STAT448 - Assignment 2

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2022-09-05

```
## Loading required package: ggplot2

## Loading required package: lattice

##
## Attaching package: 'corrgram'

## The following object is masked from 'package:lattice':
##
##     panel.fill

## Loading required package: Matrix

## Loaded glmnet 4.1-4
```

Question 1

a)

As there are many variables available in the dataset, we thought the use of multiple correlation charts to show the correlation throughout the dataset would be the most appropriate. The data has been split into their respected categories as seen in the excel file. The categories are also then compared to the two output variables (108, 109)to show correlation to the outcomes throughout the dataset.

```
corrgram(Residen[,c(1:4, 108, 109)])
```
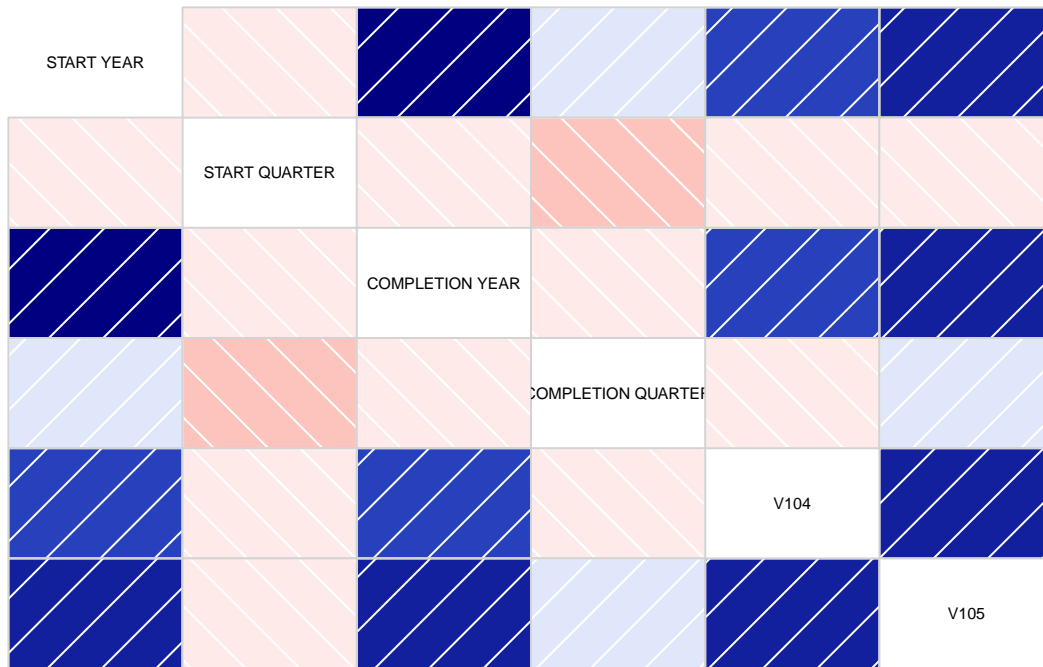
Residen[,c(1:4, 108, 109)] relates to PROJECT DATES (PERSIAN CALENDAR) START QUARTER has slight negative correlation to all the variables within the correlation chart, and COMPLETION YEAR and COMPLETION QUARTER also have slight negative correlation to each other, as does COMPLETION QUARTER and the output variable V104. COMPLETION QUARTER also only has slight positive correlation to START YEAR and V105 and its negative correlation is stronger than the other negative correlations displayed in this chart. All other variables have strong positive correlations with some lesser positive correlation in relation to V104.

```
corrgram(Residen[,c(5:12, 108, 109)])
```
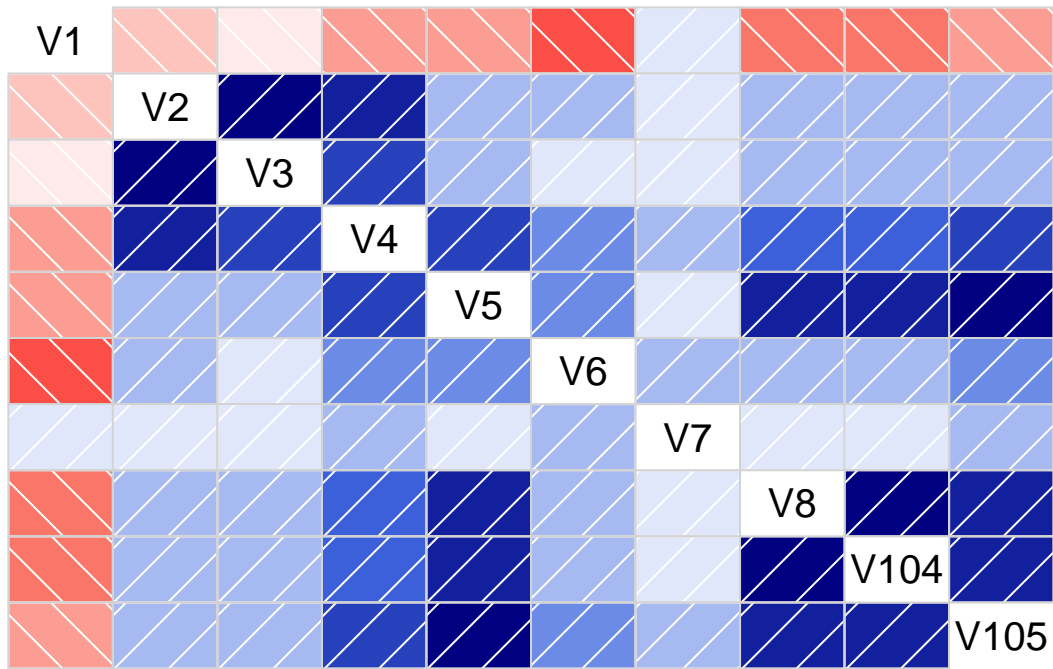
Residen[,c(5:12, 108, 109)] relates to PROJECT PHYSICAL AND FINANCIAL VARIABLES V1 has negative correlation to all variables except for V7 which shows a weak positive correlation. V2, V3 and V4 all have a strong correlation to each other, and it is also obvious that V4 has a stronger correlation to all other variables, apart from V1 compared to the other variables in the chart. In contrast, V7 has a weak positive correlation to all variables in the chart. V8 shows the strongest correlation to the outcome variables.

```
corrgram(Residen[,c(13:31, 108, 109)])
```
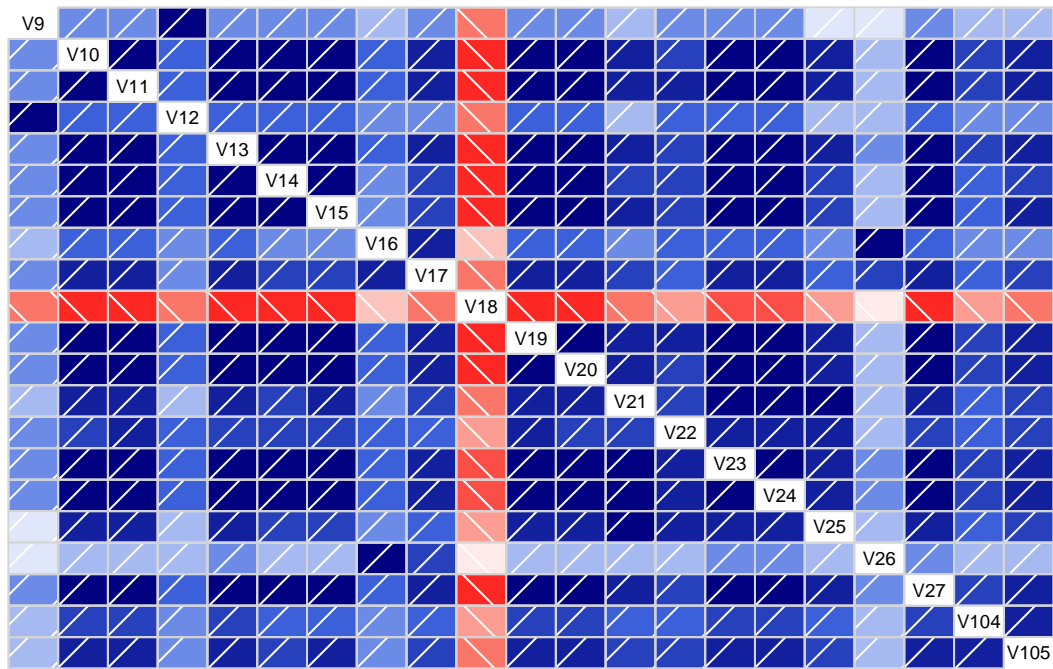
Residen[,c(13:31, 108, 109)] relates to ECONOMIC VARIABLES AND INDICES IN TIME LAG 1 V18 is the variable that has a strong negative correlation to nearly every variable in the chart except for V26 which is a very weak negative and V16 AND V17 which both display strong positive correlation levels. Similar to the last correlation chart where V7 showed more correlation to the negative value and weak positive to all other variables, V26 displays the same characteristics. V12 displays a weaker correlation that the rest of the variables, except V9 but not to the extent of V26. V9 also shows weak positives to all variables apart from the strong positive correlation to V12. Many more variables display high positive correlation to the outcome variables V104 and V105.

```
corrgram(Residen[,c(32:50, 108, 109)])
```
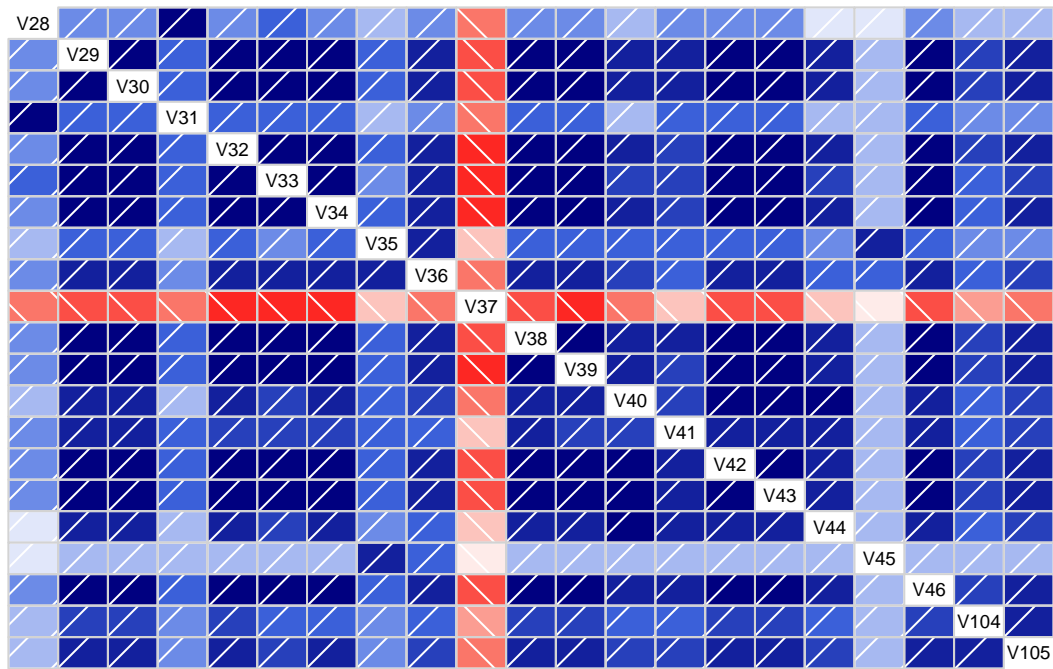
Residen[,c(32:50, 108, 109)] relates to ECONOMIC VARIABLES AND INDICES IN TIME LAG 2 The trend stays mostly the same with V28 displaying the same characteristics as V9 and V31 matching V12 with some minor adjustments in terms of weak to strong positive correlation. V37 is the strong negative correlation in this subset of data. V45 shows weak positives to all variables except for two stronger positive correlations to V35 and V36 and the weak negative to V37. All other variables display a strong positive correlation to the two outcome variables.
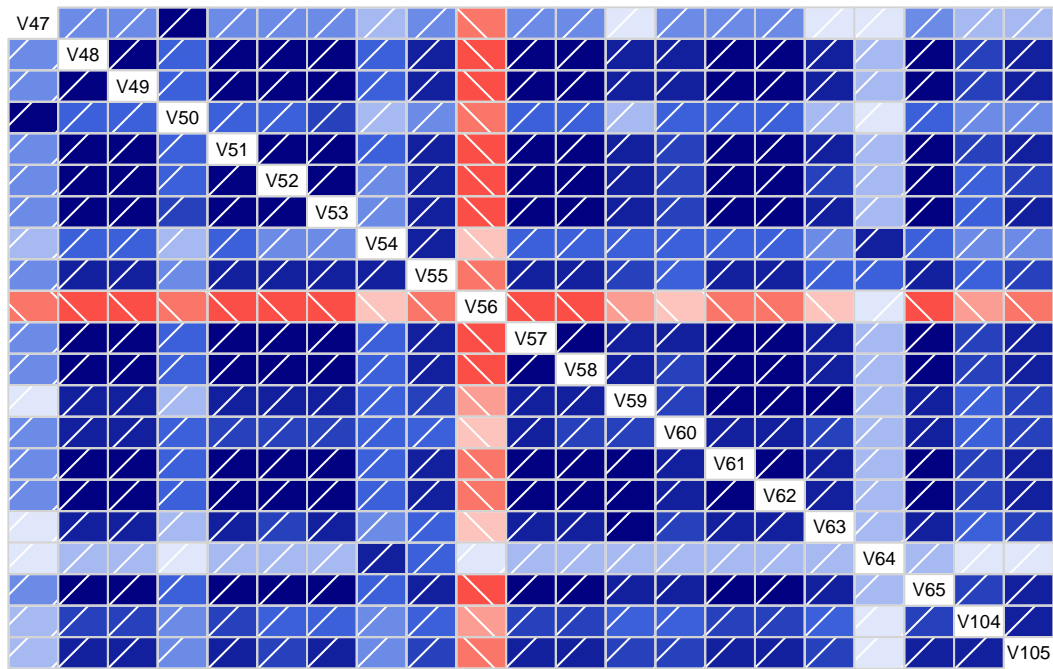
```
corrgram(Residen[,c(51:69, 108, 109)])
```

Residen[,c(51:69, 108, 109)] relates to ECONOMIC VARIABLES AND INDICES IN TIME LAG 3 V56 displays the strong negative correlation to all other variables except for the weak positive correlation to V64. V47 displays weak positives to all other variables except for the strong positive correlation to V50. V50 also then shows weak positive correlation to all other variables, although stronger positives in comparison to V47. V54 also shows a weaker positive correlation to all other variables. V64 shows very weak positive correlation to all variables except for V54 and V55 which are strong positives. All other variables display strong positive correlation to the two outcome variables.

```
corrgram(Residen[,c(70:88, 108, 109)])
```

Residen[,c(70:88, 108, 109)] relates to ECONOMIC VARIABLES AND INDICES IN TIME LAG 4 V75 is the one that displays negative correlation throughout all the variables, although there are now 3 variables which show weaker correlation, 2 negative V73 and V79 and 1 positive V83. V83 displays weak positive correlation to all other variables other than V73 and V74 which have strong correlation. V66 and V69 display weak positive correlation to all other variables apart from each other which is a strong positive correlation. V73 also shows weaker positive correlation to all other variables apart from V74 and V83. All other variables display a high level of positive correlation to the outcome variables.

```
corrgram(Residen[,89:109])
```

Residen[,89:109] relates to ECONOMIC VARIABLES AND INDICES IN TIME LAG 5 V94 displays a medium negative correlation to all variables except V98, V101, V102 and V104. V98 and V102 show a weak positive correlation to V94 whereas V101 and V104 show a weak negative correlation. V85 and V88 both display a weak positive correlation to all other variables apart from each other which display a strong positive correlation. V102 shows a weak positive correlation to all variables except V92 and V934 which shows as a much stronger positive correlation. All other variables show a high level of positive correlation with the outcome variables.

