.32 -18189
## - `AH:TAT`      1  0.1609 621.35 -18189
## - `AT:TAT`      1  0.1616 621.35 -18189
## <none>           621.19 -18189
## - `GTEP:TAT`    1  0.2288 621.41 -18188
## - `GTEP:TIT`    1  0.2531 621.44 -18188
## - `GTEP:TEY`    1  0.2540 621.44 -18188
## - `AFDP:CDP`    1  0.2845 621.47 -18187
## - `AH:TEY`      1  0.3101 621.50 -18187
## - `AH:TIT`      1  0.3474 621.53 -18186
## - CDP            1  0.3709 621.56 -18186
## - `TIT:CDP`     1  0.4022 621.59 -18186
## - `AFDP:TAT`    1  0.4204 621.61 -18186
## - `AT:TIT`      1  0.4387 621.62 -18185
## - `AH:GTEP`     1  0.4885 621.67 -18185
## - `AP:GTEP`     1  0.4971 621.68 -18185
## - AT             1  0.5312 621.72 -18184
## - GTEP           1  0.6041 621.79 -18184
## - TEY            1  0.6696 621.85 -18183
## - `AH:AFDP`     1  0.8384 622.02 -18181
## - `AT:AH`        1  0.8647 622.05 -18180
## - AFDP           1  0.8780 622.06 -18180
## - `AFDP:GTEP`   1  0.8850 622.07 -18180
## - `AT:GTEP`     1  0.9490 622.13 -18179
## - TIT            1  1.0981 622.28 -18178
## - `AT:TEY`      1  1.7173 622.90 -18170
## - `AP:TAT`      1  1.7829 622.97 -18170
## - `AP:AH`        1  1.8529 623.04 -18169
## - `AP:TIT`      1  2.5318 623.72 -18161
## - AP              1  2.9421 624.13 -18156
## - TAT            1  3.0521 624.24 -18154
## - `TIT:TAT`     1  3.2333 624.42 -18152
## - `AP:TEY`      1  4.6234 625.81 -18136
## - `AT:AP`        1  6.8927 628.08 -18109
##
## Step: AIC=-18190.54
## .outcome ~ AT + AP + AFDP + GTEP + TIT + TAT + TEY + CDP + `AT:AP` +
##          `AT:AH` + `AT:AFDP` + `AT:GTEP` + `AT:TIT` + `AT:TAT` + `AT:TEY` +
##          `AP:AH` + `AP:AFDP` + `AP:GTEP` + `AP:TIT` + `AP:TAT` + `AP:TEY` +
##          `AP:CDP` + `AH:AFDP` + `AH:GTEP` + `AH:TIT` + `AH:TAT` +
##          `AH:TEY` + `AH:CDP` + `AFDP:GTEP` + `AFDP:TIT` + `AFDP:TAT` +
##          `AFDP:TEY` + `AFDP:CDP` + `GTEP:TIT` + `GTEP:TAT` + `GTEP:TEY` +
##          `GTEP:CDP` + `TIT:TAT` + `TIT:TEY` + `TIT:CDP` + `TAT:TEY` +

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##      `TAT:CDP` + `TEY:CDP`
##
##              Df Sum of Sq    RSS     AIC
## - `TAT:CDP`   1  0.0190 621.21 -18192
## - `AP:CDP`   1  0.0509 621.25 -18192
## - `AH:CDP`   1  0.0729 621.27 -18192
## - `AFDP:TEY` 1  0.0913 621.29 -18192
## - `GTEP:CDP` 1  0.0970 621.29 -18191
## - `AP:AFDP`   1  0.0973 621.29 -18191
## - `AT:AFDP`   1  0.1131 621.31 -18191
## - `TEY:CDP`   1  0.1210 621.32 -18191
## - `TAT:TEY`   1  0.1450 621.34 -18191
## - `AH:TAT`   1  0.1582 621.35 -18191
## <none>           621.20 -18190
## - `GTEP:TAT`  1  0.2201 621.42 -18190
## - `GTEP:TIT`  1  0.2435 621.44 -18190
## - `GTEP:TEY`  1  0.2443 621.44 -18190
## - `TIT:TEY`   1  0.2622 621.46 -18189
## - `AH:TEY`   1  0.3106 621.51 -18189
## - `AFDP:TIT`  1  0.3338 621.53 -18189
## - `AH:TIT`   1  0.3642 621.56 -18188
## - CDP        1  0.3896 621.58 -18188
## - `TIT:CDP`  1  0.4026 621.60 -18188
## - `AH:GTEP`  1  0.4896 621.68 -18187
## - `AP:GTEP`  1  0.5088 621.70 -18186
## - AT         1  0.5615 621.76 -18186
## - GTEP       1  0.5954 621.79 -18186
## - TEY        1  0.7214 621.92 -18184
## - `AH:AFDP`  1  0.8294 622.02 -18183
## - `AT:AH`    1  0.8582 622.05 -18182
## - AFDP       1  0.8725 622.07 -18182
## - `AFDP:CDP` 1  0.8935 622.09 -18182
## - `AFDP:GTEP` 1  0.9148 622.11 -18182
## - `AT:GTEP`  1  0.9394 622.13 -18181
## - `AT:TAT`   1  0.9723 622.17 -18181
## - `AFDP:TAT` 1  1.2765 622.47 -18177
## - TIT        1  1.3757 622.57 -18176
## - `AT:TEY`   1  1.7073 622.90 -18172
## - `AP:AH`    1  1.8482 623.04 -18171
## - `AT:TIT`   1  2.0508 623.25 -18168
## - `AP:TAT`   1  2.0892 623.28 -18168
## - `AP:TIT`   1  2.7967 623.99 -18159
## - AP          1  2.9321 624.13 -18158
## - `TIT:TAT`  1  3.3555 624.55 -18153
## - TAT         1  3.5004 624.70 -18151
## - `AP:TEY`   1  4.6190 625.81 -18138
## - `AT:AP`    1  6.8889 628.08 -18111
##
## Step: AIC=-18192.32
## .outcome ~ AT + AP + AFDP + GTEP + TIT + TAT + TEY + CDP + `AT:AP` +
##           `AT:AH` + `AT:AFDP` + `AT:GTEP` + `AT:TIT` + `AT:TAT` + `AT:TEY` +
##           `AP:AH` + `AP:AFDP` + `AP:GTEP` + `AP:TIT` + `AP:TAT` + `AP:TEY` +
##           `AP:CDP` + `AH:AFDP` + `AH:GTEP` + `AH:TIT` + `AH:TAT` +
##           `AH:TEY` + `AH:CDP` + `AFDP:GTEP` + `AFDP:TIT` + `AFDP:TAT` +