Overall, there are clear patterns within the dataset, which are present throughout all time lags. There will be fine margins to determine the best features for the model.

b)

```
resdat <- Residen[,-109]

res.mod = lm(resdat$V104 ~ .,data=resdat)
summary(res.mod)
```

```
##
## Call:
## lm(formula = resdat$V104 ~ ., data = resdat)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
```

```
## -901.15   -52.29    -1.50    45.71   645.31
##
## Coefficients: (32 not defined because of singularities)
##                      Estimate Std. Error t value Pr(>|t|)
## (Intercept)          1.004e+05  1.999e+05   0.502 0.615781
## `START YEAR`        -1.614e+03  3.388e+03  -0.476 0.634175
## `START QUARTER`     -4.928e+02  2.457e+03  -0.201 0.841139
## `COMPLETION YEAR`    1.521e+02  1.689e+01   9.007  < 2e-16 ***
## `COMPLETION QUARTER` 5.984e+01  8.881e+00   6.738 8.36e-11 ***
## V1                  -4.779e+00  2.225e+00  -2.148 0.032529 *
## V2                   6.630e-02  2.195e-02   3.020 0.002746 **
## V3                  -2.331e-01  6.451e-02  -3.612 0.000356 ***
## V4                   6.442e-03  3.570e-02   0.180 0.856905
## V5                  -6.548e-01  3.342e-01  -1.960 0.050975 .
## V6                   8.764e-02  6.322e-02   1.386 0.166727
## V7                         NA         NA      NA       NA
## V8                   1.203e+00  1.681e-02  71.579  < 2e-16 ***
## V9                   2.016e-01  1.103e+00   0.183 0.855159
## V10                  1.373e+02  9.675e+02   0.142 0.887245
## V11                  1.048e+01  7.426e+01   0.141 0.887830
## V12                 -1.626e+02  6.837e+02  -0.238 0.812200
## V13                  1.329e-04  1.125e-01   0.001 0.999058
## V14                  1.799e-01  4.339e-01   0.415 0.678643
## V15                 -2.265e+01  5.008e+01  -0.452 0.651433
## V16                  8.696e-01  2.753e+00   0.316 0.752315
## V17                 -4.247e-03  1.860e-01  -0.023 0.981801
## V18                  2.328e+02  1.235e+03   0.188 0.850672
## V19                 -2.007e-01  4.647e+00  -0.043 0.965587
## V20                 -3.910e-01  1.187e+00  -0.329 0.742147
## V21                  6.422e-02  3.565e-01   0.180 0.857174
## V22                  3.682e-03  4.524e-01   0.008 0.993511
## V23                  6.413e+00  6.128e+02   0.010 0.991658
## V24                  4.270e+01  2.347e+02   0.182 0.855747
## V25                  5.267e-02  1.033e-01   0.510 0.610369
## V26                 -4.675e-04  4.268e-01  -0.001 0.999127
## V27                  9.455e-04  9.654e-03   0.098 0.922046
## V28                  5.915e-02  1.795e-01   0.330 0.741930
## V29                 -1.144e+02  8.626e+02  -0.133 0.894615
## V30                 -7.247e+00  1.452e+02  -0.050 0.960240
## V31                 -9.085e+01  3.036e+02  -0.299 0.764953
## V32                 -1.780e-03  8.287e-02  -0.021 0.982879
## V33                 -5.666e-02  3.707e-01  -0.153 0.878630
## V34                 -9.607e+00  1.077e+02  -0.089 0.929008
## V35                  9.323e-01  1.976e+00   0.472 0.637449
## V36                  1.490e-02  8.094e-02   0.184 0.854034
## V37                  7.421e+01  6.343e+02   0.117 0.906942
## V38                 -4.162e-01  6.246e+00  -0.067 0.946913
## V39                  6.458e-01  2.013e+00   0.321 0.748563
## V40                 -8.375e-02  1.877e-01  -0.446 0.655784
## V41                  1.615e-01  5.671e-01   0.285 0.776052
## V42                  1.890e+02  6.380e+02   0.296 0.767239
## V43                 -1.891e+02  8.982e+02  -0.211 0.833373
## V44                 -1.202e-02  5.531e-01  -0.022 0.982673
## V45                 -1.184e-02  3.554e-01  -0.033 0.973441
```

```
## V46                        -1.038e-03 8.216e-03  -0.126 0.899575
## V47                         1.040e-01 2.590e-01   0.402 0.688186
## V48                         1.119e+02 1.334e+03   0.084 0.933224
## V49                        -3.006e+01 4.980e+01  -0.604 0.546571
## V50                        -1.746e+02 4.440e+02  -0.393 0.694395
## V51                         6.526e-03 1.409e-01   0.046 0.963102
## V52                        -7.985e-02 4.933e-01  -0.162 0.871519
## V53                         6.439e+00 1.296e+02   0.050 0.960422
## V54                         2.405e+00 4.657e+00   0.516 0.605918
## V55                        -1.698e-02 1.631e-01  -0.104 0.917133
## V56                         3.089e+01 2.974e+02   0.104 0.917333
## V57                        -2.722e-01 2.233e+00  -0.122 0.903072
## V58                         3.539e-01 3.079e+00   0.115 0.908564
## V59                        -9.660e-02 5.540e-01  -0.174 0.861684
## V60                        -2.140e-01 1.307e+00  -0.164 0.870070
## V61                         4.198e+01 1.636e+02   0.257 0.797647
## V62                         2.040e+02 1.364e+03   0.150 0.881170
## V63                        -1.273e-01 8.479e-01  -0.150 0.880716
## V64                        -2.178e-02 3.772e-01  -0.058 0.953994
## V65                        -9.490e-04 8.072e-03  -0.118 0.906483
## V66                         6.260e-02 6.990e-01   0.090 0.928700
## V67                        -2.018e+02 7.758e+02  -0.260 0.794924
## V68                         6.947e+01 7.047e+01   0.986 0.324982
## V69                         1.248e+02 1.397e+02   0.894 0.372099
## V70                        -9.328e-03 4.437e-02  -0.210 0.833629
## V71                        -1.346e-01 4.248e-01  -0.317 0.751583
## V72                        -1.492e+01 2.247e+02  -0.066 0.947118
## V73                                NA        NA      NA       NA
## V74                                NA        NA      NA       NA
## V75                                NA        NA      NA       NA
## V76                                NA        NA      NA       NA
## V77                                NA        NA      NA       NA
## V78                                NA        NA      NA       NA
## V79                                NA        NA      NA       NA
## V80                                NA        NA      NA       NA
## V81                                NA        NA      NA       NA
## V82                                NA        NA      NA       NA
## V83                                NA        NA      NA       NA
## V84                                NA        NA      NA       NA
## V85                                NA        NA      NA       NA
## V86                                NA        NA      NA       NA
## V87                                NA        NA      NA       NA
## V88                                NA        NA      NA       NA
## V89                                NA        NA      NA       NA
## V90                                NA        NA      NA       NA
## V91                                NA        NA      NA       NA
## V92                                NA        NA      NA       NA
## V93                                NA        NA      NA       NA
## V94                                NA        NA      NA       NA
## V95                                NA        NA      NA       NA
## V96                                NA        NA      NA       NA
## V97                                NA        NA      NA       NA
## V98                                NA        NA      NA       NA
## V99                                NA        NA      NA       NA
```

```
## V100                         NA         NA        NA        NA
## V101                         NA         NA        NA        NA
## V102                         NA         NA        NA        NA
## V103                         NA         NA        NA        NA
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 148.6 on 296 degrees of freedom
## Multiple R-squared:  0.9879, Adjusted R-squared:  0.9848
## F-statistic: 321.9 on 75 and 296 DF,  p-value: < 2.2e-16
```

We can see that the residuals shown in the summary do not appear to be strongly symmetrical. This means that the model is predicting points that are fairly far away from the actual observed points.

COMPLETION YEAR, COMPLETION QUARTER, V3 and V8 all are highly significant p-values as they are very close to 0. Many of the other variables fall much closer to 1 and are not considered significant to the model. There are also a fair few NA values which means that these variables are more linearly related to the other variables.

The adjusted R-squared value of 0.9848 is very close to 1 which means that is does explain the observed variance in the response variable and that the model fits the actual data fairly well.

The F-statistic shows that the model is performing better than random, which shows how the model can outperform noise as a predictor.

c)

```
set.seed(2022)

row.number <- sample(1:nrow(resdat), 0.8*nrow(resdat))

train <- resdat[row.number,]
test <- resdat[-row.number,]

model <- lm(train$V104 ~., data=train)
model0 <- lm(train$V104~1, data=train)


start_time <- Sys.time()
back.model <- stepAIC(model, direction="backward")
```

```
## Start:  AIC=3063.29
## train$V104 ~ 'START YEAR' + 'START QUARTER' + 'COMPLETION YEAR' +
##     'COMPLETION QUARTER' + V1 + V2 + V3 + V4 + V5 + V6 + V7 +
##     V8 + V9 + V10 + V11 + V12 + V13 + V14 + V15 + V16 + V17 +
##     V18 + V19 + V20 + V21 + V22 + V23 + V24 + V25 + V26 + V27 +
##     V28 + V29 + V30 + V31 + V32 + V33 + V34 + V35 + V36 + V37 +
##     V38 + V39 + V40 + V41 + V42 + V43 + V44 + V45 + V46 + V47 +
##     V48 + V49 + V50 + V51 + V52 + V53 + V54 + V55 + V56 + V57 +
##     V58 + V59 + V60 + V61 + V62 + V63 + V64 + V65 + V66 + V67 +
##     V68 + V69 + V70 + V71 + V72 + V73 + V74 + V75 + V76 + V77 +
##     V78 + V79 + V80 + V81 + V82 + V83 + V84 + V85 + V86 + V87 +
##     V88 + V89 + V90 + V91 + V92 + V93 + V94 + V95 + V96 + V97 +
##     V98 + V99 + V100 + V101 + V102 + V103
```

```
## 
## 
## Step:  AIC=3063.29
## train$V104 ~ ‘START YEAR‘ + ‘START QUARTER‘ + ‘COMPLETION YEAR‘ +
##     ‘COMPLETION QUARTER‘ + V1 + V2 + V3 + V4 + V5 + V6 + V7 +
##     V8 + V9 + V10 + V11 + V12 + V13 + V14 + V15 + V16 + V17 +
##     V18 + V19 + V20 + V21 + V22 + V23 + V24 + V25 + V26 + V27 +
##     V28 + V29 + V30 + V31 + V32 + V33 + V34 + V35 + V36 + V37 +
##     V38 + V39 + V40 + V41 + V42 + V43 + V44 + V45 + V46 + V47 +
##     V48 + V49 + V50 + V51 + V52 + V53 + V54 + V55 + V56 + V57 +
##     V58 + V59 + V60 + V61 + V62 + V63 + V64 + V65 + V66 + V67 +
##     V68 + V69 + V70 + V71 + V72 + V73 + V74 + V75 + V76 + V77 +
##     V78 + V79 + V80 + V81 + V82 + V83 + V84 + V85 + V86 + V87 +
##     V88 + V89 + V90 + V91 + V92 + V93 + V94 + V95 + V96 + V97 +
##     V98 + V99 + V100 + V101 + V102
## 
## 
## Step:  AIC=3063.29
## train$V104 ~ ‘START YEAR‘ + ‘START QUARTER‘ + ‘COMPLETION YEAR‘ +
##     ‘COMPLETION QUARTER‘ + V1 + V2 + V3 + V4 + V5 + V6 + V7 +
##     V8 + V9 + V10 + V11 + V12 + V13 + V14 + V15 + V16 + V17 +
##     V18 + V19 + V20 + V21 + V22 + V23 + V24 + V25 + V26 + V27 +
##     V28 + V29 + V30 + V31 + V32 + V33 + V34 + V35 + V36 + V37 +
##     V38 + V39 + V40 + V41 + V42 + V43 + V44 + V45 + V46 + V47 +
##     V48 + V49 + V50 + V51 + V52 + V53 + V54 + V55 + V56 + V57 +
##     V58 + V59 + V60 + V61 + V62 + V63 + V64 + V65 + V66 + V67 +
##     V68 + V69 + V70 + V71 + V72 + V73 + V74 + V75 + V76 + V77 +
##     V78 + V79 + V80 + V81 + V82 + V83 + V84 + V85 + V86 + V87 +
##     V88 + V89 + V90 + V91 + V92 + V93 + V94 + V95 + V96 + V97 +
##     V98 + V99 + V100 + V101
## 
## 
## Step:  AIC=3063.29
## train$V104 ~ ‘START YEAR‘ + ‘START QUARTER‘ + ‘COMPLETION YEAR‘ +
##     ‘COMPLETION QUARTER‘ + V1 + V2 + V3 + V4 + V5 + V6 + V7 +
##     V8 + V9 + V10 + V11 + V12 + V13 + V14 + V15 + V16 + V17 +
##     V18 + V19 + V20 + V21 + V22 + V23 + V24 + V25 + V26 + V27 +
##     V28 + V29 + V30 + V31 + V32 + V33 + V34 + V35 + V36 + V37 +
##     V38 + V39 + V40 + V41 + V42 + V43 + V44 + V45 + V46 + V47 +
##     V48 + V49 + V50 + V51 + V52 + V53 + V54 + V55 + V56 + V57 +
##     V58 + V59 + V60 + V61 + V62 + V63 + V64 + V65 + V66 + V67 +
##     V68 + V69 + V70 + V71 + V72 + V73 + V74 + V75 + V76 + V77 +
##     V78 + V79 + V80 + V81 + V82 + V83 + V84 + V85 + V86 + V87 +
##     V88 + V89 + V90 + V91 + V92 + V93 + V94 + V95 + V96 + V97 +
##     V98 + V99 + V100
## 
## 
## Step:  AIC=3063.29
## train$V104 ~ ‘START YEAR‘ + ‘START QUARTER‘ + ‘COMPLETION YEAR‘ +
##     ‘COMPLETION QUARTER‘ + V1 + V2 + V3 + V4 + V5 + V6 + V7 +
##     V8 + V9 + V10 + V11 + V12 + V13 + V14 + V15 + V16 + V17 +
##     V18 + V19 + V20 + V21 + V22 + V23 + V24 + V25 + V26 + V27 +
##     V28 + V29 + V30 + V31 + V32 + V33 + V34 + V35 + V36 + V37 +
##     V38 + V39 + V40 + V41 + V42 + V43 + V44 + V45 + V46 + V47 +
```

```
##      V48 + V49 + V50 + V51 + V52 + V53 + V54 + V55 + V56 + V57 +
##      V58 + V59 + V60 + V61 + V62 + V63 + V64 + V65 + V66 + V67 +
##      V68 + V69 + V70 + V71 + V72 + V73 + V74 + V75 + V76 + V77 +
##      V78 + V79 + V80 + V81 + V82 + V83 + V84 + V85 + V86 + V87 +
##      V88 + V89 + V90 + V91 + V92 + V93 + V94 + V95 + V96 + V97 +
##      V98 + V99
##
##
## Step:  AIC=3063.29
## train$V104 ~ 'START YEAR' + 'START QUARTER' + 'COMPLETION YEAR' +
##      'COMPLETION QUARTER' + V1 + V2 + V3 + V4 + V5 + V6 + V7 +
##      V8 + V9 + V10 + V11 + V12 + V13 + V14 + V15 + V16 + V17 +
##      V18 + V19 + V20 + V21 + V22 + V23 + V24 + V25 + V26 + V27 +
##      V28 + V29 + V30 + V31 + V32 + V33 + V34 + V35 + V36 + V37 +
##      V38 + V39 + V40 + V41 + V42 + V43 + V44 + V45 + V46 + V47 +
##      V48 + V49 + V50 + V51 + V52 + V53 + V54 + V55 + V56 + V57 +
##      V58 + V59 + V60 + V61 + V62 + V63 + V64 + V65 + V66 + V67 +
##      V68 + V69 + V70 + V71 + V72 + V73 + V74 + V75 + V76 + V77 +
##      V78 + V79 + V80 + V81 + V82 + V83 + V84 + V85 + V86 + V87 +
##      V88 + V89 + V90 + V91 + V92 + V93 + V94 + V95 + V96 + V97 +
##      V98
##
##
## Step:  AIC=3063.29
## train$V104 ~ 'START YEAR' + 'START QUARTER' + 'COMPLETION YEAR' +
##      'COMPLETION QUARTER' + V1 + V2 + V3 + V4 + V5 + V6 + V7 +
##      V8 + V9 + V10 + V11 + V12 + V13 + V14 + V15 + V16 + V17 +
##      V18 + V19 + V20 + V21 + V22 + V23 + V24 + V25 + V26 + V27 +
##      V28 + V29 + V30 + V31 + V32 + V33 + V34 + V35 + V36 + V37 +
##      V38 + V39 + V40 + V41 + V42 + V43 + V44 + V45 + V46 + V47 +
##      V48 + V49 + V50 + V51 + V52 + V53 + V54 + V55 + V56 + V57 +
##      V58 + V59 + V60 + V61 + V62 + V63 + V64 + V65 + V66 + V67 +
##      V68 + V69 + V70 + V71 + V72 + V73 + V74 + V75 + V76 + V77 +
##      V78 + V79 + V80 + V81 + V82 + V83 + V84 + V85 + V86 + V87 +
##      V88 + V89 + V90 + V91 + V92 + V93 + V94 + V95 + V96 + V97
##
##
## Step:  AIC=3063.29
## train$V104 ~ 'START YEAR' + 'START QUARTER' + 'COMPLETION YEAR' +
##      'COMPLETION QUARTER' + V1 + V2 + V3 + V4 + V5 + V6 + V7 +
##      V8 + V9 + V10 + V11 + V12 + V13 + V14 + V15 + V16 + V17 +
##      V18 + V19 + V20 + V21 + V22 + V23 + V24 + V25 + V26 + V27 +
##      V28 + V29 + V30 + V31 + V32 + V33 + V34 + V35 + V36 + V37 +
##      V38 + V39 + V40 + V41 + V42 + V43 + V44 + V45 + V46 + V47 +
##      V48 + V49 + V50 + V51 + V52 + V53 + V54 + V55 + V56 + V57 +
##      V58 + V59 + V60 + V61 + V62 + V63 + V64 + V65 + V66 + V67 +
##      V68 + V69 + V70 + V71 + V72 + V73 + V74 + V75 + V76 + V77 +
##      V78 + V79 + V80 + V81 + V82 + V83 + V84 + V85 + V86 + V87 +
##      V88 + V89 + V90 + V91 + V92 + V93 + V94 + V95 + V96
##
##
## Step:  AIC=3063.29
## train$V104 ~ 'START YEAR' + 'START QUARTER' + 'COMPLETION YEAR' +
##      'COMPLETION QUARTER' + V1 + V2 + V3 + V4 + V5 + V6 + V7 +
```

```
##      V8 + V9 + V10 + V11 + V12 + V13 + V14 + V15 + V16 + V17 +
##      V18 + V19 + V20 + V21 + V22 + V23 + V24 + V25 + V26 + V27 +
##      V28 + V29 + V30 + V31 + V32 + V33 + V34 + V35 + V36 + V37 +
##      V38 + V39 + V40 + V41 + V42 + V43 + V44 + V45 + V46 + V47 +
##      V48 + V49 + V50 + V51 + V52 + V53 + V54 + V55 + V56 + V57 +
##      V58 + V59 + V60 + V61 + V62 + V63 + V64 + V65 + V66 + V67 +
##      V68 + V69 + V70 + V71 + V72 + V73 + V74 + V75 + V76 + V77 +
##      V78 + V79 + V80 + V81 + V82 + V83 + V84 + V85 + V86 + V87 +
##      V88 + V89 + V90 + V91 + V92 + V93 + V94 + V95
##
##
## Step:  AIC=3063.29
## train$V104 ~ ‘START YEAR‘ + ‘START QUARTER‘ + ‘COMPLETION YEAR‘ +
##      ‘COMPLETION QUARTER‘ + V1 + V2 + V3 + V4 + V5 + V6 + V7 +
##      V8 + V9 + V10 + V11 + V12 + V13 + V14 + V15 + V16 + V17 +
##      V18 + V19 + V20 + V21 + V22 + V23 + V24 + V25 + V26 + V27 +
##      V28 + V29 + V30 + V31 + V32 + V33 + V34 + V35 + V36 + V37 +
##      V38 + V39 + V40 + V41 + V42 + V43 + V44 + V45 + V46 + V47 +
##      V48 + V49 + V50 + V51 + V52 + V53 + V54 + V55 + V56 + V57 +
##      V58 + V59 + V60 + V61 + V62 + V63 + V64 + V65 + V66 + V67 +
##      V68 + V69 + V70 + V71 + V72 + V73 + V74 + V75 + V76 + V77 +
##      V78 + V79 + V80 + V81 + V82 + V83 + V84 + V85 + V86 + V87 +
##      V88 + V89 + V90 + V91 + V92 + V93 + V94
##
##
## Step:  AIC=3063.29
## train$V104 ~ ‘START YEAR‘ + ‘START QUARTER‘ + ‘COMPLETION YEAR‘ +
##      ‘COMPLETION QUARTER‘ + V1 + V2 + V3 + V4 + V5 + V6 + V7 +
##      V8 + V9 + V10 + V11 + V12 + V13 + V14 + V15 + V16 + V17 +
##      V18 + V19 + V20 + V21 + V22 + V23 + V24 + V25 + V26 + V27 +
##      V28 + V29 + V30 + V31 + V32 + V33 + V34 + V35 + V36 + V37 +
##      V38 + V39 + V40 + V41 + V42 + V43 + V44 + V45 + V46 + V47 +
##      V48 + V49 + V50 + V51 + V52 + V53 + V54 + V55 + V56 + V57 +
##      V58 + V59 + V60 + V61 + V62 + V63 + V64 + V65 + V66 + V67 +
##      V68 + V69 + V70 + V71 + V72 + V73 + V74 + V75 + V76 + V77 +
##      V78 + V79 + V80 + V81 + V82 + V83 + V84 + V85 + V86 + V87 +
##      V88 + V89 + V90 + V91 + V92 + V93
##
##
## Step:  AIC=3063.29
## train$V104 ~ ‘START YEAR‘ + ‘START QUARTER‘ + ‘COMPLETION YEAR‘ +
##      ‘COMPLETION QUARTER‘ + V1 + V2 + V3 + V4 + V5 + V6 + V7 +
##      V8 + V9 + V10 + V11 + V12 + V13 + V14 + V15 + V16 + V17 +
##      V18 + V19 + V20 + V21 + V22 + V23 + V24 + V25 + V26 + V27 +
##      V28 + V29 + V30 + V31 + V32 + V33 + V34 + V35 + V36 + V37 +
##      V38 + V39 + V40 + V41 + V42 + V43 + V44 + V45 + V46 + V47 +
##      V48 + V49 + V50 + V51 + V52 + V53 + V54 + V55 + V56 + V57 +
##      V58 + V59 + V60 + V61 + V62 + V63 + V64 + V65 + V66 + V67 +
##      V68 + V69 + V70 + V71 + V72 + V73 + V74 + V75 + V76 + V77 +
##      V78 + V79 + V80 + V81 + V82 + V83 + V84 + V85 + V86 + V87 +
##      V88 + V89 + V90 + V91 + V92
##
##
## Step:  AIC=3063.29
```

```
## train$V104 ~ 'START YEAR' + 'START QUARTER' + 'COMPLETION YEAR' +
##     'COMPLETION QUARTER' + V1 + V2 + V3 + V4 + V5 + V6 + V7 +
##     V8 + V9 + V10 + V11 + V12 + V13 + V14 + V15 + V16 + V17 +
##     V18 + V19 + V20 + V21 + V22 + V23 + V24 + V25 + V26 + V27 +
##     V28 + V29 + V30 + V31 + V32 + V33 + V34 + V35 + V36 + V37 +
##     V38 + V39 + V40 + V41 + V42 + V43 + V44 + V45 + V46 + V47 +
##     V48 + V49 + V50 + V51 + V52 + V53 + V54 + V55 + V56 + V57 +
##     V58 + V59 + V60 + V61 + V62 + V63 + V64 + V65 + V66 + V67 +
##     V68 + V69 + V70 + V71 + V72 + V73 + V74 + V75 + V76 + V77 +
##     V78 + V79 + V80 + V81 + V82 + V83 + V84 + V85 + V86 + V87 +
##     V88 + V89 + V90 + V91
##
##
## Step:  AIC=3063.29
## train$V104 ~ 'START YEAR' + 'START QUARTER' + 'COMPLETION YEAR' +
##     'COMPLETION QUARTER' + V1 + V2 + V3 + V4 + V5 + V6 + V7 +
##     V8 + V9 + V10 + V11 + V12 + V13 + V14 + V15 + V16 + V17 +
##     V18 + V19 + V20 + V21 + V22 + V23 + V24 + V25 + V26 + V27 +
##     V28 + V29 + V30 + V31 + V32 + V33 + V34 + V35 + V36 + V37 +
##     V38 + V39 + V40 + V41 + V42 + V43 + V44 + V45 + V46 + V47 +
##     V48 + V49 + V50 + V51 + V52 + V53 + V54 + V55 + V56 + V57 +
##     V58 + V59 + V60 + V61 + V62 + V63 + V64 + V65 + V66 + V67 +
##     V68 + V69 + V70 + V71 + V72 + V73 + V74 + V75 + V76 + V77 +
##     V78 + V79 + V80 + V81 + V82 + V83 + V84 + V85 + V86 + V87 +
##     V88 + V89 + V90
##
##
## Step:  AIC=3063.29
## train$V104 ~ 'START YEAR' + 'START QUARTER' + 'COMPLETION YEAR' +
##     'COMPLETION QUARTER' + V1 + V2 + V3 + V4 + V5 + V6 + V7 +
##     V8 + V9 + V10 + V11 + V12 + V13 + V14 + V15 + V16 + V17 +
##     V18 + V19 + V20 + V21 + V22 + V23 + V24 + V25 + V26 + V27 +
##     V28 + V29 + V30 + V31 + V32 + V33 + V34 + V35 + V36 + V37 +
##     V38 + V39 + V40 + V41 + V42 + V43 + V44 + V45 + V46 + V47 +
##     V48 + V49 + V50 + V51 + V52 + V53 + V54 + V55 + V56 + V57 +
##     V58 + V59 + V60 + V61 + V62 + V63 + V64 + V65 + V66 + V67 +
##     V68 + V69 + V70 + V71 + V72 + V73 + V74 + V75 + V76 + V77 +
##     V78 + V79 + V80 + V81 + V82 + V83 + V84 + V85 + V86 + V87 +
##     V88 + V89
##
##
## Step:  AIC=3063.29
## train$V104 ~ 'START YEAR' + 'START QUARTER' + 'COMPLETION YEAR' +
##     'COMPLETION QUARTER' + V1 + V2 + V3 + V4 + V5 + V6 + V7 +
##     V8 + V9 + V10 + V11 + V12 + V13 + V14 + V15 + V16 + V17 +
##     V18 + V19 + V20 + V21 + V22 + V23 + V24 + V25 + V26 + V27 +
##     V28 + V29 + V30 + V31 + V32 + V33 + V34 + V35 + V36 + V37 +
##     V38 + V39 + V40 + V41 + V42 + V43 + V44 + V45 + V46 + V47 +
##     V48 + V49 + V50 + V51 + V52 + V53 + V54 + V55 + V56 + V57 +
##     V58 + V59 + V60 + V61 + V62 + V63 + V64 + V65 + V66 + V67 +
##     V68 + V69 + V70 + V71 + V72 + V73 + V74 + V75 + V76 + V77 +
##     V78 + V79 + V80 + V81 + V82 + V83 + V84 + V85 + V86 + V87 +
##     V88
##
```

```
## 
## Step:  AIC=3063.29
## train$V104 ~ 'START YEAR' + 'START QUARTER' + 'COMPLETION YEAR' +
##     'COMPLETION QUARTER' + V1 + V2 + V3 + V4 + V5 + V6 + V7 +
##     V8 + V9 + V10 + V11 + V12 + V13 + V14 + V15 + V16 + V17 +
##     V18 + V19 + V20 + V21 + V22 + V23 + V24 + V25 + V26 + V27 +
##     V28 + V29 + V30 + V31 + V32 + V33 + V34 + V35 + V36 + V37 +
##     V38 + V39 + V40 + V41 + V42 + V43 + V44 + V45 + V46 + V47 +
##     V48 + V49 + V50 + V51 + V52 + V53 + V54 + V55 + V56 + V57 +
##     V58 + V59 + V60 + V61 + V62 + V63 + V64 + V65 + V66 + V67 +
##     V68 + V69 + V70 + V71 + V72 + V73 + V74 + V75 + V76 + V77 +
##     V78 + V79 + V80 + V81 + V82 + V83 + V84 + V85 + V86 + V87
## 
## 
## Step:  AIC=3063.29
## train$V104 ~ 'START YEAR' + 'START QUARTER' + 'COMPLETION YEAR' +
##     'COMPLETION QUARTER' + V1 + V2 + V3 + V4 + V5 + V6 + V7 +
##     V8 + V9 + V10 + V11 + V12 + V13 + V14 + V15 + V16 + V17 +
##     V18 + V19 + V20 + V21 + V22 + V23 + V24 + V25 + V26 + V27 +
##     V28 + V29 + V30 + V31 + V32 + V33 + V34 + V35 + V36 + V37 +
##     V38 + V39 + V40 + V41 + V42 + V43 + V44 + V45 + V46 + V47 +
##     V48 + V49 + V50 + V51 + V52 + V53 + V54 + V55 + V56 + V57 +
##     V58 + V59 + V60 + V61 + V62 + V63 + V64 + V65 + V66 + V67 +
##     V68 + V69 + V70 + V71 + V72 + V73 + V74 + V75 + V76 + V77 +
##     V78 + V79 + V80 + V81 + V82 + V83 + V84 + V85 + V86
## 
## 
## Step:  AIC=3063.29
## train$V104 ~ 'START YEAR' + 'START QUARTER' + 'COMPLETION YEAR' +
##     'COMPLETION QUARTER' + V1 + V2 + V3 + V4 + V5 + V6 + V7 +
##     V8 + V9 + V10 + V11 + V12 + V13 + V14 + V15 + V16 + V17 +
##     V18 + V19 + V20 + V21 + V22 + V23 + V24 + V25 + V26 + V27 +
##     V28 + V29 + V30 + V31 + V32 + V33 + V34 + V35 + V36 + V37 +
##     V38 + V39 + V40 + V41 + V42 + V43 + V44 + V45 + V46 + V47 +
##     V48 + V49 + V50 + V51 + V52 + V53 + V54 + V55 + V56 + V57 +
##     V58 + V59 + V60 + V61 + V62 + V63 + V64 + V65 + V66 + V67 +
##     V68 + V69 + V70 + V71 + V72 + V73 + V74 + V75 + V76 + V77 +
##     V78 + V79 + V80 + V81 + V82 + V83 + V84 + V85
## 
## 
## Step:  AIC=3063.29
## train$V104 ~ 'START YEAR' + 'START QUARTER' + 'COMPLETION YEAR' +
##     'COMPLETION QUARTER' + V1 + V2 + V3 + V4 + V5 + V6 + V7 +
##     V8 + V9 + V10 + V11 + V12 + V13 + V14 + V15 + V16 + V17 +
##     V18 + V19 + V20 + V21 + V22 + V23 + V24 + V25 + V26 + V27 +
##     V28 + V29 + V30 + V31 + V32 + V33 + V34 + V35 + V36 + V37 +
##     V38 + V39 + V40 + V41 + V42 + V43 + V44 + V45 + V46 + V47 +
##     V48 + V49 + V50 + V51 + V52 + V53 + V54 + V55 + V56 + V57 +
##     V58 + V59 + V60 + V61 + V62 + V63 + V64 + V65 + V66 + V67 +
##     V68 + V69 + V70 + V71 + V72 + V73 + V74 + V75 + V76 + V77 +
##     V78 + V79 + V80 + V81 + V82 + V83 + V84
## 
## 
## Step:  AIC=3063.29
```

```
## train$V104 ~ 'START YEAR' + 'START QUARTER' + 'COMPLETION YEAR' +
##     'COMPLETION QUARTER' + V1 + V2 + V3 + V4 + V5 + V6 + V7 +
##     V8 + V9 + V10 + V11 + V12 + V13 + V14 + V15 + V16 + V17 +
##     V18 + V19 + V20 + V21 + V22 + V23 + V24 + V25 + V26 + V27 +
##     V28 + V29 + V30 + V31 + V32 + V33 + V34 + V35 + V36 + V37 +
##     V38 + V39 + V40 + V41 + V42 + V43 + V44 + V45 + V46 + V47 +
##     V48 + V49 + V50 + V51 + V52 + V53 + V54 + V55 + V56 + V57 +
##     V58 + V59 + V60 + V61 + V62 + V63 + V64 + V65 + V66 + V67 +
##     V68 + V69 + V70 + V71 + V72 + V73 + V74 + V75 + V76 + V77 +
##     V78 + V79 + V80 + V81 + V82 + V83
##
##
## Step:  AIC=3063.29
## train$V104 ~ 'START YEAR' + 'START QUARTER' + 'COMPLETION YEAR' +
##     'COMPLETION QUARTER' + V1 + V2 + V3 + V4 + V5 + V6 + V7 +
##     V8 + V9 + V10 + V11 + V12 + V13 + V14 + V15 + V16 + V17 +
##     V18 + V19 + V20 + V21 + V22 + V23 + V24 + V25 + V26 + V27 +
##     V28 + V29 + V30 + V31 + V32 + V33 + V34 + V35 + V36 + V37 +
##     V38 + V39 + V40 + V41 + V42 + V43 + V44 + V45 + V46 + V47 +
##     V48 + V49 + V50 + V51 + V52 + V53 + V54 + V55 + V56 + V57 +
##     V58 + V59 + V60 + V61 + V62 + V63 + V64 + V65 + V66 + V67 +
##     V68 + V69 + V70 + V71 + V72 + V73 + V74 + V75 + V76 + V77 +
##     V78 + V79 + V80 + V81 + V82
##
##
## Step:  AIC=3063.29
## train$V104 ~ 'START YEAR' + 'START QUARTER' + 'COMPLETION YEAR' +
##     'COMPLETION QUARTER' + V1 + V2 + V3 + V4 + V5 + V6 + V7 +
##     V8 + V9 + V10 + V11 + V12 + V13 + V14 + V15 + V16 + V17 +
##     V18 + V19 + V20 + V21 + V22 + V23 + V24 + V25 + V26 + V27 +
##     V28 + V29 + V30 + V31 + V32 + V33 + V34 + V35 + V36 + V37 +
##     V38 + V39 + V40 + V41 + V42 + V43 + V44 + V45 + V46 + V47 +
##     V48 + V49 + V50 + V51 + V52 + V53 + V54 + V55 + V56 + V57 +
##     V58 + V59 + V60 + V61 + V62 + V63 + V64 + V65 + V66 + V67 +
##     V68 + V69 + V70 + V71 + V72 + V73 + V74 + V75 + V76 + V77 +
##     V78 + V79 + V80 + V81
##
##
## Step:  AIC=3063.29
## train$V104 ~ 'START YEAR' + 'START QUARTER' + 'COMPLETION YEAR' +
##     'COMPLETION QUARTER' + V1 + V2 + V3 + V4 + V5 + V6 + V7 +
##     V8 + V9 + V10 + V11 + V12 + V13 + V14 + V15 + V16 + V17 +
##     V18 + V19 + V20 + V21 + V22 + V23 + V24 + V25 + V26 + V27 +
##     V28 + V29 + V30 + V31 + V32 + V33 + V34 + V35 + V36 + V37 +
##     V38 + V39 + V40 + V41 + V42 + V43 + V44 + V45 + V46 + V47 +
##     V48 + V49 + V50 + V51 + V52 + V53 + V54 + V55 + V56 + V57 +
##     V58 + V59 + V60 + V61 + V62 + V63 + V64 + V65 + V66 + V67 +
##     V68 + V69 + V70 + V71 + V72 + V73 + V74 + V75 + V76 + V77 +
##     V78 + V79 + V80
##
##
## Step:  AIC=3063.29
## train$V104 ~ 'START YEAR' + 'START QUARTER' + 'COMPLETION YEAR' +
##     'COMPLETION QUARTER' + V1 + V2 + V3 + V4 + V5 + V6 + V7 +
```

```
##      V8 + V9 + V10 + V11 + V12 + V13 + V14 + V15 + V16 + V17 +
##      V18 + V19 + V20 + V21 + V22 + V23 + V24 + V25 + V26 + V27 +
##      V28 + V29 + V30 + V31 + V32 + V33 + V34 + V35 + V36 + V37 +
##      V38 + V39 + V40 + V41 + V42 + V43 + V44 + V45 + V46 + V47 +
##      V48 + V49 + V50 + V51 + V52 + V53 + V54 + V55 + V56 + V57 +
##      V58 + V59 + V60 + V61 + V62 + V63 + V64 + V65 + V66 + V67 +
##      V68 + V69 + V70 + V71 + V72 + V73 + V74 + V75 + V76 + V77 +
##      V78 + V79
##
##
## Step:  AIC=3063.29
## train$V104 ~ 'START YEAR' + 'START QUARTER' + 'COMPLETION YEAR' +
##      'COMPLETION QUARTER' + V1 + V2 + V3 + V4 + V5 + V6 + V7 +
##      V8 + V9 + V10 + V11 + V12 + V13 + V14 + V15 + V16 + V17 +
##      V18 + V19 + V20 + V21 + V22 + V23 + V24 + V25 + V26 + V27 +
##      V28 + V29 + V30 + V31 + V32 + V33 + V34 + V35 + V36 + V37 +
##      V38 + V39 + V40 + V41 + V42 + V43 + V44 + V45 + V46 + V47 +
##      V48 + V49 + V50 + V51 + V52 + V53 + V54 + V55 + V56 + V57 +
##      V58 + V59 + V60 + V61 + V62 + V63 + V64 + V65 + V66 + V67 +
##      V68 + V69 + V70 + V71 + V72 + V73 + V74 + V75 + V76 + V77 +
##      V78
##
##
## Step:  AIC=3063.29
## train$V104 ~ 'START YEAR' + 'START QUARTER' + 'COMPLETION YEAR' +
##      'COMPLETION QUARTER' + V1 + V2 + V3 + V4 + V5 + V6 + V7 +
##      V8 + V9 + V10 + V11 + V12 + V13 + V14 + V15 + V16 + V17 +
##      V18 + V19 + V20 + V21 + V22 + V23 + V24 + V25 + V26 + V27 +
##      V28 + V29 + V30 + V31 + V32 + V33 + V34 + V35 + V36 + V37 +
##      V38 + V39 + V40 + V41 + V42 + V43 + V44 + V45 + V46 + V47 +
##      V48 + V49 + V50 + V51 + V52 + V53 + V54 + V55 + V56 + V57 +
##      V58 + V59 + V60 + V61 + V62 + V63 + V64 + V65 + V66 + V67 +
##      V68 + V69 + V70 + V71 + V72 + V73 + V74 + V75 + V76 + V77
##
##
## Step:  AIC=3063.29
## train$V104 ~ 'START YEAR' + 'START QUARTER' + 'COMPLETION YEAR' +
##      'COMPLETION QUARTER' + V1 + V2 + V3 + V4 + V5 + V6 + V7 +
##      V8 + V9 + V10 + V11 + V12 + V13 + V14 + V15 + V16 + V17 +
##      V18 + V19 + V20 + V21 + V22 + V23 + V24 + V25 + V26 + V27 +
##      V28 + V29 + V30 + V31 + V32 + V33 + V34 + V35 + V36 + V37 +
##      V38 + V39 + V40 + V41 + V42 + V43 + V44 + V45 + V46 + V47 +
##      V48 + V49 + V50 + V51 + V52 + V53 + V54 + V55 + V56 + V57 +
##      V58 + V59 + V60 + V61 + V62 + V63 + V64 + V65 + V66 + V67 +
##      V68 + V69 + V70 + V71 + V72 + V73 + V74 + V75 + V76
##
##
## Step:  AIC=3063.29
## train$V104 ~ 'START YEAR' + 'START QUARTER' + 'COMPLETION YEAR' +
##      'COMPLETION QUARTER' + V1 + V2 + V3 + V4 + V5 + V6 + V7 +
##      V8 + V9 + V10 + V11 + V12 + V13 + V14 + V15 + V16 + V17 +
##      V18 + V19 + V20 + V21 + V22 + V23 + V24 + V25 + V26 + V27 +
##      V28 + V29 + V30 + V31 + V32 + V33 + V34 + V35 + V36 + V37 +
##      V38 + V39 + V40 + V41 + V42 + V43 + V44 + V45 + V46 + V47 +
```

```
##      V48 + V49 + V50 + V51 + V52 + V53 + V54 + V55 + V56 + V57 +
##      V58 + V59 + V60 + V61 + V62 + V63 + V64 + V65 + V66 + V67 +
##      V68 + V69 + V70 + V71 + V72 + V73 + V74 + V75
##
##
## Step:  AIC=3063.29
## train$V104 ~ ‘START YEAR‘ + ‘START QUARTER‘ + ‘COMPLETION YEAR‘ +
##      ‘COMPLETION QUARTER‘ + V1 + V2 + V3 + V4 + V5 + V6 + V7 +
##      V8 + V9 + V10 + V11 + V12 + V13 + V14 + V15 + V16 + V17 +
##      V18 + V19 + V20 + V21 + V22 + V23 + V24 + V25 + V26 + V27 +
##      V28 + V29 + V30 + V31 + V32 + V33 + V34 + V35 + V36 + V37 +
##      V38 + V39 + V40 + V41 + V42 + V43 + V44 + V45 + V46 + V47 +
##      V48 + V49 + V50 + V51 + V52 + V53 + V54 + V55 + V56 + V57 +
##      V58 + V59 + V60 + V61 + V62 + V63 + V64 + V65 + V66 + V67 +
##      V68 + V69 + V70 + V71 + V72 + V73 + V74
##
##
## Step:  AIC=3063.29
## train$V104 ~ ‘START YEAR‘ + ‘START QUARTER‘ + ‘COMPLETION YEAR‘ +
##      ‘COMPLETION QUARTER‘ + V1 + V2 + V3 + V4 + V5 + V6 + V7 +
##      V8 + V9 + V10 + V11 + V12 + V13 + V14 + V15 + V16 + V17 +
##      V18 + V19 + V20 + V21 + V22 + V23 + V24 + V25 + V26 + V27 +
##      V28 + V29 + V30 + V31 + V32 + V33 + V34 + V35 + V36 + V37 +
##      V38 + V39 + V40 + V41 + V42 + V43 + V44 + V45 + V46 + V47 +
##      V48 + V49 + V50 + V51 + V52 + V53 + V54 + V55 + V56 + V57 +
##      V58 + V59 + V60 + V61 + V62 + V63 + V64 + V65 + V66 + V67 +
##      V68 + V69 + V70 + V71 + V72 + V73
##
##
## Step:  AIC=3063.29
## train$V104 ~ ‘START YEAR‘ + ‘START QUARTER‘ + ‘COMPLETION YEAR‘ +
##      ‘COMPLETION QUARTER‘ + V1 + V2 + V3 + V4 + V5 + V6 + V7 +
##      V8 + V9 + V10 + V11 + V12 + V13 + V14 + V15 + V16 + V17 +
##      V18 + V19 + V20 + V21 + V22 + V23 + V24 + V25 + V26 + V27 +
##      V28 + V29 + V30 + V31 + V32 + V33 + V34 + V35 + V36 + V37 +
##      V38 + V39 + V40 + V41 + V42 + V43 + V44 + V45 + V46 + V47 +
##      V48 + V49 + V50 + V51 + V52 + V53 + V54 + V55 + V56 + V57 +
##      V58 + V59 + V60 + V61 + V62 + V63 + V64 + V65 + V66 + V67 +
##      V68 + V69 + V70 + V71 + V72
##
##
## Step:  AIC=3063.29
## train$V104 ~ ‘START YEAR‘ + ‘START QUARTER‘ + ‘COMPLETION YEAR‘ +
##      ‘COMPLETION QUARTER‘ + V1 + V2 + V3 + V4 + V5 + V6 + V7 +
##      V8 + V9 + V10 + V11 + V12 + V13 + V14 + V15 + V16 + V17 +
##      V18 + V19 + V20 + V21 + V22 + V23 + V24 + V25 + V26 + V27 +
##      V28 + V29 + V30 + V31 + V32 + V33 + V34 + V35 + V36 + V37 +
##      V38 + V39 + V40 + V41 + V42 + V43 + V44 + V45 + V46 + V47 +
##      V48 + V49 + V50 + V51 + V52 + V53 + V54 + V55 + V56 + V57 +
##      V58 + V59 + V60 + V61 + V62 + V63 + V64 + V65 + V66 + V67 +
##      V68 + V69 + V70 + V71
##
##
## Step:  AIC=3063.29
```

```
## train$V104 ~ 'START YEAR' + 'START QUARTER' + 'COMPLETION YEAR' +
##      'COMPLETION QUARTER' + V1 + V2 + V3 + V4 + V5 + V6 + V7 +
##      V8 + V9 + V10 + V11 + V12 + V13 + V14 + V15 + V16 + V17 +
##      V18 + V19 + V20 + V21 + V22 + V23 + V24 + V25 + V26 + V27 +
##      V28 + V29 + V30 + V31 + V32 + V33 + V34 + V35 + V36 + V37 +
##      V38 + V39 + V40 + V41 + V42 + V43 + V44 + V45 + V46 + V47 +
##      V48 + V49 + V50 + V51 + V52 + V53 + V54 + V55 + V56 + V57 +
##      V58 + V59 + V60 + V61 + V62 + V63 + V64 + V65 + V66 + V67 +
##      V68 + V69 + V70
##
##
## Step:  AIC=3063.29
## train$V104 ~ 'START YEAR' + 'START QUARTER' + 'COMPLETION YEAR' +
##      'COMPLETION QUARTER' + V1 + V2 + V3 + V4 + V5 + V6 + V8 +
##      V9 + V10 + V11 + V12 + V13 + V14 + V15 + V16 + V17 + V18 +
##      V19 + V20 + V21 + V22 + V23 + V24 + V25 + V26 + V27 + V28 +
##      V29 + V30 + V31 + V32 + V33 + V34 + V35 + V36 + V37 + V38 +
##      V39 + V40 + V41 + V42 + V43 + V44 + V45 + V46 + V47 + V48 +
##      V49 + V50 + V51 + V52 + V53 + V54 + V55 + V56 + V57 + V58 +
##      V59 + V60 + V61 + V62 + V63 + V64 + V65 + V66 + V67 + V68 +
##      V69 + V70
##
##                         Df Sum of Sq      RSS    AIC
## - V43                    1         7  5441201 3061.3
## - V9                     1         8  5441202 3061.3
## - V25                    1        16  5441210 3061.3
## - V20                    1        26  5441220 3061.3
## - V30                    1        35  5441229 3061.3
## - V24                    1        72  5441266 3061.3
## - V52                    1       108  5441302 3061.3
## - V62                    1       110  5441304 3061.3
## - V69                    1       124  5441318 3061.3
## - 'START QUARTER'        1       226  5441420 3061.3
## - V35                    1       279  5441473 3061.3
## - V17                    1       321  5441515 3061.3
## - V39                    1       375  5441569 3061.3
## - V22                    1       377  5441571 3061.3
## - V58                    1       396  5441590 3061.3
## - V54                    1       522  5441716 3061.3
## - V28                    1       529  5441723 3061.3
## - V63                    1       598  5441792 3061.3
## - V50                    1       649  5441843 3061.3
## - V53                    1       712  5441906 3061.3
## - V38                    1       832  5442026 3061.3
## - V47                    1       850  5442044 3061.3
## - V18                    1       953  5442147 3061.3
## - V27                    1       970  5442164 3061.3
## - V57                    1      1060  5442254 3061.3
## - V31                    1      1102  5442296 3061.3
## - V29                    1      1144  5442338 3061.3
## - V65                    1      1441  5442635 3061.4
## - V61                    1      1466  5442660 3061.4
## - V64                    1      1541  5442735 3061.4
## - V46                    1      1658  5442852 3061.4
```

```
## - V10                       1      1705  5442899 3061.4
## - V55                       1      1724  5442918 3061.4
## - V21                       1      1740  5442934 3061.4
## - V26                       1      1955  5443149 3061.4
## - V45                       1      1998  5443192 3061.4
## - V37                       1      2040  5443234 3061.4
## - V48                       1      2490  5443684 3061.4
## - V51                       1      2546  5443740 3061.4
## - V49                       1      2973  5444167 3061.4
## - V56                       1      2996  5444190 3061.4
## - V67                       1      3267  5444461 3061.5
## - V19                       1      3938  5445132 3061.5
## - V60                       1      4121  5445315 3061.5
## - V23                       1      4230  5445424 3061.5
## - V12                       1      4494  5445688 3061.5
## - V14                       1      5005  5446199 3061.6
## - V66                       1      5223  5446417 3061.6
## - V16                       1      5318  5446512 3061.6
## - V41                       1      5382  5446576 3061.6
## - V36                       1      5496  5446690 3061.6
## - V59                       1      6990  5448184 3061.7
## - V33                       1      7223  5448417 3061.7
## - V11                       1      7392  5448586 3061.7
## - 'START YEAR'              1      7532  5448726 3061.7
## - V4                        1      7561  5448755 3061.7
## - V13                       1      8466  5449660 3061.7
## - V42                       1     11044  5452238 3061.9
## - V44                       1     12287  5453481 3062.0
## - V15                       1     12540  5453734 3062.0
## - V68                       1     12883  5454077 3062.0
## - V34                       1     16599  5457793 3062.2
## - V70                       1     16757  5457951 3062.2
## - V40                       1     19123  5460317 3062.3
## - V32                       1     28490  5469684 3062.8
## <none>                                   5441194 3063.3
## - V6                        1     53000  5494194 3064.2
## - V5                        1     56154  5497348 3064.3
## - V1                        1    118100  5559294 3067.7
## - V2                        1    130323  5571517 3068.3
## - V3                        1    149374  5590568 3069.3
## - 'COMPLETION QUARTER'  1    613376  6054570 3093.0
## - 'COMPLETION YEAR'     1    714939  6156133 3098.0
## - V8                        1  92124914 97566108 3918.6
##
## Step:  AIC=3061.29
## train$V104 ~ 'START YEAR' + 'START QUARTER' + 'COMPLETION YEAR' +
##     'COMPLETION QUARTER' + V1 + V2 + V3 + V4 + V5 + V6 + V8 +
##     V9 + V10 + V11 + V12 + V13 + V14 + V15 + V16 + V17 + V18 +
##     V19 + V20 + V21 + V22 + V23 + V24 + V25 + V26 + V27 + V28 +
##     V29 + V30 + V31 + V32 + V33 + V34 + V35 + V36 + V37 + V38 +
##     V39 + V40 + V41 + V42 + V44 + V45 + V46 + V47 + V48 + V49 +
##     V50 + V51 + V52 + V53 + V54 + V55 + V56 + V57 + V58 + V59 +
##     V60 + V61 + V62 + V63 + V64 + V65 + V66 + V67 + V68 + V69 +
##     V70
```

```
##
##                          Df Sum of Sq      RSS    AIC
## - V9                      1         1  5441202 3059.3
## - V25                     1        18  5441219 3059.3
## - V20                     1        19  5441220 3059.3
## - V30                     1        34  5441235 3059.3
## - V24                     1       106  5441307 3059.3
## - V69                     1       136  5441338 3059.3
## - V62                     1       144  5441346 3059.3
## - `START QUARTER`         1       268  5441469 3059.3
## - V35                     1       325  5441527 3059.3
## - V52                     1       381  5441582 3059.3
## - V17                     1       399  5441600 3059.3
## - V39                     1       455  5441656 3059.3
## - V54                     1       515  5441717 3059.3
## - V58                     1       546  5441748 3059.3
## - V28                     1       579  5441780 3059.3
## - V63                     1       751  5441952 3059.3
## - V50                     1       814  5442015 3059.3
## - V47                     1       843  5442044 3059.3
## - V27                     1      1032  5442233 3059.3
## - V53                     1      1135  5442336 3059.3
## - V22                     1      1187  5442389 3059.4
## - V31                     1      1224  5442425 3059.4
## - V29                     1      1248  5442450 3059.4
## - V65                     1      1459  5442660 3059.4
## - V64                     1      1535  5442736 3059.4
## - V61                     1      1576  5442777 3059.4
## - V18                     1      1636  5442838 3059.4
## - V10                     1      1743  5442944 3059.4
## - V21                     1      1764  5442966 3059.4
## - V46                     1      1782  5442983 3059.4
## - V38                     1      1795  5442996 3059.4
## - V55                     1      1817  5443018 3059.4
## - V26                     1      1949  5443150 3059.4
## - V45                     1      2006  5443208 3059.4
## - V51                     1      2887  5444088 3059.4
## - V37                     1      2982  5444183 3059.4
## - V49                     1      3622  5444823 3059.5
## - V57                     1      3685  5444886 3059.5
## - V56                     1      4401  5445602 3059.5
## - V12                     1      4491  5445692 3059.5
## - V60                     1      4865  5446067 3059.6
## - V19                     1      5026  5446227 3059.6
## - V14                     1      5077  5446278 3059.6
## - V41                     1      5453  5446654 3059.6
## - V16                     1      6034  5447235 3059.6
## - V36                     1      6314  5447515 3059.6
## - V23                     1      7048  5448249 3059.7
## - V59                     1      7383  5448584 3059.7
## - V4                      1      7608  5448810 3059.7
## - V48                     1      7848  5449049 3059.7
## - V33                     1      8597  5449799 3059.8
## - V11                     1      8950  5450152 3059.8
```

```
## - V66                        1       9810  5451011 3059.8
## - 'START YEAR'               1      10778  5451979 3059.9
## - V67                        1      12228  5453429 3060.0
## - V13                        1      12491  5453692 3060.0
## - V68                        1      12898  5454100 3060.0
## - V44                        1      13417  5454618 3060.0
## - V15                        1      15562  5456763 3060.1
## - V34                        1      16726  5457927 3060.2
## - V42                        1      17681  5458882 3060.2
## - V70                        1      18012  5459213 3060.3
## - V40                        1      20488  5461690 3060.4
## - V32                        1      31093  5472294 3061.0
## <none>                                    5441201 3061.3
## - V6                         1      53009  5494210 3062.2
## - V5                         1      56147  5497348 3062.3
## - V1                         1     118216  5559417 3065.7
## - V2                         1     131487  5572688 3066.4
## - V3                         1     150571  5591773 3067.4
## - 'COMPLETION QUARTER'       1     613742  6054944 3091.0
## - 'COMPLETION YEAR'          1     719813  6161015 3096.2
## - V8                         1   92144768 97585969 3916.6
##
## Step:  AIC=3059.29
## train$V104 ~ 'START YEAR' + 'START QUARTER' + 'COMPLETION YEAR' +
##     'COMPLETION QUARTER' + V1 + V2 + V3 + V4 + V5 + V6 + V8 +
##     V10 + V11 + V12 + V13 + V14 + V15 + V16 + V17 + V18 + V19 +
##     V20 + V21 + V22 + V23 + V24 + V25 + V26 + V27 + V28 + V29 +
##     V30 + V31 + V32 + V33 + V34 + V35 + V36 + V37 + V38 + V39 +
##     V40 + V41 + V42 + V44 + V45 + V46 + V47 + V48 + V49 + V50 +
##     V51 + V52 + V53 + V54 + V55 + V56 + V57 + V58 + V59 + V60 +
##     V61 + V62 + V63 + V64 + V65 + V66 + V67 + V68 + V69 + V70
##
##                         Df Sum of Sq      RSS    AIC
## - V20                    1        19  5441221 3057.3
## - V25                    1        28  5441230 3057.3
## - V30                    1        33  5441235 3057.3
## - V24                    1       118  5441321 3057.3
## - V69                    1       146  5441348 3057.3
## - V62                    1       177  5441379 3057.3
## - 'START QUARTER'        1       274  5441477 3057.3
## - V35                    1       325  5441527 3057.3
## - V17                    1       449  5441651 3057.3
## - V39                    1       498  5441700 3057.3
## - V54                    1       530  5441732 3057.3
## - V52                    1       563  5441765 3057.3
## - V28                    1       580  5441782 3057.3
## - V58                    1       628  5441830 3057.3
## - V63                    1       911  5442113 3057.3
## - V50                    1       912  5442114 3057.3
## - V47                    1       938  5442140 3057.3
## - V27                    1      1034  5442236 3057.3
## - V31                    1      1229  5442431 3057.4
## - V22                    1      1259  5442461 3057.4
## - V29                    1      1327  5442529 3057.4
```

```
## - V53                       1        1428  5442630 3057.4
## - V65                       1        1525  5442727 3057.4
## - V61                       1        1595  5442797 3057.4
## - V64                       1        1612  5442814 3057.4
## - V46                       1        1872  5443074 3057.4
## - V21                       1        1874  5443076 3057.4
## - V10                       1        1982  5443184 3057.4
## - V55                       1        1992  5443194 3057.4
## - V26                       1        2073  5443275 3057.4
## - V45                       1        2128  5443330 3057.4
## - V18                       1        2134  5443336 3057.4
## - V38                       1        2309  5443511 3057.4
## - V37                       1        3256  5444458 3057.5
## - V49                       1        3777  5444979 3057.5
## - V51                       1        3790  5444993 3057.5
## - V57                       1        4346  5445548 3057.5
## - V56                       1        4420  5445622 3057.5
## - V12                       1        4516  5445718 3057.5
## - V14                       1        5169  5446371 3057.6
## - V60                       1        5274  5446476 3057.6
## - V19                       1        5368  5446570 3057.6
## - V41                       1        5564  5446766 3057.6
## - V16                       1        6315  5447517 3057.6
## - V36                       1        6639  5447841 3057.6
## - V23                       1        7094  5448296 3057.7
## - V4                        1        7611  5448813 3057.7
## - V59                       1        7698  5448900 3057.7
## - V48                       1        7944  5449146 3057.7
## - V33                       1        8962  5450165 3057.8
## - V11                       1        9321  5450523 3057.8
## - V66                       1       10229  5451431 3057.8
## - 'START YEAR'              1       12053  5453255 3057.9
## - V68                       1       13105  5454307 3058.0
## - V44                       1       13572  5454774 3058.0
## - V67                       1       14752  5455954 3058.1
## - V15                       1       15842  5457044 3058.1
## - V34                       1       17682  5458884 3058.2
## - V42                       1       18109  5459312 3058.3
## - V13                       1       19432  5460635 3058.3
## - V70                       1       20021  5461223 3058.4
## - V40                       1       21027  5462229 3058.4
## - V32                       1       33179  5474381 3059.1
## <none>                                     5441202 3059.3
## - V6                        1       53459  5494661 3060.2
## - V5                        1       56155  5497357 3060.3
## - V1                        1      118438  5559640 3063.7
## - V2                        1      131845  5573047 3064.4
## - V3                        1      151549  5592751 3065.4
## - 'COMPLETION QUARTER'      1      613752  6054954 3089.0
## - 'COMPLETION YEAR'         1      723132  6164334 3094.3
## - V8                        1    92154665 97595867 3914.7
##
## Step:  AIC=3057.29
## train$V104 ~ 'START YEAR' + 'START QUARTER' + 'COMPLETION YEAR' +
```

```
##      `COMPLETION QUARTER` + V1 + V2 + V3 + V4 + V5 + V6 + V8 +
##      V10 + V11 + V12 + V13 + V14 + V15 + V16 + V17 + V18 + V19 +
##      V21 + V22 + V23 + V24 + V25 + V26 + V27 + V28 + V29 + V30 +
##      V31 + V32 + V33 + V34 + V35 + V36 + V37 + V38 + V39 + V40 +
##      V41 + V42 + V44 + V45 + V46 + V47 + V48 + V49 + V50 + V51 +
##      V52 + V53 + V54 + V55 + V56 + V57 + V58 + V59 + V60 + V61 +
##      V62 + V63 + V64 + V65 + V66 + V67 + V68 + V69 + V70
##
##                          Df Sum of Sq      RSS    AIC
## - V30                     1        54  5441275 3055.3
## - V24                     1       101  5441322 3055.3
## - V25                     1       134  5441355 3055.3
## - V69                     1       140  5441361 3055.3
## - V62                     1       232  5441453 3055.3
## - V35                     1       318  5441539 3055.3
## - `START QUARTER`         1       441  5441662 3055.3
## - V54                     1       545  5441766 3055.3
## - V28                     1       617  5441838 3055.3
## - V39                     1       727  5441948 3055.3
## - V27                     1      1054  5442275 3055.3
## - V52                     1      1213  5442434 3055.4
## - V31                     1      1411  5442632 3055.4
## - V22                     1      1621  5442842 3055.4
## - V17                     1      1648  5442869 3055.4
## - V21                     1      1941  5443162 3055.4
## - V63                     1      1973  5443194 3055.4
## - V46                     1      2157  5443377 3055.4
## - V58                     1      2285  5443506 3055.4
## - V65                     1      2488  5443709 3055.4
## - V47                     1      2791  5444012 3055.4
## - V64                     1      3461  5444681 3055.5
## - V50                     1      3471  5444691 3055.5
## - V61                     1      3615  5444835 3055.5
## - V49                     1      3843  5445064 3055.5
## - V53                     1      4126  5445347 3055.5
## - V10                     1      4385  5445606 3055.5
## - V56                     1      4478  5445699 3055.5
## - V26                     1      4581  5445801 3055.5
## - V45                     1      4651  5445871 3055.5
## - V57                     1      4710  5445931 3055.5
## - V38                     1      4921  5446142 3055.6
## - V29                     1      5141  5446362 3055.6
## - V18                     1      5503  5446724 3055.6
## - V19                     1      5697  5446918 3055.6
## - V41                     1      6642  5447863 3055.6
## - V55                     1      7165  5448386 3055.7
## - V60                     1      7336  5448557 3055.7
## - V59                     1      7720  5448941 3055.7
## - V51                     1      7866  5449087 3055.7
## - V4                      1      7887  5449108 3055.7
## - V37                     1      8683  5449903 3055.8
## - V48                     1      8718  5449939 3055.8
## - V12                     1      8909  5450130 3055.8
## - V66                     1     10609  5451830 3055.9
```

```
## - V23                         1      11464  5452685 3055.9
## - V36                         1      11544  5452765 3055.9
## - V68                         1      13510  5454731 3056.0
## - V33                         1      14718  5455939 3056.1
## - V67                         1      17802  5459023 3056.3
## - V44                         1      20794  5462015 3056.4
## - `START YEAR`                1      21049  5462270 3056.4
## - V16                         1      21344  5462565 3056.4
## - V70                         1      21409  5462630 3056.5
## - V40                         1      22268  5463489 3056.5
## - V14                         1      22744  5463965 3056.5
## - V34                         1      28845  5470066 3056.9
## - V42                         1      31692  5472913 3057.0
## - V11                         1      32523  5473744 3057.1
## - V32                         1      35451  5476672 3057.2
## <none>                               5441221 3057.3
## - V13                         1      37560  5478781 3057.3
## - V6                          1      53558  5494778 3058.2
## - V5                          1      56533  5497754 3058.4
## - V15                         1      58713  5499934 3058.5
## - V1                          1     118677  5559898 3061.7
## - V2                          1     133810  5575031 3062.5
## - V3                          1     152096  5593316 3063.5
## - `COMPLETION QUARTER`        1     615175  6056396 3087.1
## - `COMPLETION YEAR`           1     723214  6164435 3092.4
## - V8                          1   92154762 97595983 3912.7
##
## Step:  AIC=3055.29
## train$V104 ~ `START YEAR` + `START QUARTER` + `COMPLETION YEAR` +
##     `COMPLETION QUARTER` + V1 + V2 + V3 + V4 + V5 + V6 + V8 +
##     V10 + V11 + V12 + V13 + V14 + V15 + V16 + V17 + V18 + V19 +
##     V21 + V22 + V23 + V24 + V25 + V26 + V27 + V28 + V29 + V31 +
##     V32 + V33 + V34 + V35 + V36 + V37 + V38 + V39 + V40 + V41 +
##     V42 + V44 + V45 + V46 + V47 + V48 + V49 + V50 + V51 + V52 +
##     V53 + V54 + V55 + V56 + V57 + V58 + V59 + V60 + V61 + V62 +
##     V63 + V64 + V65 + V66 + V67 + V68 + V69 + V70
##
##                       Df Sum of Sq      RSS    AIC
## - V69                  1        108  5441383 3053.3
## - V24                  1        118  5441393 3053.3
## - V25                  1        134  5441408 3053.3
## - V62                  1        227  5441502 3053.3
## - `START QUARTER`      1        411  5441686 3053.3
## - V54                  1        496  5441771 3053.3
## - V28                  1        599  5441874 3053.3
## - V39                  1        676  5441951 3053.3
## - V35                  1        924  5442199 3053.3
## - V27                  1       1232  5442506 3053.4
## - V31                  1       1443  5442718 3053.4
## - V52                  1       1585  5442859 3053.4
## - V17                  1       1603  5442878 3053.4
## - V63                  1       1919  5443194 3053.4
## - V22                  1       1975  5443250 3053.4
## - V21                  1       2235  5443510 3053.4
```

```
## - V58                     1     2299  5443574 3053.4
## - V65                     1     2439  5443714 3053.4
## - V64                     1     3414  5444689 3053.5
## - V50                     1     3417  5444691 3053.5
## - V61                     1     3567  5444842 3053.5
## - V47                     1     3686  5444960 3053.5
## - V53                     1     4096  5445370 3053.5
## - V46                     1     4145  5445420 3053.5
## - V56                     1     4589  5445864 3053.5
## - V26                     1     4591  5445866 3053.5
## - V45                     1     4613  5445887 3053.5
## - V38                     1     4878  5446153 3053.6
## - V10                     1     5456  5446730 3053.6
## - V19                     1     5653  5446927 3053.6
## - V57                     1     6474  5447749 3053.6
## - V49                     1     7009  5448284 3053.7
## - V55                     1     7176  5448450 3053.7
## - V18                     1     7281  5448556 3053.7
## - V51                     1     7820  5449094 3053.7
## - V4                      1     7834  5449108 3053.7
## - V41                     1     8162  5449436 3053.7
## - V48                     1     8670  5449945 3053.8
## - V12                     1     8971  5450245 3053.8
## - V29                     1     9138  5450412 3053.8
## - V37                     1     9230  5450504 3053.8
## - V59                     1    10495  5451770 3053.9
## - V60                     1    10611  5451886 3053.9
## - V66                     1    10642  5451917 3053.9
## - V23                     1    11741  5453015 3053.9
## - V36                     1    12175  5453450 3054.0
## - V68                     1    14647  5455922 3054.1
## - V67                     1    17850  5459125 3054.3
## - V33                     1    18267  5459542 3054.3
## - V16                     1    21290  5462565 3054.4
## - V40                     1    22281  5463555 3054.5
## - V70                     1    22385  5463660 3054.5
## - V44                     1    23673  5464948 3054.6
## - V14                     1    24003  5465278 3054.6
## - 'START YEAR'            1    26299  5467574 3054.7
## - V34                     1    30837  5472112 3055.0
## - V32                     1    36452  5477727 3055.3
## - V42                     1    36541  5477816 3055.3
## <none>                               5441275 3055.3
## - V13                     1    37552  5478826 3055.3
## - V11                     1    40075  5481350 3055.5
## - V6                      1    54461  5495736 3056.2
## - V5                      1    57544  5498819 3056.4
## - V15                     1    59144  5500418 3056.5
## - V1                      1   119793  5561067 3059.8
## - V2                      1   135423  5576698 3060.6
## - V3                      1   153676  5594951 3061.6
## - 'COMPLETION QUARTER'    1   616239  6057514 3085.2
## - 'COMPLETION YEAR'       1   729423  6170698 3090.7
## - V8                      1 92157467 97598742 3910.7
```

```
##
## Step:  AIC=3053.3
## train$V104 ~ 'START YEAR' + 'START QUARTER' + 'COMPLETION YEAR' +
##     'COMPLETION QUARTER' + V1 + V2 + V3 + V4 + V5 + V6 + V8 +
##     V10 + V11 + V12 + V13 + V14 + V15 + V16 + V17 + V18 + V19 +
##     V21 + V22 + V23 + V24 + V25 + V26 + V27 + V28 + V29 + V31 +
##     V32 + V33 + V34 + V35 + V36 + V37 + V38 + V39 + V40 + V41 +
##     V42 + V44 + V45 + V46 + V47 + V48 + V49 + V50 + V51 + V52 +
##     V53 + V54 + V55 + V56 + V57 + V58 + V59 + V60 + V61 + V62 +
##     V63 + V64 + V65 + V66 + V67 + V68 + V70
##
##                        Df Sum of Sq      RSS    AIC
## - V62                   1       142  5441525 3051.3
## - V24                   1       163  5441546 3051.3
## - V25                   1       222  5441605 3051.3
## - 'START QUARTER'       1       315  5441697 3051.3
## - V54                   1       699  5442081 3051.3
## - V39                   1       708  5442091 3051.3
## - V28                   1       914  5442297 3051.3
## - V35                   1      1191  5442574 3051.4
## - V17                   1      1570  5442953 3051.4
## - V52                   1      1689  5443072 3051.4
## - V27                   1      1744  5443127 3051.4
## - V22                   1      1897  5443279 3051.4
## - V31                   1      1993  5443376 3051.4
## - V21                   1      2144  5443527 3051.4
## - V58                   1      2354  5443736 3051.4
## - V65                   1      2525  5443907 3051.4
## - V47                   1      3646  5445029 3051.5
## - V50                   1      3674  5445057 3051.5
## - V63                   1      3762  5445145 3051.5
## - V64                   1      3988  5445371 3051.5
## - V46                   1      4067  5445449 3051.5
## - V56                   1      4591  5445974 3051.5
## - V61                   1      4808  5446191 3051.6
## - V53                   1      5048  5446431 3051.6
## - V38                   1      5193  5446576 3051.6
## - V19                   1      5553  5446935 3051.6
## - V26                   1      5878  5447260 3051.6
## - V57                   1      6397  5447780 3051.6
## - V10                   1      6616  5447999 3051.7
## - V45                   1      6712  5448095 3051.7
## - V49                   1      7076  5448459 3051.7
## - V18                   1      7367  5448750 3051.7
## - V4                    1      7757  5449140 3051.7
## - V55                   1      8518  5449901 3051.8
## - V48                   1      8753  5450135 3051.8
## - V41                   1      8787  5450169 3051.8
## - V37                   1      9156  5450539 3051.8
## - V59                   1     10388  5451771 3051.9
## - V29                   1     10648  5452031 3051.9
## - V12                   1     10665  5452048 3051.9
## - V60                   1     10801  5452184 3051.9
## - V51                   1     12134  5453517 3052.0
```