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##  `AFDP:TEY` + `AFDP:CDP` + `GTEP:TIT` + `GTEP:TAT` + `GTEP:TEY` +
##  `GTEP:CDP` + `TIT:TAT` + `TIT:TEY` + `TIT:CDP` + `TAT:TEY` +
##  `TEY:CDP` +
##
##          Df Sum of Sq    RSS     AIC
## - `AP:CDP`    1   0.0577 621.27 -18194
## - `AFDP:TEY`  1   0.0723 621.29 -18194
## - `AH:CDP`    1   0.0778 621.29 -18193
## - `AT:AFDP`   1   0.0946 621.31 -18193
## - `TEY:CDP`   1   0.1057 621.32 -18193
## - `GTEP:CDP`  1   0.1128 621.33 -18193
## - `AP:AFDP`   1   0.1142 621.33 -18193
## <none>           621.21 -18192
## - `AH:TAT`    1   0.1706 621.38 -18192
## - `GTEP:TAT`  1   0.2093 621.42 -18192
## - `TIT:TEY`   1   0.2436 621.46 -18191
## - `GTEP:TIT`  1   0.2466 621.46 -18191
## - `GTEP:TEY`  1   0.2995 621.51 -18191
## - `TAT:TEY`   1   0.3040 621.52 -18191
## - `AH:TEY`    1   0.3238 621.54 -18190
## - `AH:TIT`    1   0.3852 621.60 -18190
## - `AFDP:TIT`  1   0.3914 621.61 -18190
## - CDP         1   0.4086 621.62 -18190
## - `AH:GTEP`   1   0.4843 621.70 -18189
## - AT          1   0.5682 621.78 -18188
## - `TIT:CDP`   1   0.6296 621.84 -18187
## - `AP:GTEP`   1   0.6364 621.85 -18187
## - GTEP        1   0.6659 621.88 -18186
## - TEY         1   0.7522 621.97 -18185
## - `AH:AFDP`   1   0.8215 622.04 -18185
## - AFDP        1   0.8536 622.07 -18184
## - `AT:AH`     1   0.8811 622.10 -18184
## - `AFDP:CDP`  1   0.9284 622.14 -18183
## - `AT:GTEP`   1   1.1037 622.32 -18181
## - `AT:TAT`    1   1.1090 622.32 -18181
## - `AFDP:GTEP` 1   1.1266 622.34 -18181
## - TIT         1   1.3657 622.58 -18178
## - `AFDP:TAT`  1   1.3727 622.59 -18178
## - `AT:TEY`    1   1.8022 623.02 -18173
## - `AP:AH`     1   1.8879 623.10 -18172
## - `AT:TIT`    1   2.0702 623.28 -18170
## - `AP:TAT`    1   2.0827 623.30 -18170
## - `AP:TIT`    1   2.8030 624.02 -18161
## - AP          1   2.9323 624.15 -18160
## - TAT         1   3.5233 624.74 -18153
## - `TIT:TAT`   1   4.2820 625.50 -18144
## - `AP:TEY`    1   4.7645 625.98 -18138
## - `AT:AP`     1   7.1019 628.32 -18110
##
## Step: AIC=-18193.63
## .outcome ~ AT + AP + AFDP + GTEP + TIT + TAT + TEY + CDP + `AT:AP` +
##      `AT:AH` + `AT:AFDP` + `AT:GTEP` + `AT:TIT` + `AT:TAT` + `AT:TEY` +
##      `AP:AH` + `AP:AFDP` + `AP:GTEP` + `AP:TIT` + `AP:TAT` + `AP:TEY` +
##      `AH:AFDP` + `AH:GTEP` + `AH:TIT` + `AH:TAT` + `AH:TEY` +

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##  `AH:CDP` + `AFDP:GTEP` + `AFDP:TIT` + `AFDP:TAT` + `AFDP:TEY` +
##  `AFDP:CDP` + `GTEP:TIT` + `GTEP:TAT` + `GTEP:TEY` + `GTEP:CDP` +
##  `TIT:TAT` + `TIT:TEY` + `TIT:CDP` + `TAT:TEY` + `TEY:CDP`
##
##          Df Sum of Sq    RSS   AIC
## - `AFDP:TEY`  1  0.0603 621.33 -18195
## - `TEY:CDP`   1  0.0664 621.34 -18195
## - `GTEP:CDP`  1  0.0809 621.35 -18195
## - `AT:AFDP`   1  0.0823 621.35 -18195
## - `AH:CDP`   1  0.0939 621.37 -18194
## - `AP:AFDP`   1  0.1095 621.38 -18194
## <none>           621.27 -18194
## - `GTEP:TAT`  1  0.1683 621.44 -18194
## - `AH:TAT`    1  0.1894 621.46 -18193
## - `GTEP:TIT`  1  0.2049 621.48 -18193
## - `TAT:TEY`   1  0.2504 621.52 -18193
## - `GTEP:TEY`  1  0.2791 621.55 -18192
## - `TIT:TEY`   1  0.3125 621.58 -18192
## - `AH:TEY`    1  0.3198 621.59 -18192
## - `AH:TIT`    1  0.4122 621.68 -18191
## - `AFDP:TIT`  1  0.4495 621.72 -18190
## - `AH:GTEP`   1  0.4872 621.76 -18190
## - CDP         1  0.5518 621.82 -18189
## - `TIT:CDP`   1  0.5779 621.85 -18189
## - AT          1  0.6257 621.90 -18188
## - GTEP        1  0.6357 621.91 -18188
## - `AP:GTEP`   1  0.6429 621.91 -18188
## - `AH:AFDP`   1  0.8134 622.09 -18186
## - AFDP        1  0.8173 622.09 -18186
## - TEY         1  0.8592 622.13 -18185
## - `AT:AH`     1  0.8747 622.15 -18185
## - `AFDP:CDP`  1  0.9828 622.25 -18184
## - `AT:GTEP`   1  1.0699 622.34 -18183
## - `AT:TAT`   1  1.0962 622.37 -18183
## - `AFDP:GTEP` 1  1.1127 622.38 -18182
## - `AFDP:TAT`  1  1.4777 622.75 -18178
## - TIT         1  1.5738 622.85 -18177
## - `AT:TEY`   1  1.7983 623.07 -18174
## - `AP:AH`    1  1.8886 623.16 -18173
## - `AT:TIT`   1  2.0250 623.30 -18172
## - AP          1  2.9191 624.19 -18161
## - `AP:TAT`   1  3.6854 624.96 -18152
## - `AP:TIT`   1  3.8200 625.09 -18150
## - `TIT:TAT`  1  4.2312 625.50 -18146
## - `AP:TEY`   1  4.8865 626.16 -18138
## - TAT         1  6.4749 627.75 -18119
## - `AT:AP`    1  7.1792 628.45 -18111
##
## Step: AIC=-18194.91
## .outcome ~ AT + AP + AFDP + GTEP + TIT + TAT + TEY + CDP + `AT:AP` +
## `AT:AH` + `AT:AFDP` + `AT:GTEP` + `AT:TIT` + `AT:TAT` + `AT:TEY` +
## `AP:AH` + `AP:AFDP` + `AP:GTEP` + `AP:TIT` + `AP:TAT` + `AP:TEY` +
## `AH:AFDP` + `AH:GTEP` + `AH:TIT` + `AH:TAT` + `AH:TEY` +
## `AH:CDP` + `AFDP:GTEP` + `AFDP:TIT` + `AFDP:TAT` + `AFDP:CDP` +