28

```
## - V36                      1      12220  5453603 3052.0
## - V23                      1      13663  5455046 3052.0
## - V66                      1      14224  5455607 3052.1
## - V68                      1      15006  5456389 3052.1
## - V67                      1      18351  5459734 3052.3
## - V16                      1      21221  5462604 3052.5
## - V33                      1      21864  5463246 3052.5
## - V40                      1      22184  5463567 3052.5
## - V70                      1      23017  5464400 3052.5
## - V44                      1      24916  5466298 3052.7
## - V14                      1      28031  5469414 3052.8
## - 'START YEAR'             1      31288  5472671 3053.0
## - V34                      1      35391  5476774 3053.2
## - V42                      1      36522  5477905 3053.3
## <none>                                   5441383 3053.3
## - V32                      1      37942  5479325 3053.4
## - V11                      1      40744  5482127 3053.5
## - V6                       1      54620  5496002 3054.3
## - V5                       1      58509  5499891 3054.5
## - V15                      1      59039  5500422 3054.5
## - V13                      1      72217  5513600 3055.2
## - V1                       1     122314  5563697 3057.9
## - V2                       1     135336  5576719 3058.6
## - V3                       1     153687  5595070 3059.6
## - 'COMPLETION QUARTER'     1     617806  6059189 3083.2
## - 'COMPLETION YEAR'        1     729373  6170756 3088.7
## - V8                       1   92164163 97605546 3908.7
##
## Step:  AIC=3051.3
## train$V104 ~ 'START YEAR' + 'START QUARTER' + 'COMPLETION YEAR' +
##     'COMPLETION QUARTER' + V1 + V2 + V3 + V4 + V5 + V6 + V8 +
##     V10 + V11 + V12 + V13 + V14 + V15 + V16 + V17 + V18 + V19 +
##     V21 + V22 + V23 + V24 + V25 + V26 + V27 + V28 + V29 + V31 +
##     V32 + V33 + V34 + V35 + V36 + V37 + V38 + V39 + V40 + V41 +
##     V42 + V44 + V45 + V46 + V47 + V48 + V49 + V50 + V51 + V52 +
##     V53 + V54 + V55 + V56 + V57 + V58 + V59 + V60 + V61 + V63 +
##     V64 + V65 + V66 + V67 + V68 + V70
##
##                         Df Sum of Sq     RSS    AIC
## - 'START QUARTER'        1       229  5441754 3049.3
## - V25                    1       239  5441764 3049.3
## - V39                    1       566  5442091 3049.3
## - V54                    1      1495  5443020 3049.4
## - V24                    1      1743  5443268 3049.4
## - V52                    1      1776  5443301 3049.4
## - V35                    1      1828  5443353 3049.4
## - V22                    1      1970  5443495 3049.4
## - V28                    1      1987  5443512 3049.4
## - V58                    1      2214  5443739 3049.4
## - V65                    1      2447  5443972 3049.4
## - V17                    1      2518  5444043 3049.4
## - V21                    1      3180  5444705 3049.5
## - V31                    1      3719  5445244 3049.5
## - V64                    1      3848  5445373 3049.5
```

```
## - V46                       1      4086  5445611 3049.5
## - V63                       1      4123  5445648 3049.5
## - V47                       1      4298  5445823 3049.5
## - V50                       1      4588  5446113 3049.6
## - V61                       1      5003  5446528 3049.6
## - V53                       1      5030  5446555 3049.6
## - V27                       1      5246  5446771 3049.6
## - V26                       1      5872  5447397 3049.6
## - V38                       1      5875  5447400 3049.6
## - V56                       1      6378  5447903 3049.7
## - V45                       1      6885  5448410 3049.7
## - V49                       1      7120  5448645 3049.7
## - V18                       1      7227  5448752 3049.7
## - V4                        1      7764  5449289 3049.7
## - V57                       1      8063  5449588 3049.7
## - V37                       1      9718  5451243 3049.8
## - V29                       1     10594  5452119 3049.9
## - V12                       1     10736  5452261 3049.9
## - V60                       1     10740  5452265 3049.9
## - V41                       1     11479  5453004 3049.9
## - V10                       1     13147  5454672 3050.0
## - V23                       1     13589  5455114 3050.0
## - V19                       1     14209  5455734 3050.1
## - V59                       1     14855  5456380 3050.1
## - V48                       1     16461  5457986 3050.2
## - V55                       1     16750  5458275 3050.2
## - V66                       1     17450  5458975 3050.3
## - V68                       1     18831  5460356 3050.3
## - V67                       1     19233  5460758 3050.4
## - V36                       1     21214  5462739 3050.5
## - V16                       1     21374  5462899 3050.5
## - V70                       1     27263  5468788 3050.8
## - V44                       1     27382  5468907 3050.8
## - V51                       1     28348  5469873 3050.8
## - V14                       1     30446  5471971 3051.0
## - V33                       1     30564  5472089 3051.0
## - V40                       1     30805  5472330 3051.0
## <none>                             5441525 3051.3
## - 'START YEAR'              1     39145  5480670 3051.4
## - V32                       1     45811  5487336 3051.8
## - V11                       1     47469  5488994 3051.9
## - V34                       1     50942  5492467 3052.1
## - V6                        1     54761  5496286 3052.3
## - V5                        1     58407  5499932 3052.5
## - V15                       1     59134  5500659 3052.5
## - V42                       1     61338  5502863 3052.6
## - V13                       1     73168  5514693 3053.3
## - V1                        1    122205  5563730 3055.9
## - V2                        1    135355  5576880 3056.6
## - V3                        1    154037  5595562 3057.6
## - 'COMPLETION QUARTER'      1    618133  6059658 3081.3
## - 'COMPLETION YEAR'         1    731725  6173250 3086.8
## - V8                        1  92365858 97807383 3907.3
##
```

```
## Step:  AIC=3049.32
## train$V104 ~ 'START YEAR' + 'COMPLETION YEAR' + 'COMPLETION QUARTER' +
##     V1 + V2 + V3 + V4 + V5 + V6 + V8 + V10 + V11 + V12 + V13 +
##     V14 + V15 + V16 + V17 + V18 + V19 + V21 + V22 + V23 + V24 +
##     V25 + V26 + V27 + V28 + V29 + V31 + V32 + V33 + V34 + V35 +
##     V36 + V37 + V38 + V39 + V40 + V41 + V42 + V44 + V45 + V46 +
##     V47 + V48 + V49 + V50 + V51 + V52 + V53 + V54 + V55 + V56 +
##     V57 + V58 + V59 + V60 + V61 + V63 + V64 + V65 + V66 + V67 +
##     V68 + V70
##
##                     Df Sum of Sq     RSS    AIC
## - V25                1       191 5441945 3047.3
## - V39                1       392 5442146 3047.3
## - V54                1      1269 5443023 3047.4
## - V24                1      1528 5443282 3047.4
## - V35                1      1676 5443429 3047.4
## - V28                1      1801 5443554 3047.4
## - V58                1      2013 5443767 3047.4
## - V17                1      2323 5444077 3047.4
## - V65                1      2514 5444268 3047.5
## - V52                1      2910 5444664 3047.5
## - V21                1      3197 5444951 3047.5
## - V31                1      3631 5445384 3047.5
## - V22                1      3913 5445667 3047.5
## - V46                1      4076 5445830 3047.5
## - V47                1      4187 5445941 3047.5
## - V50                1      4359 5446113 3047.6
## - V27                1      5018 5446771 3047.6
## - V61                1      5675 5447428 3047.6
## - V38                1      5910 5447663 3047.6
## - V56                1      7194 5448948 3047.7
## - V18                1      7331 5449085 3047.7
## - V4                 1      7651 5449405 3047.7
## - V49                1      7816 5449570 3047.7
## - V57                1      7841 5449595 3047.7
## - V63                1      7902 5449656 3047.7
## - V53                1      8259 5450013 3047.8
## - V37                1     10771 5452525 3047.9
## - V29                1     10893 5452647 3047.9
## - V60                1     10949 5452703 3047.9
## - V12                1     11446 5453200 3047.9
## - V41                1     12698 5454452 3048.0
## - V10                1     13414 5455168 3048.0
## - V19                1     14108 5455862 3048.1
## - V59                1     16438 5458192 3048.2
## - V66                1     17462 5459215 3048.3
## - V48                1     17839 5459593 3048.3
## - V55                1     18804 5460558 3048.3
## - V67                1     19484 5461238 3048.4
## - V68                1     20452 5462206 3048.4
## - V64                1     22561 5464314 3048.5
## - V36                1     27401 5469154 3048.8
## - V70                1     27461 5469215 3048.8
## - V44                1     30311 5472065 3049.0
```