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##      `GTEP:TIT` + `GTEP:TAT` + `GTEP:TEY` + `GTEP:CDP` + `TIT:TAT` +
##      `TIT:TEY` + `TIT:CDP` + `TAT:TEY` + `TEY:CDP`
##
##              Df Sum of Sq    RSS     AIC
## - `AT:AFDP`   1  0.0242 621.36 -18197
## - `TEY:CDP`   1  0.0386 621.37 -18196
## - `GTEP:CDP`  1  0.0753 621.41 -18196
## - `AH:CDP`   1  0.1057 621.44 -18196
## - `AP:AFDP`  1  0.1219 621.45 -18196
## <none>          621.33 -18195
## - `AH:TAT`   1  0.1903 621.52 -18195
## - `TAT:TEY`   1  0.2074 621.54 -18194
## - `GTEP:TAT` 1  0.2398 621.57 -18194
## - `TIT:TEY`   1  0.2763 621.61 -18194
## - `AH:TEY`   1  0.3045 621.64 -18193
## - `GTEP:TIT` 1  0.3109 621.64 -18193
## - `AH:TIT`   1  0.4144 621.75 -18192
## - `GTEP:TEY` 1  0.4773 621.81 -18191
## - `AH:GTEP`  1  0.4837 621.82 -18191
## - `CDP`       1  0.5043 621.84 -18191
## - `TIT:CDP`  1  0.5334 621.87 -18191
## - `AP:GTEP`  1  0.5855 621.92 -18190
## - `AT`        1  0.6990 622.03 -18189
## - `GTEP`      1  0.7881 622.12 -18188
## - `AH:AFDP`  1  0.8544 622.19 -18187
## - `AFDP`      1  0.8868 622.22 -18186
## - `AFDP:CDP` 1  0.9234 622.26 -18186
## - `AT:AH`    1  0.9426 622.27 -18186
## - `AFDP:GTEP` 1  1.0535 622.39 -18184
## - `TEY`       1  1.1084 622.44 -18184
## - `AT:TAT`   1  1.2293 622.56 -18182
## - `AFDP:TIT` 1  1.2736 622.61 -18182
## - `AT:GTEP`  1  1.3575 622.69 -18181
## - `TIT`       1  1.7080 623.04 -18177
## - `AP:AH`    1  1.8821 623.21 -18175
## - `AT:TIT`   1  2.0361 623.37 -18173
## - `AT:TEY`   1  2.1109 623.44 -18172
## - `AFDP:TAT` 1  2.2563 623.59 -18170
## - `AP`        1  2.8869 624.22 -18163
## - `AP:TAT`   1  3.7764 625.11 -18152
## - `AP:TIT`   1  3.8502 625.18 -18151
## - `TIT:TAT`  1  4.4258 625.76 -18144
## - `AP:TEY`   1  4.9144 626.25 -18139
## - `TAT`       1  6.4234 627.76 -18121
## - `AT:AP`    1  7.1239 628.46 -18113
##
## Step: AIC=-18196.63
## .outcome ~ AT + AP + AFDP + GTEP + TIT + TAT + TEY + CDP + `AT:AP` +
##           `AT:AH` + `AT:GTEP` + `AT:TIT` + `AT:TAT` + `AT:TEY` + `AP:AH` +
##           `AP:AFDP` + `AP:GTEP` + `AP:TIT` + `AP:TAT` + `AP:TEY` +
##           `AH:AFDP` + `AH:GTEP` + `AH:TIT` + `AH:TAT` + `AH:TEY` +
##           `AH:CDP` + `AFDP:GTEP` + `AFDP:TIT` + `AFDP:TAT` + `AFDP:CDP` +
##           `GTEP:TIT` + `GTEP:TAT` + `GTEP:TEY` + `GTEP:CDP` + `TIT:TAT` +
##           `TIT:TEY` + `TIT:CDP` + `TAT:TEY` + `TEY:CDP`
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## 
##              Df Sum of Sq    RSS     AIC
## - `TEY:CDP`   1   0.0346 621.39 -18198
## - `GTEP:CDP`  1   0.0769 621.43 -18198
## - `AH:CDP`    1   0.1076 621.46 -18197
## <none>          621.36 -18197
## - `TAT:TEY`   1   0.2000 621.56 -18196
## - `GTEP:TAT`  1   0.2331 621.59 -18196
## - `AH:TAT`    1   0.2407 621.60 -18196
## - `AP:AFDP`   1   0.2417 621.60 -18196
## - `TIT:TEY`   1   0.2733 621.63 -18195
## - `GTEP:TIT`  1   0.3061 621.66 -18195
## - `AH:TEY`    1   0.3659 621.72 -18194
## - `GTEP:TEY`  1   0.4731 621.83 -18193
## - CDP         1   0.4814 621.84 -18193
## - `AH:GTEP`   1   0.4826 621.84 -18193
## - `AH:TIT`    1   0.4884 621.84 -18193
## - `TIT:CDP`   1   0.5103 621.87 -18193
## - `AP:GTEP`   1   0.5794 621.94 -18192
## - GTEP        1   0.7890 622.15 -18189
## - AT          1   0.8280 622.18 -18189
## - `AFDP:CDP`  1   0.9084 622.26 -18188
## - `AT:AH`     1   0.9205 622.28 -18188
## - AFDP        1   0.9926 622.35 -18187
## - `AH:AFDP`   1   1.0019 622.36 -18187
## - TEY         1   1.0844 622.44 -18186
## - `AFDP:GTEP` 1   1.1162 622.47 -18185
## - `AFDP:TIT`  1   1.2814 622.64 -18183
## - `AT:GTEP`   1   1.3763 622.73 -18182
## - TIT         1   1.7538 623.11 -18178
## - `AP:AH`     1   1.9334 623.29 -18176
## - `AFDP:TAT`  1   2.2329 623.59 -18172
## - `AT:TAT`    1   2.3397 623.70 -18171
## - AP          1   2.9369 624.29 -18164
## - `AP:TIT`   1   4.1406 625.50 -18150
## - `AP:TAT`   1   4.1638 625.52 -18149
## - `TIT:TAT`   1   4.4016 625.76 -18146
## - `AT:TIT`   1   4.9436 626.30 -18140
## - `AP:TEY`   1   5.1077 626.46 -18138
## - `AT:TEY`   1   5.9038 627.26 -18129
## - `AT:AP`    1   7.1036 628.46 -18115
## - TAT         1   7.2788 628.64 -18113
## 
## Step:  AIC=-18198.21
## .outcome ~ AT + AP + AFDP + GTEP + TIT + TAT + TEY + CDP + `AT:AP` +
##           `AT:AH` + `AT:GTEP` + `AT:TIT` + `AT:TAT` + `AT:TEY` + `AP:AH` +
##           `AP:AFDP` + `AP:GTEP` + `AP:TIT` + `AP:TAT` + `AP:TEY` +
##           `AH:AFDP` + `AH:GTEP` + `AH:TIT` + `AH:TAT` + `AH:TEY` +
##           `AH:CDP` + `AFDP:GTEP` + `AFDP:TIT` + `AFDP:TAT` + `AFDP:CDP` +
##           `GTEP:TIT` + `GTEP:TAT` + `GTEP:TEY` + `GTEP:CDP` + `TIT:TAT` +
##           `TIT:TEY` + `TIT:CDP` + `TAT:TEY`
## 
##              Df Sum of Sq    RSS     AIC
## - `GTEP:CDP`  1   0.0430 621.43 -18200

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## - `AH:CDP`      1    0.1624 621.55 -18198
## <none>          621.39 -18198
## - `AP:AFDP`     1    0.2411 621.63 -18197
## - `GTEP:TAT`    1    0.2721 621.66 -18197
## - `AH:TAT`      1    0.3121 621.70 -18196
## - `AH:TEY`      1    0.3640 621.76 -18196
## - `TAT:TEY`     1    0.3961 621.79 -18196
## - `GTEP:TIT`    1    0.4103 621.80 -18195
## - `GTEP:TEY`    1    0.4584 621.85 -18195
## - `CDP`          1    0.4788 621.87 -18194
## - `AH:GTEP`     1    0.4869 621.88 -18194
## - `TIT:CDP`     1    0.5311 621.92 -18194
## - `AH:TIT`      1    0.5900 621.98 -18193
## - `AP:GTEP`     1    0.6433 622.03 -18193
## - `GTEP`         1    0.7842 622.18 -18191
## - `TIT:TEY`     1    0.8006 622.19 -18191
## - `AT:AH`        1    0.9117 622.30 -18189
## - `AT`           1    0.9307 622.32 -18189
## - `AFDP`         1    0.9664 622.36 -18189
## - `AH:AFDP`     1    1.0040 622.40 -18188
## - `AFDP:CDP`    1    1.1112 622.50 -18187
## - `AFDP:GTEP`   1    1.1384 622.53 -18187
## - `TEY`          1    1.2306 622.62 -18186
## - `AT:GTEP`     1    1.4023 622.79 -18184
## - `AFDP:TIT`    1    1.5602 622.95 -18182
## - `TIT`          1    1.8019 623.19 -18179
## - `AP:AH`        1    1.9417 623.33 -18177
## - `AT:TAT`      1    2.3064 623.70 -18173
## - `AFDP:TAT`    1    2.5416 623.93 -18170
## - `AP`            1    2.9022 624.29 -18166
## - `AP:TIT`       1    4.1070 625.50 -18152
## - `AP:TAT`       1    4.1365 625.53 -18151
## - `TIT:TAT`     1    4.5343 625.93 -18146
## - `AP:TEY`       1    5.0804 626.47 -18140
## - `AT:TIT`       1    5.2356 626.63 -18138
## - `AT:TEY`       1    5.8821 627.27 -18131
## - `AT:AP`         1    7.0758 628.47 -18117
## - `TAT`          1    7.2515 628.64 -18114
##
## Step: AIC=-18199.7
## .outcome ~ AT + AP + AFDP + GTEP + TIT + TAT + TEY + CDP + `AT:AP` +
##           `AT:AH` + `AT:GTEP` + `AT:TIT` + `AT:TAT` + `AT:TEY` + `AP:AH` +
##           `AP:AFDP` + `AP:GTEP` + `AP:TIT` + `AP:TAT` + `AP:TEY` +
##           `AH:AFDP` + `AH:GTEP` + `AH:TIT` + `AH:TAT` + `AH:TEY` +
##           `AH:CDP` + `AFDP:GTEP` + `AFDP:TIT` + `AFDP:TAT` + `AFDP:CDP` +
##           `GTEP:TIT` + `GTEP:TAT` + `GTEP:TEY` + `TIT:TAT` + `TIT:TEY` +
##           `TIT:CDP` + `TAT:TEY`
##
##              Df Sum of Sq    RSS    AIC
## <none>                  621.43 -18200
## - `AH:CDP`     1    0.2085 621.64 -18199
## - `AP:AFDP`     1    0.2375 621.67 -18199
## - `GTEP:TAT`    1    0.2774 621.71 -18198
## - `AH:TEY`      1    0.3429 621.78 -18198

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## - `AH:TAT`      1  0.3447 621.78 -18198
## - `GTEP:TIT`    1  0.3806 621.81 -18197
## - `TAT:TEY`     1  0.3888 621.82 -18197
## - `AH:GTEP`     1  0.4968 621.93 -18196
## - `AP:GTEP`     1  0.6040 622.04 -18194
## - `AH:TIT`      1  0.6297 622.06 -18194
## - `GTEP:TEY`    1  0.7206 622.15 -18193
## - CDP          1  0.7937 622.23 -18192
## - GTEP          1  0.8857 622.32 -18191
## - AT           1  0.8877 622.32 -18191
## - `AT:AH`       1  0.8886 622.32 -18191
## - `TIT:CDP`     1  0.9164 622.35 -18191
## - AFDP          1  0.9797 622.41 -18190
## - `AH:AFDP`     1  1.0093 622.44 -18190
## - `AFDP:CDP`    1  1.0853 622.52 -18189
## - `AFDP:GTEP`   1  1.1087 622.54 -18188
## - TEY          1  1.1924 622.63 -18188
## - `TIT:TEY`     1  1.2662 622.70 -18187
## - `AFDP:TIT`    1  1.5684 623.00 -18183
## - `AT:GTEP`     1  1.6403 623.07 -18182
## - TIT          1  1.7673 623.20 -18181
## - `AP:AH`       1  1.9159 623.35 -18179
## - `AT:TAT`      1  2.3168 623.75 -18174
## - `AFDP:TAT`    1  2.5854 624.02 -18171
## - AP           1  2.9363 624.37 -18167
## - `AP:TIT`      1  4.1129 625.55 -18153
## - `AP:TAT`      1  4.1246 625.56 -18153
## - `TIT:TAT`     1  4.9850 626.42 -18143
## - `AP:TEY`      1  5.0608 626.49 -18142
## - `AT:TIT`      1  5.8078 627.24 -18133
## - `AT:TEY`      1  5.9370 627.37 -18132
## - `AT:AP`       1  7.0451 628.48 -18118
## - TAT          1  7.3394 628.77 -18115

```

## Decision Trees

```

# install.packages('tree')
library(tidyverse)

## -- Attaching packages ----- tidyverse 1.3.0 --

## v tibble  3.1.0     v dplyr    1.0.5
## v tidyrr   1.1.3     v stringr  1.4.0
## v purrr   0.3.4     vforcats  0.5.1

## Warning: package 'tibble' was built under R version 3.6.2

## Warning: package 'tidyrr' was built under R version 3.6.2

## Warning: package 'purrr' was built under R version 3.6.2

```

```

## Warning: package 'dplyr' was built under R version 3.6.2

## Warning: package 'forcats' was built under R version 3.6.2

## -- Conflicts ----- tidyverse_conflicts() --
## x dplyr::filter() masks stats::filter()
## x dplyr::lag()    masks stats::lag()
## x purrr::lift()   masks caret::lift()
## x dplyr::select() masks MASS::select()

library(tree)