31

```
## - V16                       1      30773 5472527 3049.0
## - V40                       1      31267 5473021 3049.0
## - V14                       1      34538 5476292 3049.2
## - V33                       1      36480 5478234 3049.3
## <none>                                  5441754 3049.3
## - V26                       1      37541 5479295 3049.4
## - V23                       1      38551 5480305 3049.4
## - V51                       1      39388 5481142 3049.5
## - 'START YEAR'              1      40959 5482713 3049.5
## - V45                       1      46954 5488708 3049.9
## - V11                       1      50033 5491787 3050.0
## - V34                       1      50772 5492526 3050.1
## - V32                       1      51120 5492874 3050.1
## - V6                        1      54704 5496458 3050.3
## - V5                        1      58268 5500022 3050.5
## - V15                       1      60385 5502138 3050.6
## - V13                       1      73630 5515384 3051.3
## - V42                       1      76164 5517918 3051.4
## - V1                        1     121989 5563743 3053.9
## - V2                        1     135136 5576890 3054.6
## - V3                        1     153808 5595562 3055.6
## - 'COMPLETION QUARTER'      1     619539 6061293 3079.3
## - 'COMPLETION YEAR'         1     747890 6189643 3085.6
## - V8                        1   92378208 97819962 3905.4
##
## Step:  AIC=3047.33
## train$V104 ~ 'START YEAR' + 'COMPLETION YEAR' + 'COMPLETION QUARTER' +
##     V1 + V2 + V3 + V4 + V5 + V6 + V8 + V10 + V11 + V12 + V13 +
##     V14 + V15 + V16 + V17 + V18 + V19 + V21 + V22 + V23 + V24 +
##     V26 + V27 + V28 + V29 + V31 + V32 + V33 + V34 + V35 + V36 +
##     V37 + V38 + V39 + V40 + V41 + V42 + V44 + V45 + V46 + V47 +
##     V48 + V49 + V50 + V51 + V52 + V53 + V54 + V55 + V56 + V57 +
##     V58 + V59 + V60 + V61 + V63 + V64 + V65 + V66 + V67 + V68 +
##     V70
##
##                      Df Sum of Sq      RSS    AIC
## - V39                 1       447  5442392 3045.4
## - V54                 1      1093  5443039 3045.4
## - V24                 1      1488  5443433 3045.4
## - V35                 1      1492  5443437 3045.4
## - V58                 1      1886  5443831 3045.4
## - V28                 1      2002  5443947 3045.4
## - V17                 1      2404  5444349 3045.5
## - V52                 1      2720  5444665 3045.5
## - V65                 1      2821  5444766 3045.5
## - V21                 1      3006  5444951 3045.5
## - V46                 1      4141  5446086 3045.6
## - V47                 1      4150  5446095 3045.6
## - V31                 1      4440  5446385 3045.6
## - V50                 1      4785  5446730 3045.6
## - V27                 1      5659  5447604 3045.6
## - V38                 1      5737  5447682 3045.6
## - V61                 1      5841  5447786 3045.6
## - V22                 1      6815  5448760 3045.7
```

32

```
## - V56                     1       7312    5449257 3045.7
## - V18                     1       7410    5449355 3045.7
## - V4                      1       7723    5449668 3045.7
## - V63                     1       7807    5449752 3045.8
## - V57                     1       7922    5449867 3045.8
## - V49                     1       8700    5450645 3045.8
## - V53                     1       8931    5450877 3045.8
## - V37                     1      10603    5452548 3045.9
## - V29                     1      10834    5452779 3045.9
## - V12                     1      11267    5453212 3045.9
## - V60                     1      11363    5453308 3045.9
## - V41                     1      13214    5455159 3046.0
## - V10                     1      13242    5455187 3046.0
## - V19                     1      14004    5455949 3046.1
## - V59                     1      17343    5459288 3046.3
## - V66                     1      17447    5459392 3046.3
## - V48                     1      18322    5460268 3046.3
## - V67                     1      19660    5461605 3046.4
## - V55                     1      19668    5461613 3046.4
## - V68                     1      25463    5467408 3046.7
## - V64                     1      26581    5468526 3046.8
## - V36                     1      27383    5469328 3046.8
## - V70                     1      27388    5469333 3046.8
## - V16                     1      30781    5472727 3047.0
## - V40                     1      31583    5473528 3047.0
## - V44                     1      35557    5477502 3047.3
## <none>                                    5441945 3047.3
## - V14                     1      37141    5479087 3047.3
## - V33                     1      38138    5480083 3047.4
## - V26                     1      39136    5481082 3047.5
## - V23                     1      39858    5481803 3047.5
## - 'START YEAR'            1      45442    5487387 3047.8
## - V51                     1      45799    5487744 3047.8
## - V45                     1      48793    5490738 3048.0
## - V32                     1      50980    5492925 3048.1
## - V6                      1      55913    5497858 3048.4
## - V11                     1      56389    5498334 3048.4
## - V5                      1      58227    5500172 3048.5
## - V34                     1      68698    5510643 3049.1
## - V15                     1      68956    5510901 3049.1
## - V13                     1      78198    5520143 3049.6
## - V42                     1      80676    5522621 3049.7
## - V1                      1     121800    5563745 3051.9
## - V2                      1     135007    5576952 3052.6
## - V3                      1     153666    5595611 3053.6
## - 'COMPLETION QUARTER'    1     627181    6069126 3077.7
## - 'COMPLETION YEAR'       1     760321    6202266 3084.2
## - V8                      1   92382972   97824917 3903.4
##
## Step:  AIC=3045.35
## train$V104 ~ 'START YEAR' + 'COMPLETION YEAR' + 'COMPLETION QUARTER' +
##     V1 + V2 + V3 + V4 + V5 + V6 + V8 + V10 + V11 + V12 + V13 +
##     V14 + V15 + V16 + V17 + V18 + V19 + V21 + V22 + V23 + V24 +
##     V26 + V27 + V28 + V29 + V31 + V32 + V33 + V34 + V35 + V36 +
```

```
##     V37 + V38 + V40 + V41 + V42 + V44 + V45 + V46 + V47 + V48 +
##     V49 + V50 + V51 + V52 + V53 + V54 + V55 + V56 + V57 + V58 +
##     V59 + V60 + V61 + V63 + V64 + V65 + V66 + V67 + V68 + V70
##
##                   Df Sum of Sq      RSS    AIC
## - V54              1       682  5443074 3043.4
## - V35              1      1158  5443550 3043.4
## - V28              1      1555  5443947 3043.4
## - V52              1      2400  5444792 3043.5
## - V24              1      2599  5444991 3043.5
## - V21              1      2599  5444991 3043.5
## - V65              1      2792  5445184 3043.5
## - V17              1      3992  5446384 3043.6
## - V47              1      4040  5446432 3043.6
## - V31              1      4074  5446466 3043.6
## - V50              1      4648  5447040 3043.6
## - V46              1      4662  5447054 3043.6
## - V27              1      5406  5447798 3043.6
## - V61              1      5452  5447844 3043.6
## - V58              1      5786  5448178 3043.7
## - V22              1      6770  5449162 3043.7
## - V56              1      7217  5449609 3043.7
## - V63              1      7454  5449846 3043.8
## - V4               1      7851  5450243 3043.8
## - V53              1      8584  5450976 3043.8
## - V57              1      9287  5451679 3043.9
## - V38              1      9597  5451989 3043.9
## - V49              1      9792  5452184 3043.9
## - V18              1     10088  5452480 3043.9
## - V37              1     10386  5452778 3043.9
## - V60              1     10969  5453361 3043.9
## - V12              1     12717  5455109 3044.0
## - V29              1     13445  5455837 3044.1
## - V10              1     13909  5456301 3044.1
## - V41              1     17595  5459987 3044.3
## - V48              1     18811  5461203 3044.4
## - V59              1     19224  5461616 3044.4
## - V55              1     19773  5462165 3044.4
## - V67              1     21220  5463612 3044.5
## - V19              1     22667  5465059 3044.6
## - V68              1     27150  5469542 3044.8
## - V64              1     27320  5469712 3044.8
## - V70              1     29758  5472150 3045.0
## - V66              1     30798  5473190 3045.0
## - V16              1     33021  5475413 3045.1
## - V40              1     36549  5478941 3045.3
## <none>                           5442392 3045.4
## - V23              1     39510  5481902 3045.5
## - V36              1     39721  5482113 3045.5
## - V26              1     42214  5484606 3045.6
## - V51              1     45415  5487807 3045.8
## - V33              1     47152  5489544 3045.9
## - V44              1     50497  5492889 3046.1
## - V45              1     51964  5494356 3046.2
```

```
## - V6                          1        55880  5498272 3046.4
## - V5                          1        58039  5500431 3046.5
## - 'START YEAR'                 1        58116  5500508 3046.5
## - V11                         1        62043  5504435 3046.7
## - V32                         1        65632  5508024 3046.9
## - V34                         1        69256  5511648 3047.1
## - V15                         1        71131  5513523 3047.2
## - V14                         1        79864  5522256 3047.7
## - V42                         1        91557  5533949 3048.3
## - V1                          1       121353  5563745 3049.9
## - V13                         1       130209  5572601 3050.4
## - V2                          1       136417  5578809 3050.7
## - V3                          1       155739  5598131 3051.7
## - 'COMPLETION QUARTER'  1       637511  6079903 3076.2
## - 'COMPLETION YEAR'     1       770000  6212392 3082.7
## - V8                          1     92744229 98186621 3902.5
##
## Step:  AIC=3043.39
## train$V104 ~ 'START YEAR' + 'COMPLETION YEAR' + 'COMPLETION QUARTER' +
##     V1 + V2 + V3 + V4 + V5 + V6 + V8 + V10 + V11 + V12 + V13 +
##     V14 + V15 + V16 + V17 + V18 + V19 + V21 + V22 + V23 + V24 +
##     V26 + V27 + V28 + V29 + V31 + V32 + V33 + V34 + V35 + V36 +
##     V37 + V38 + V40 + V41 + V42 + V44 + V45 + V46 + V47 + V48 +
##     V49 + V50 + V51 + V52 + V53 + V55 + V56 + V57 + V58 + V59 +
##     V60 + V61 + V63 + V64 + V65 + V66 + V67 + V68 + V70
##
##                          Df Sum of Sq      RSS    AIC
## - V28                     1       1062  5444136 3041.4
## - V35                     1       1313  5444387 3041.5
## - V52                     1       1951  5445025 3041.5
## - V24                     1       2116  5445191 3041.5
## - V17                     1       3356  5446430 3041.6
## - V31                     1       3559  5446633 3041.6
## - V21                     1       3573  5446648 3041.6
## - V46                     1       3991  5447065 3041.6
## - V50                     1       4033  5447107 3041.6
## - V65                     1       4139  5447213 3041.6
## - V61                     1       4824  5447899 3041.7
## - V27                     1       4839  5447913 3041.7
## - V58                     1       5284  5448358 3041.7
## - V47                     1       6531  5449605 3041.7
## - V56                     1       6595  5449669 3041.7
## - V63                     1       6773  5449847 3041.8
## - V22                     1       7747  5450821 3041.8
## - V4                      1       7817  5450891 3041.8
## - V53                     1       8075  5451150 3041.8
## - V49                     1       9112  5452187 3041.9
## - V18                     1      10811  5453885 3042.0
## - V37                     1      10896  5453971 3042.0
## - V60                     1      11015  5454089 3042.0
## - V12                     1      12339  5455413 3042.1
## - V29                     1      12867  5455942 3042.1
## - V10                     1      13246  5456320 3042.1
## - V38                     1      13998  5457073 3042.2
```

```
## - V57                        1      15775  5458850 3042.2
## - V41                        1      17063  5460137 3042.3
## - V59                        1      20349  5463424 3042.5
## - V48                        1      20863  5463937 3042.5
## - V67                        1      22854  5465929 3042.6
## - V55                        1      25094  5468168 3042.8
## - V68                        1      26521  5469595 3042.8
## - V64                        1      28693  5471767 3042.9
## - V70                        1      29163  5472237 3043.0
## - V19                        1      31981  5475055 3043.1
## - V16                        1      32489  5475563 3043.2
## - V66                        1      34317  5477392 3043.3
## <none>                              5443074 3043.4
## - V40                        1      37455  5480530 3043.4
## - V23                        1      39752  5482826 3043.5
## - V26                        1      41698  5484772 3043.7
## - V36                        1      42078  5485153 3043.7
## - V33                        1      50402  5493477 3044.1
## - V51                        1      51655  5494729 3044.2
## - V45                        1      51835  5494909 3044.2
## - V6                         1      55572  5498646 3044.4
## - V5                         1      58409  5501483 3044.6
## - `START YEAR`               1      59697  5502771 3044.6
## - V44                        1      66509  5509583 3045.0
## - V11                        1      66681  5509756 3045.0
## - V32                        1      66796  5509871 3045.0
## - V15                        1      70655  5513729 3045.2
## - V34                        1      73821  5516895 3045.4
## - V14                        1      80322  5523396 3045.7
## - V42                        1      92615  5535689 3046.4
## - V1                         1     121430  5564505 3047.9
## - V2                         1     136545  5579620 3048.7
## - V13                        1     141956  5585030 3049.0
## - V3                         1     155639  5598713 3049.8
## - `COMPLETION QUARTER`  1     637294  6080368 3074.3
## - `COMPLETION YEAR`     1     770354  6213428 3080.7
## - V8                         1   93097407 98540481 3901.5
##
## Step:  AIC=3041.45
## train$V104 ~ `START YEAR` + `COMPLETION YEAR` + `COMPLETION QUARTER` +
##     V1 + V2 + V3 + V4 + V5 + V6 + V8 + V10 + V11 + V12 + V13 +
##     V14 + V15 + V16 + V17 + V18 + V19 + V21 + V22 + V23 + V24 +
##     V26 + V27 + V29 + V31 + V32 + V33 + V34 + V35 + V36 + V37 +
##     V38 + V40 + V41 + V42 + V44 + V45 + V46 + V47 + V48 + V49 +
##     V50 + V51 + V52 + V53 + V55 + V56 + V57 + V58 + V59 + V60 +
##     V61 + V63 + V64 + V65 + V66 + V67 + V68 + V70
##
##                          Df Sum of Sq      RSS    AIC
## - V24                      1       1397  5445533 3039.5
## - V17                      1       2464  5446601 3039.6
## - V52                      1       2580  5446716 3039.6
## - V31                      1       2662  5446798 3039.6
## - V35                      1       3328  5447464 3039.6
## - V50                      1       3352  5447488 3039.6
```