## Registered S3 method overwritten by 'tree':
##   method      from
##   print.tree  cli

RMSE <- function(y, y_hat) {
  rmse <- sqrt(sum(((y_hat - y)^2)/length(y)))
  print(rmse)
}

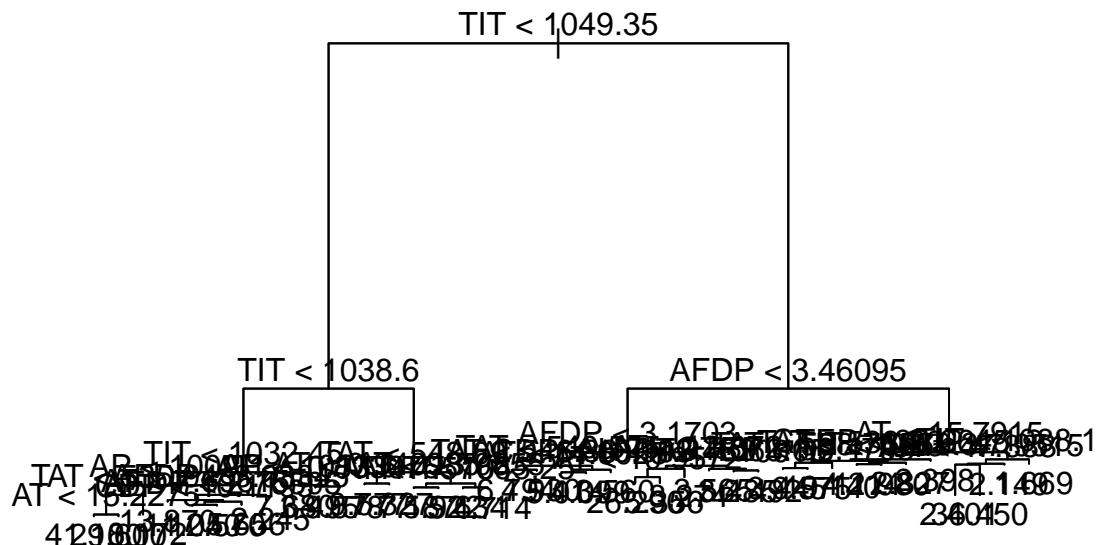
set.seed(1)
train <- gt_2015 %>% dplyr::select(-NOX) %>% sample_frac(0.8)
test <- gt_2015 %>% dplyr::select(-NOX) %>% setdiff(train)

tree_C0 <- tree(CO ~ . , train,
                  control = tree.control(nobs = length(train$CO),
                                         minsize = 2, mindev=0.001), method = "recursive.partition")
summary(tree_C0)

## 
## Regression tree:
## tree(formula = CO ~ ., data = train, control = tree.control(nobs = length(train$CO),
##   minsize = 2, mindev = 0.001), method = "recursive.partition")
## Variables actually used in tree construction:
## [1] "TIT"   "AP"    "TAT"   "AT"    "AFDP"  "CDP"   "AH"    "GTEP"
## Number of terminal nodes: 39
## Residual mean deviance: 0.592 = 3474 / 5868
## Distribution of residuals:
##      Min. 1st Qu. Median Mean 3rd Qu. Max.
## -4.75000 -0.35380 -0.03801 0.00000 0.29350 16.99000

plot(tree_C0)
text(tree_C0, pretty = 0)

```

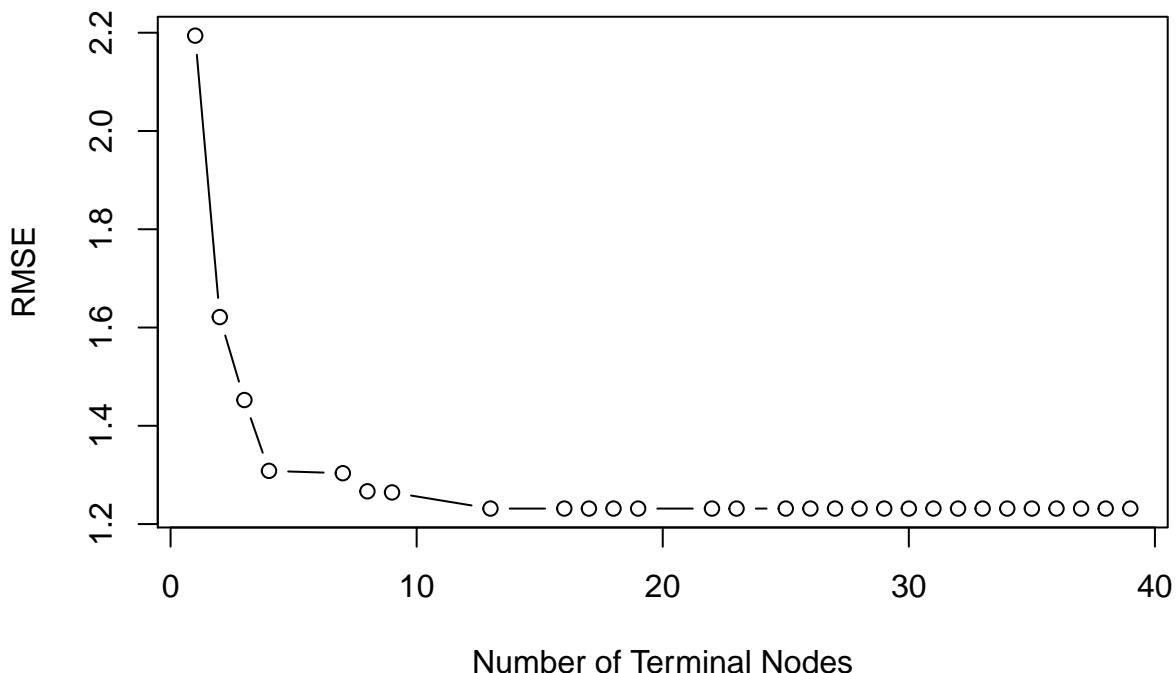


```
tree_pred <- predict(tree_C0, test)
RMSE(test$C0, tree_pred)
```

```
## [1] 1.237462
```

```
cv_info <- cv.tree(tree_C0, FUN = prune.tree)
plot(cv_info$size, sqrt(cv_info$dev / nrow(train)), type = "b", xlab = "Number of Terminal Nodes", ylab = "RMSE")
```

## Decision Tree Cross Validation



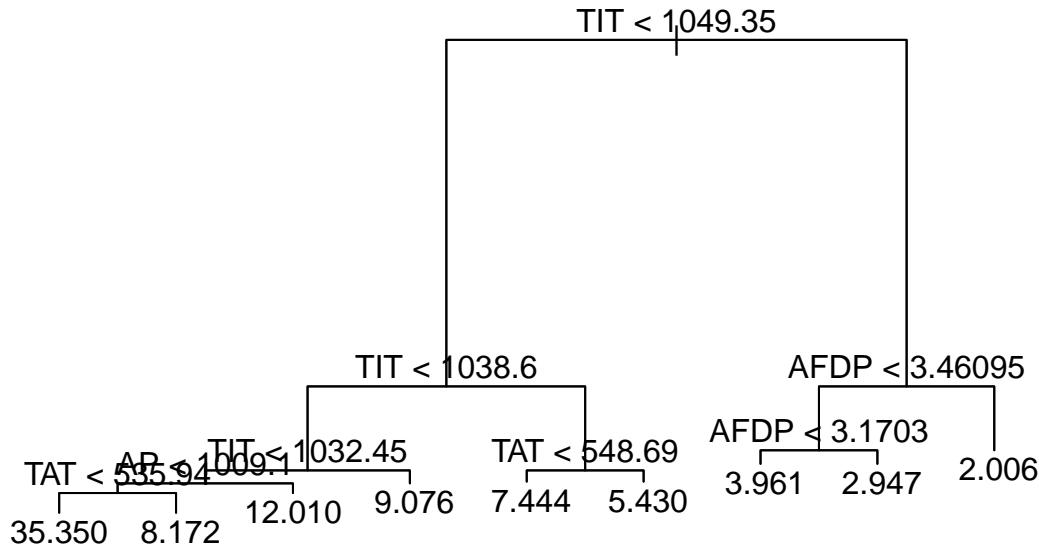
```

pruned_tree <- prune.tree(tree_C0, best = 9)
summary(pruned_tree)

## 
## Regression tree:
## snip.tree(tree = tree_C0, nodes = c(10L, 9L, 32L, 11L, 12L, 17L,
## 13L, 7L))
## Variables actually used in tree construction:
## [1] "TIT"   "AP"    "TAT"   "AFDP"
## Number of terminal nodes: 9
## Residual mean deviance: 1.254 = 7398 / 5898
## Distribution of residuals:
##      Min. 1st Qu. Median     Mean 3rd Qu. Max.
## -10.4400 -0.5023 -0.1009  0.0000  0.4191 34.4500

plot(pruned_tree)
text(pruned_tree, pretty = 0)

```



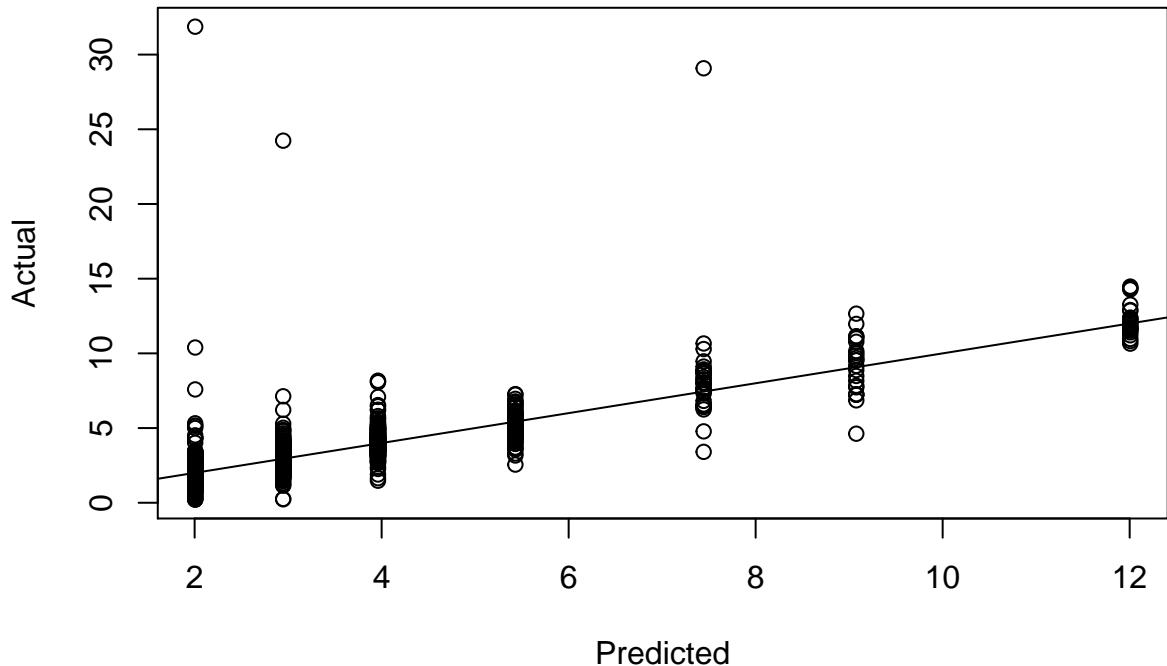
```

tree_pred <- predict(pruned_tree, test)
RMSE(test$C0, tree_pred)

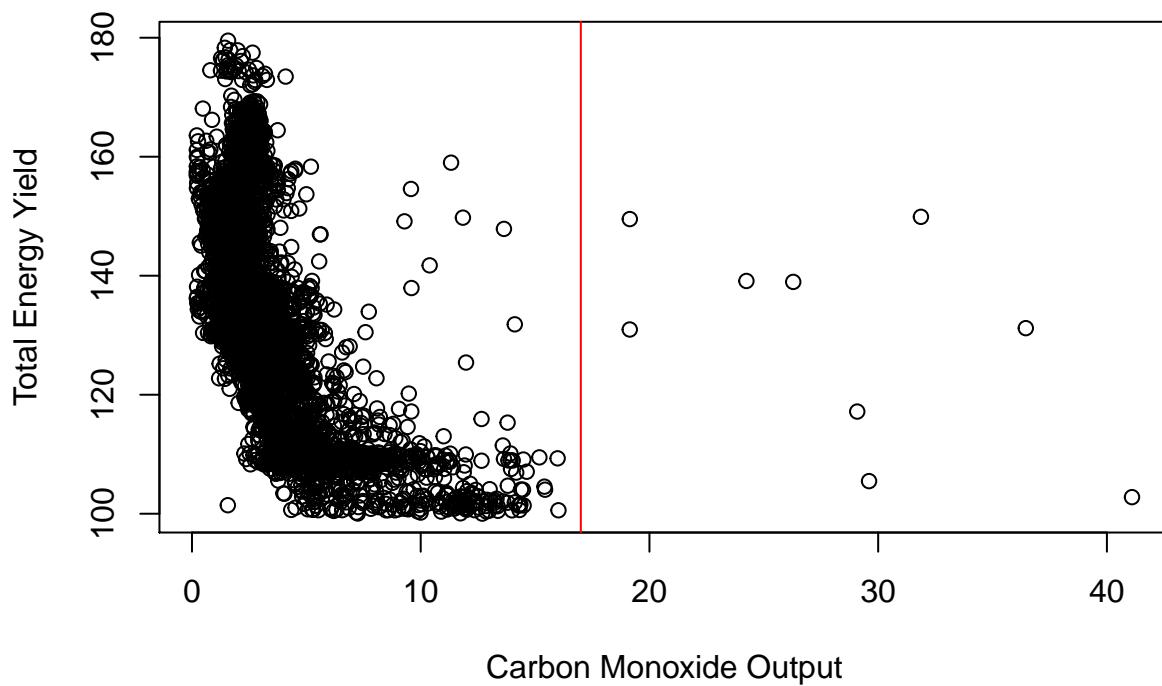
## [1] 1.405592

plot(tree_pred, test$C0, xlab = "Predicted", ylab = "Actual")
abline(0, 1)

```



```
plot(gt_2015$CO, gt_2015$TEY, ylab = "Total Energy Yield", xlab = "Carbon Monoxide Output")
abline(v = 17, col = "red")
```