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## - V61                   1      3859  5447995 3039.7
## - V65                   1      3905  5448041 3039.7
## - V27                   1      3960  5448097 3039.7
## - V58                   1      4734  5448870 3039.7
## - V46                   1      4869  5449005 3039.7
## - V21                   1      5005  5449141 3039.7
## - V63                   1      6985  5451121 3039.8
## - V22                   1      7794  5451930 3039.9
## - V4                    1      8059  5452195 3039.9
## - V53                   1      8738  5452875 3039.9
## - V56                   1      9384  5453520 3040.0
## - V18                   1     10942  5455079 3040.0
## - V47                   1     11030  5455166 3040.0
## - V49                   1     11353  5455489 3040.1
## - V29                   1     12062  5456199 3040.1
## - V38                   1     14343  5458479 3040.2
## - V37                   1     14835  5458971 3040.3
## - V10                   1     14905  5459041 3040.3
## - V57                   1     16677  5460813 3040.4
## - V41                   1     16820  5460957 3040.4
## - V60                   1     17784  5461920 3040.4
## - V12                   1     17924  5462061 3040.4
## - V67                   1     23434  5467570 3040.7
## - V55                   1     24590  5468726 3040.8
## - V59                   1     25632  5469768 3040.8
## - V68                   1     26289  5470426 3040.9
## - V48                   1     29693  5473829 3041.1
## - V19                   1     30969  5475105 3041.1
## - V70                   1     31299  5475435 3041.1
## - V16                   1     34229  5478365 3041.3
## - V66                   1     36089  5480225 3041.4
## <none>                              5444136 3041.4
## - V64                   1     39350  5483486 3041.6
## - V40                   1     45648  5489784 3041.9
## - V23                   1     48677  5492813 3042.1
## - V33                   1     49553  5493689 3042.1
## - V36                   1     54804  5498940 3042.4
## - V6                    1     54865  5499001 3042.4
## - V26                   1     55846  5499982 3042.5
## - V5                    1     57730  5501866 3042.6
## - V45                   1     61115  5505251 3042.8
## - V51                   1     62385  5506521 3042.8
## - V11                   1     65853  5509990 3043.0
## - V44                   1     66378  5510514 3043.0
## - V15                   1     69720  5513856 3043.2
## - V32                   1     70196  5514332 3043.3
## - `START YEAR`          1     71960  5516096 3043.3
## - V34                   1     73381  5517517 3043.4
## - V14                   1     89990  5534126 3044.3
## - V42                   1    101905  5546041 3045.0
## - V1                    1    120907  5565043 3046.0
## - V2                    1    137677  5581813 3046.9
## - V13                   1    146095  5590231 3047.3
## - V3                    1    157127  5601263 3047.9
```

37

```
## - 'COMPLETION QUARTER'  1    636356  6080492 3072.3
## - 'COMPLETION YEAR'      1    770116  6214252 3078.7
## - V8                     1  93100571 98544707 3899.5
##
## Step:  AIC=3039.52
## train$V104 ~ 'START YEAR' + 'COMPLETION YEAR' + 'COMPLETION QUARTER' +
##     V1 + V2 + V3 + V4 + V5 + V6 + V8 + V10 + V11 + V12 + V13 +
##     V14 + V15 + V16 + V17 + V18 + V19 + V21 + V22 + V23 + V26 +
##     V27 + V29 + V31 + V32 + V33 + V34 + V35 + V36 + V37 + V38 +
##     V40 + V41 + V42 + V44 + V45 + V46 + V47 + V48 + V49 + V50 +
##     V51 + V52 + V53 + V55 + V56 + V57 + V58 + V59 + V60 + V61 +
##     V63 + V64 + V65 + V66 + V67 + V68 + V70
##
##                         Df Sum of Sq      RSS    AIC
## - V17                    1      1071  5446604 3037.6
## - V31                    1      2581  5448114 3037.7
## - V35                    1      2787  5448320 3037.7
## - V52                    1      2923  5448456 3037.7
## - V50                    1      3166  5448699 3037.7
## - V58                    1      3548  5449081 3037.7
## - V46                    1      3592  5449125 3037.7
## - V27                    1      3626  5449159 3037.7
## - V61                    1      4233  5449766 3037.8
## - V21                    1      4319  5449851 3037.8
## - V65                    1      4524  5450057 3037.8
## - V4                     1      7986  5453518 3038.0
## - V63                    1      9362  5454895 3038.0
## - V22                    1     10270  5455803 3038.1
## - V18                    1     11173  5456706 3038.1
## - V49                    1     12041  5457574 3038.2
## - V29                    1     12107  5457640 3038.2
## - V47                    1     12201  5457733 3038.2
## - V56                    1     13559  5459092 3038.3
## - V53                    1     13659  5459192 3038.3
## - V37                    1     15809  5461341 3038.4
## - V10                    1     16285  5461818 3038.4
## - V60                    1     16737  5462270 3038.4
## - V12                    1     17582  5463114 3038.5
## - V41                    1     17916  5463449 3038.5
## - V38                    1     21018  5466551 3038.7
## - V57                    1     22954  5468487 3038.8
## - V67                    1     23056  5468589 3038.8
## - V68                    1     25368  5470901 3038.9
## - V59                    1     26268  5471801 3039.0
## - V55                    1     27986  5473519 3039.0
## - V48                    1     29489  5475021 3039.1
## - V19                    1     29583  5475116 3039.1
## - V70                    1     29913  5475446 3039.1
## <none>                            5445533 3039.5
## - V16                    1     37505  5483038 3039.6
## - V66                    1     40302  5485835 3039.7
## - V40                    1     44296  5489829 3039.9
## - V36                    1     53407  5498940 3040.4
## - V6                     1     54232  5499764 3040.5
```

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## - V5                         1       57410 5502943 3040.6
## - V33                        1       61313 5506845 3040.8
## - V64                        1       65397 5510930 3041.1
## - V44                        1       66761 5512294 3041.1
## - V51                        1       67093 5512626 3041.2
## - V32                        1       69101 5514634 3041.3
## - V11                        1       71099 5516632 3041.4
## - V23                        1       77489 5523022 3041.7
## - V26                        1       84543 5530076 3042.1
## - V34                        1       84811 5530343 3042.1
## - V45                        1       86060 5531593 3042.2
## - V15                        1       86306 5531839 3042.2
## - V14                        1       88886 5534419 3042.3
## - V42                        1      114972 5560505 3043.7
## - V1                         1      119767 5565300 3044.0
## - `START YEAR`               1      124933 5570466 3044.3
## - V2                         1      138825 5584358 3045.0
## - V13                        1      151063 5596595 3045.6
## - V3                         1      158304 5603837 3046.0
## - `COMPLETION QUARTER`  1      642592 6088124 3070.7
## - `COMPLETION YEAR`     1      772570 6218103 3076.9
## - V8                         1  93103712 98549245 3897.6
##
## Step:  AIC=3037.58
## train$V104 ~ `START YEAR` + `COMPLETION YEAR` + `COMPLETION QUARTER` +
##     V1 + V2 + V3 + V4 + V5 + V6 + V8 + V10 + V11 + V12 + V13 +
##     V14 + V15 + V16 + V18 + V19 + V21 + V22 + V23 + V26 + V27 +
##     V29 + V31 + V32 + V33 + V34 + V35 + V36 + V37 + V38 + V40 +
##     V41 + V42 + V44 + V45 + V46 + V47 + V48 + V49 + V50 + V51 +
##     V52 + V53 + V55 + V56 + V57 + V58 + V59 + V60 + V61 + V63 +
##     V64 + V65 + V66 + V67 + V68 + V70
##
##                           Df Sum of Sq     RSS    AIC
## - V31                      1        1661 5448264 3035.7
## - V58                      1        2627 5449230 3035.7
## - V27                      1        2750 5449354 3035.7
## - V46                      1        3159 5449763 3035.8
## - V52                      1        3498 5450102 3035.8
## - V35                      1        3671 5450275 3035.8
## - V50                      1        3781 5450385 3035.8
## - V61                      1        4479 5451082 3035.8
## - V65                      1        5313 5451916 3035.9
## - V21                      1        7516 5454120 3036.0
## - V4                       1        7595 5454198 3036.0
## - V29                      1       11437 5458041 3036.2
## - V18                      1       11516 5458120 3036.2
## - V49                      1       11952 5458555 3036.2
## - V22                      1       13098 5459701 3036.3
## - V63                      1       14389 5460992 3036.4
## - V10                      1       15817 5462420 3036.4
## - V47                      1       16657 5463261 3036.5
## - V60                      1       17439 5464043 3036.5
## - V56                      1       18008 5464612 3036.6
## - V41                      1       18925 5465529 3036.6
```

```
## - V38                         1     20663  5467267 3036.7
## - V57                         1     21897  5468500 3036.8
## - V67                         1     22647  5469251 3036.8
## - V53                         1     24854  5471458 3036.9
## - V12                         1     26541  5473145 3037.0
## - V37                         1     27419  5474022 3037.1
## - V55                         1     29552  5476156 3037.2
## - V68                         1     29833  5476437 3037.2
## - V19                         1     31201  5477804 3037.3
## - V59                         1     33572  5480176 3037.4
## - V16                         1     36440  5483044 3037.6
## <none>                              5446604 3037.6
## - V70                         1     43988  5490592 3038.0
## - V6                          1     53292  5499895 3038.5
## - V48                         1     54814  5501418 3038.6
## - V5                          1     57720  5504324 3038.7
## - V33                         1     62451  5509055 3039.0
## - V40                         1     62807  5509410 3039.0
## - V66                         1     63969  5510573 3039.0
## - V64                         1     64549  5511152 3039.1
## - V51                         1     68749  5515353 3039.3
## - V11                         1     73036  5519639 3039.5
## - V44                         1     74526  5521130 3039.6
## - V23                         1     80515  5527118 3039.9
## - V26                         1     83507  5530111 3040.1
## - V15                         1     86468  5533072 3040.3
## - V14                         1     88415  5535019 3040.4
## - V36                         1     91449  5538053 3040.5
## - V45                         1     91903  5538506 3040.6
## - V34                         1     96251  5542855 3040.8
## - V32                         1    113712  5560316 3041.7
## - V1                          1    122419  5569023 3042.2
## - ‘START YEAR‘                1    125828  5572432 3042.4
## - V42                         1    134813  5581417 3042.8
## - V2                          1    137783  5584387 3043.0
## - V3                          1    157325  5603928 3044.0
## - V13                         1    201260  5647864 3046.4
## - ‘COMPLETION QUARTER‘  1    650141  6096744 3069.1
## - ‘COMPLETION YEAR‘     1    792209  6238813 3075.9
## - V8                          1  93146646 98593249 3895.7
##
## Step:  AIC=3035.67
## train$V104 ~ ‘START YEAR‘ + ‘COMPLETION YEAR‘ + ‘COMPLETION QUARTER‘ +
##     V1 + V2 + V3 + V4 + V5 + V6 + V8 + V10 + V11 + V12 + V13 +
##     V14 + V15 + V16 + V18 + V19 + V21 + V22 + V23 + V26 + V27 +
##     V29 + V32 + V33 + V34 + V35 + V36 + V37 + V38 + V40 + V41 +
##     V42 + V44 + V45 + V46 + V47 + V48 + V49 + V50 + V51 + V52 +
##     V53 + V55 + V56 + V57 + V58 + V59 + V60 + V61 + V63 + V64 +
##     V65 + V66 + V67 + V68 + V70
##
##                        Df Sum of Sq      RSS    AIC
## - V27                         1      1432  5449696 3033.7
## - V58                         1      2769  5451033 3033.8
## - V65                         1      4240  5452504 3033.9
```