```
data <- gt_2015 %>% mutate(Emissions = as.factor(ifelse(CO > 17, "High", "Low"))) %>% dplyr::select(-NO)
high_CO <- data %>% filter(CO > 17) %>% dplyr::select(-CO)
low_CO <- data %>% dplyr::select(-CO) %>% setdiff(high_CO)

set.seed(1)
train <- bind_rows(low_CO %>% sample_frac(7/9), high_CO %>% sample_frac(7/9))
test <- data %>% dplyr::select(-CO) %>% setdiff(train)
```

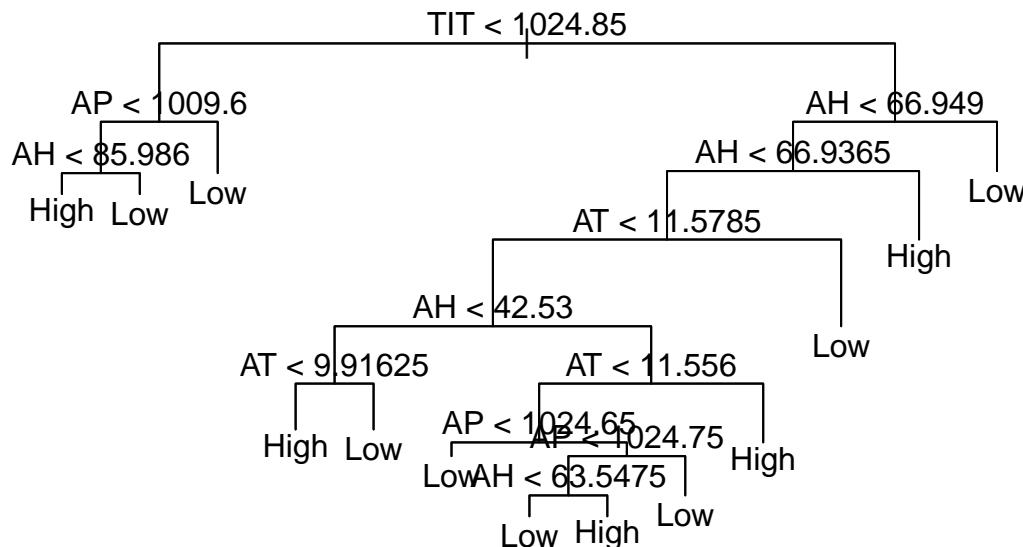
```

tree <- tree(Emissions ~ . , train,
              control = tree.control(nobs = length(train$Emissions),
                                      minsize = 1))
summary(tree)

##
## Classification tree:
## tree(formula = Emissions ~ ., data = train, control = tree.control(nobs = length(train$Emissions),
##                      minsize = 1))
## Variables actually used in tree construction:
## [1] "TIT"  "AP"   "AH"   "AT"
## Number of terminal nodes: 13
## Residual mean deviance: 0 = 0 / 5730
## Misclassification error rate: 0 = 0 / 5743

plot(tree)
text(tree, pretty = 0)

```



```

tree_pred <- predict(tree, train, type = "class")
table(predicted = tree_pred, actual = train$Emissions)

```

```

##           actual
## predicted High  Low
##      High     7    0
##      Low      0 5736

```

```

tree_pred <- predict(tree, test, type = "class")
table(predicted = tree_pred, actual = test$Emissions)

```

```

##           actual
## predicted High  Low
##      High     0    0
##      Low      2 1639

```

```

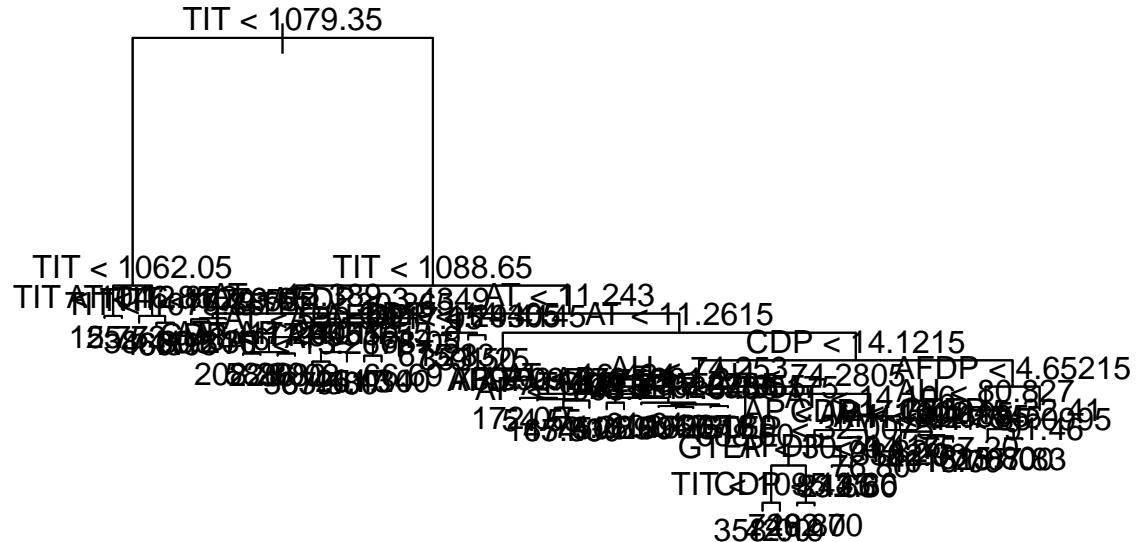
set.seed(1)
# train <- gt_2015 %>% mutate(Energy_CO_Ratio = TEY / CO) %>% sample_frac(0.8)
# test <- gt_2015 %>% mutate(Energy_CO_Ratio = TEY / CO) %>% setdiff(train)
train <- gt_2015 %>% mutate(Energy_CO_Ratio = TEY / CO) %>% dplyr::select(-c(NOX, TEY, CO)) %>% sample_
test <- gt_2015 %>% mutate(Energy_CO_Ratio = TEY / CO) %>% dplyr::select(-c(NOX, TEY, CO)) %>% setdiff(


tree_Energy_CO_Ratio <- tree(Energy_CO_Ratio ~ . , train,
                               control = tree.control(nobs = length(train$Energy_CO_Ratio),
                                                       minsize = 2, mindev=0.001), method = "recursive.partition")
summary(tree_Energy_CO_Ratio)

## 
## Regression tree:
## tree(formula = Energy_CO_Ratio ~ ., data = train, control = tree.control(nobs = length(train$Energy_CO_Ratio),
##                                minsize = 2, mindev = 0.001), method = "recursive.partition")
## Number of terminal nodes:  55
## Residual mean deviance:  496.1 = 2903000 / 5852
## Distribution of residuals:
##    Min. 1st Qu. Median Mean 3rd Qu. Max.
## -89.800 -8.799 -1.732 0.000 4.794 359.500

plot(tree_Energy_CO_Ratio)
text(tree_Energy_CO_Ratio, pretty = 0)

```



```

tree_pred <- predict(tree_Energy_CO_Ratio, test)
RMSE(test$Energy_CO_Ratio, tree_pred)

```

```

## [1] 48.42792

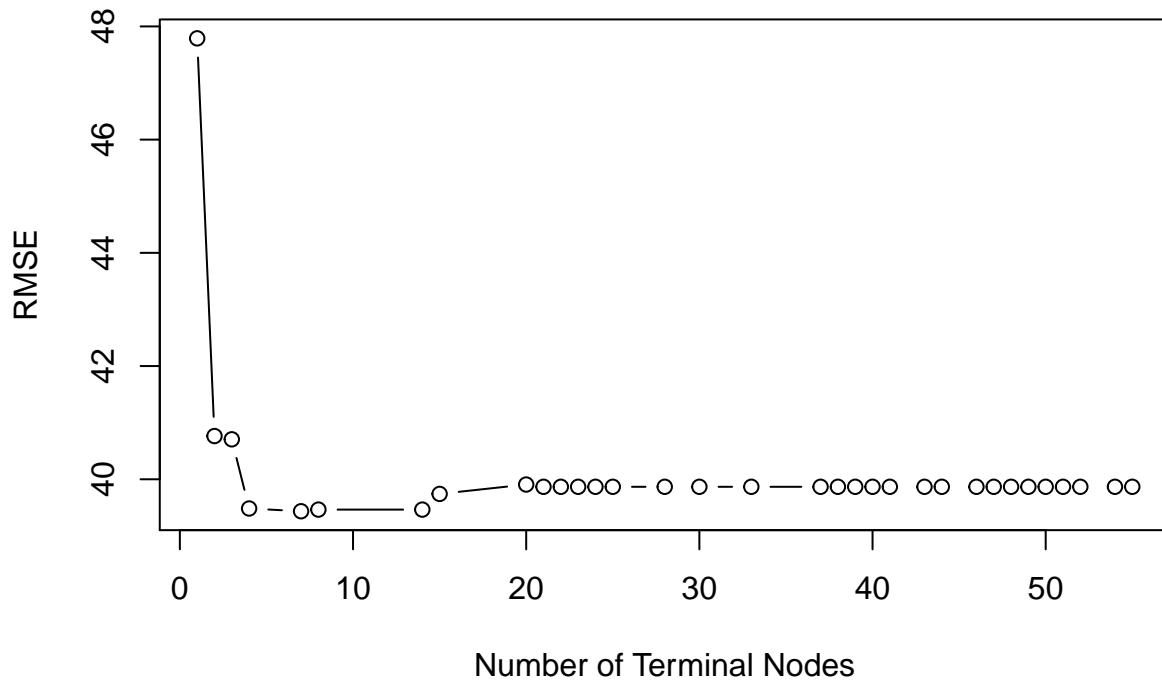
```

```

cv_info <- cv.tree(tree_Energy_CO_Ratio, FUN = prune.tree)
plot(cv_info$size, sqrt(cv_info$dev / nrow(train)), type = "b", xlab = "Number of Terminal Nodes", ylab =

```

## Decision Tree Cross Validation

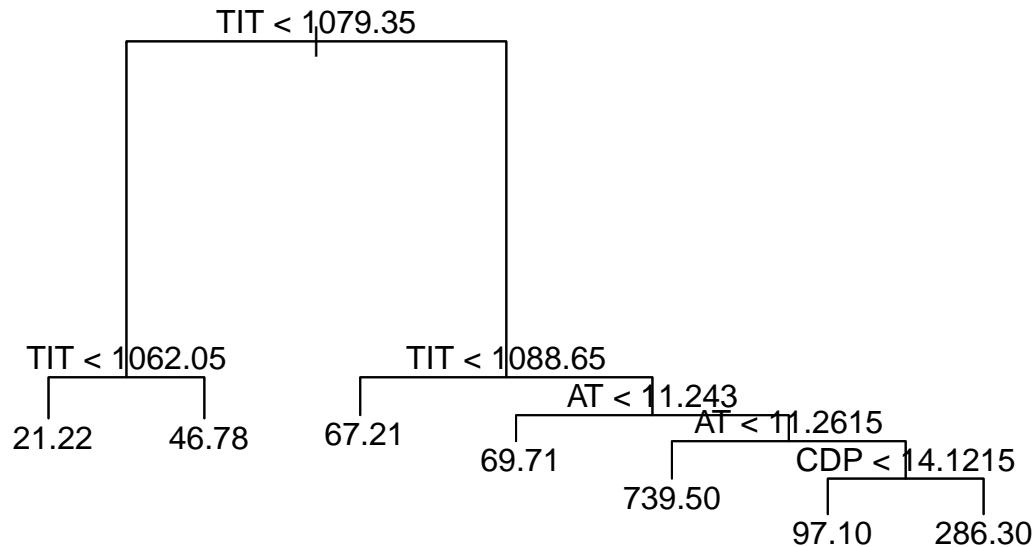


```
pruned_tree <- prune.tree(tree_Energy_CO_Ratio, best = 7)
summary(pruned_tree)
```

```
## 
## Regression tree:
## snip.tree(tree = tree_Energy_CO_Ratio, nodes = c(4L, 14L, 5L,
## 6L, 62L, 63L))
## Variables actually used in tree construction:
## [1] "TIT" "AT"  "CDP"
## Number of terminal nodes: 7
## Residual mean deviance: 1329 = 7843000 / 5900
## Distribution of residuals:
##      Min. 1st Qu. Median     Mean 3rd Qu.    Max.
## -226.400 -12.500 -3.957  0.000  6.555 639.000
```

```
plot(pruned_tree)
text(pruned_tree, pretty = 0)
```



```
tree_pred <- predict(pruned_tree, test)
RMSE(test$Energy_CO_Ratio, tree_pred)
```

```
## [1] 45.78954
```

```
plot(tree_pred, test$Energy_CO_Ratio, xlab = "Predicted", ylab = "Actual")
abline(0, 1)
```