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## - V61                1      4629  5452894 3033.9
## - V35                1      4765  5453029 3033.9
## - V52                1      4865  5453129 3033.9
## - V46                1      5156  5453421 3034.0
## - V50                1      6940  5455204 3034.0
## - V4                 1      7537  5455801 3034.1
## - V29                1     10349  5458613 3034.2
## - V21                1     10586  5458851 3034.2
## - V18                1     10658  5458923 3034.3
## - V49                1     14277  5462541 3034.4
## - V22                1     17531  5465795 3034.6
## - V47                1     18036  5466301 3034.7
## - V10                1     18506  5466770 3034.7
## - V60                1     18700  5466964 3034.7
## - V41                1     19220  5467484 3034.7
## - V38                1     19657  5467921 3034.7
## - V57                1     20475  5468739 3034.8
## - V63                1     21361  5469625 3034.8
## - V67                1     21475  5469739 3034.8
## - V12                1     25922  5474186 3035.1
## - V56                1     26179  5474444 3035.1
## - V37                1     28693  5476957 3035.2
## - V55                1     29045  5477309 3035.3
## - V53                1     33667  5481931 3035.5
## - V19                1     34885  5483150 3035.6
## - V68                1     36265  5484529 3035.6
## <none>                            5448264 3035.7
## - V16                1     45449  5493713 3036.1
## - V70                1     56751  5505016 3036.7
## - V6                 1     57551  5505815 3036.8
## - V5                 1     59766  5508031 3036.9
## - V59                1     60492  5508756 3037.0
## - V64                1     62926  5511190 3037.1
## - V33                1     65153  5513417 3037.2
## - V51                1     67817  5516081 3037.3
## - V66                1     69262  5517526 3037.4
## - V40                1     74106  5522370 3037.7
## - V11                1     79508  5527772 3038.0
## - V44                1     81053  5529318 3038.1
## - V26                1     82008  5530272 3038.1
## - V14                1     86756  5535020 3038.4
## - V23                1     90269  5538533 3038.6
## - V15                1     91466  5539730 3038.6
## - V45                1     96861  5545125 3038.9
## - V36                1    109258  5557522 3039.6
## - V48                1    114761  5563025 3039.9
## - V34                1    115193  5563457 3039.9
## - V1                 1    123763  5572027 3040.3
## - V32                1    124271  5572535 3040.4
## - `START YEAR`       1    134096  5582360 3040.9
## - V2                 1    136269  5584533 3041.0
## - V42                1    144987  5593251 3041.5
## - V3                 1    155712  5603976 3042.0
## - V13                1    199634  5647898 3044.4
```

```
## - `COMPLETION QUARTER`  1    656382  6104646 3067.5
## - `COMPLETION YEAR`      1    795461  6243726 3074.1
## - V8                     1  93170045 98618309 3893.8
##
## Step:  AIC=3033.75
## train$V104 ~ `START YEAR` + `COMPLETION YEAR` + `COMPLETION QUARTER` +
##     V1 + V2 + V3 + V4 + V5 + V6 + V8 + V10 + V11 + V12 + V13 +
##     V14 + V15 + V16 + V18 + V19 + V21 + V22 + V23 + V26 + V29 +
##     V32 + V33 + V34 + V35 + V36 + V37 + V38 + V40 + V41 + V42 +
##     V44 + V45 + V46 + V47 + V48 + V49 + V50 + V51 + V52 + V53 +
##     V55 + V56 + V57 + V58 + V59 + V60 + V61 + V63 + V64 + V65 +
##     V66 + V67 + V68 + V70
##
##                        Df Sum of Sq     RSS    AIC
## - V65                   1      2926 5452622 3031.9
## - V58                   1      4797 5454493 3032.0
## - V52                   1      5791 5455487 3032.1
## - V61                   1      6091 5455787 3032.1
## - V50                   1      6255 5455951 3032.1
## - V4                    1      7440 5457136 3032.2
## - V21                   1      9379 5459075 3032.3
## - V18                   1      9682 5459378 3032.3
## - V29                   1     10356 5460052 3032.3
## - V35                   1     12669 5462365 3032.4
## - V49                   1     13124 5462820 3032.5
## - V10                   1     17740 5467436 3032.7
## - V41                   1     17794 5467490 3032.7
## - V22                   1     18008 5467704 3032.7
## - V38                   1     18225 5467921 3032.7
## - V47                   1     18363 5468059 3032.7
## - V57                   1     19050 5468746 3032.8
## - V60                   1     20247 5469943 3032.9
## - V67                   1     20553 5470249 3032.9
## - V46                   1     22228 5471924 3033.0
## - V12                   1     24500 5474196 3033.1
## - V56                   1     26320 5476016 3033.2
## - V63                   1     27203 5476899 3033.2
## - V37                   1     29033 5478729 3033.3
## - V55                   1     29991 5479687 3033.4
## - V53                   1     32440 5482136 3033.5
## - V19                   1     33907 5483603 3033.6
## - V68                   1     35016 5484712 3033.7
## <none>                            5449696 3033.7
## - V16                   1     44124 5493820 3034.1
## - V70                   1     57218 5506914 3034.9
## - V6                    1     57778 5507474 3034.9
## - V59                   1     59142 5508838 3035.0
## - V5                    1     59487 5509183 3035.0
## - V64                   1     62350 5512046 3035.1
## - V33                   1     64811 5514507 3035.3
## - V40                   1     72998 5522694 3035.7
## - V66                   1     73170 5522866 3035.7
## - V11                   1     80876 5530572 3036.1
## - V44                   1     80911 5530607 3036.1
```

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## - V26                    1       82113  5531809 3036.2
## - V14                    1       85613  5535309 3036.4
## - V51                    1       88513  5538209 3036.5
## - V15                    1       94669  5544365 3036.9
## - V23                    1       99313  5549009 3037.1
## - V45                    1      106985  5556681 3037.5
## - V48                    1      113330  5563026 3037.9
## - V34                    1      114758  5564454 3037.9
## - V36                    1      117170  5566866 3038.1
## - V1                     1      123116  5572812 3038.4
## - V32                    1      128987  5578683 3038.7
## - V2                     1      134911  5584607 3039.0
## - `START YEAR`           1      138455  5588151 3039.2
## - V42                    1      144045  5593741 3039.5
## - V3                     1      154287  5603983 3040.0
## - V13                    1      231688  5681384 3044.1
## - `COMPLETION QUARTER`   1      664240  6113936 3065.9
## - `COMPLETION YEAR`      1      801571  6251267 3072.5
## - V8                     1    93213650 98663346 3891.9
##
## Step:  AIC=3031.91
## train$V104 ~ `START YEAR` + `COMPLETION YEAR` + `COMPLETION QUARTER` +
##     V1 + V2 + V3 + V4 + V5 + V6 + V8 + V10 + V11 + V12 + V13 +
##     V14 + V15 + V16 + V18 + V19 + V21 + V22 + V23 + V26 + V29 +
##     V32 + V33 + V34 + V35 + V36 + V37 + V38 + V40 + V41 + V42 +
##     V44 + V45 + V46 + V47 + V48 + V49 + V50 + V51 + V52 + V53 +
##     V55 + V56 + V57 + V58 + V59 + V60 + V61 + V63 + V64 + V66 +
##     V67 + V68 + V70
##
##                        Df Sum of Sq      RSS    AIC
## - V58                   1        4114  5456736 3030.1
## - V18                   1        7281  5459903 3030.3
## - V4                    1        7626  5460248 3030.3
## - V52                   1        8126  5460748 3030.4
## - V21                   1        8207  5460830 3030.4
## - V29                   1        8613  5461236 3030.4
## - V50                   1        9020  5461642 3030.4
## - V49                   1       12096  5464719 3030.6
## - V35                   1       13844  5466466 3030.7
## - V10                   1       14878  5467500 3030.7
## - V22                   1       15413  5468035 3030.7
## - V41                   1       16210  5468833 3030.8
## - V38                   1       16496  5469119 3030.8
## - V61                   1       16717  5469339 3030.8
## - V47                   1       16720  5469343 3030.8
## - V67                   1       17810  5470432 3030.9
## - V57                   1       19022  5471644 3030.9
## - V60                   1       19476  5472098 3031.0
## - V12                   1       21827  5474449 3031.1
## - V56                   1       27072  5479695 3031.4
## - V55                   1       27132  5479754 3031.4
## - V37                   1       27462  5480084 3031.4
## - V53                   1       29950  5482573 3031.5
## - V19                   1       31181  5483803 3031.6
```

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## - V68                          1       32152  5484774 3031.7
## - V63                          1       34430  5487052 3031.8
## - V46                          1       35588  5488210 3031.8
## <none>                                        5452622 3031.9
## - V16                          1       43181  5495803 3032.3
## - V70                          1       54786  5507409 3032.9
## - V5                           1       60678  5513300 3033.2
## - V6                           1       60767  5513389 3033.2
## - V59                          1       60967  5513589 3033.2
## - V33                          1       69194  5521817 3033.7
## - V64                          1       71834  5524456 3033.8
## - V66                          1       73026  5525648 3033.9
## - V40                          1       75173  5527796 3034.0
## - V44                          1       78164  5530787 3034.1
## - V11                          1       80405  5533028 3034.3
## - V15                          1       92634  5545257 3034.9
## - V23                          1       96404  5549026 3035.1
## - V26                          1       98203  5550826 3035.2
## - V51                          1      101387  5554010 3035.4
## - V34                          1      111833  5564456 3035.9
## - V14                          1      112752  5565374 3036.0
## - V36                          1      114246  5566869 3036.1
## - V1                           1      120731  5573354 3036.4
## - V48                          1      124545  5577167 3036.6
## - V45                          1      129932  5582555 3036.9
## - V32                          1      130794  5583416 3036.9
## - V2                           1      137158  5589781 3037.3
## - V42                          1      143971  5596593 3037.6
## - V3                           1      155355  5607977 3038.3
## - 'START YEAR'                 1      177566  5630189 3039.4
## - V13                          1      239506  5692129 3042.7
## - 'COMPLETION QUARTER'         1      667484  6120106 3064.2
## - 'COMPLETION YEAR'            1      799205  6251827 3070.5
## - V8                           1    93221960 98674582 3889.9
##
## Step:  AIC=3030.13
## train$V104 ~ 'START YEAR' + 'COMPLETION YEAR' + 'COMPLETION QUARTER' +
##     V1 + V2 + V3 + V4 + V5 + V6 + V8 + V10 + V11 + V12 + V13 +
##     V14 + V15 + V16 + V18 + V19 + V21 + V22 + V23 + V26 + V29 +
##     V32 + V33 + V34 + V35 + V36 + V37 + V38 + V40 + V41 + V42 +
##     V44 + V45 + V46 + V47 + V48 + V49 + V50 + V51 + V52 + V53 +
##     V55 + V56 + V57 + V59 + V60 + V61 + V63 + V64 + V66 + V67 +
##     V68 + V70
##
##                         Df Sum of Sq      RSS    AIC
## - V18                          1        5083  5461820 3028.4
## - V21                          1        6528  5463264 3028.5
## - V4                           1        7748  5464485 3028.6
## - V35                          1        9823  5466559 3028.7
## - V29                          1       10853  5467590 3028.7
## - V50                          1       12982  5469719 3028.8
## - V47                          1       13636  5470372 3028.9
## - V41                          1       16330  5473066 3029.0
## - V61                          1       16821  5473557 3029.0
```

```
## - V10                         1      20590  5477326 3029.3
## - V49                         1      22600  5479336 3029.4
## - V60                         1      24351  5481087 3029.5
## - V67                         1      28080  5484816 3029.7
## - V52                         1      28688  5485424 3029.7
## - V22                         1      30105  5486841 3029.8
## - V46                         1      33301  5490037 3029.9
## - V55                         1      35889  5492625 3030.1
## - V37                         1      36647  5493384 3030.1
## <none>                                   5456736 3030.1
## - V38                         1      38570  5495306 3030.2
## - V56                         1      39545  5496281 3030.3
## - V12                         1      39788  5496524 3030.3
## - V63                         1      40073  5496809 3030.3
## - V57                         1      40258  5496994 3030.3
## - V19                         1      43293  5500029 3030.5
## - V68                         1      50198  5506934 3030.9
## - V53                         1      50638  5507374 3030.9
## - V5                          1      61870  5518607 3031.5
## - V6                          1      62364  5519100 3031.5
## - V33                         1      68899  5525635 3031.9
## - V16                         1      69203  5525940 3031.9
## - V64                         1      72166  5528902 3032.0
## - V59                         1      77425  5534161 3032.3
## - V70                         1      81359  5538096 3032.5
## - V44                         1      93832  5550569 3033.2
## - V26                         1      95043  5551780 3033.3
## - V66                         1     100110  5556846 3033.5
## - V11                         1     110184  5566921 3034.1
## - V40                         1     111989  5568725 3034.2
## - V1                          1     119506  5576242 3034.6
## - V36                         1     121966  5578702 3034.7
## - V14                         1     122041  5578777 3034.7
## - V34                         1     126220  5582956 3034.9
## - V48                         1     128738  5585474 3035.1
## - V2                          1     136123  5592860 3035.5
## - V15                         1     138831  5595567 3035.6
## - V45                         1     141441  5598177 3035.7
## - V51                         1     142849  5599585 3035.8
## - V42                         1     142860  5599596 3035.8
## - V3                          1     153035  5609771 3036.3
## - V32                         1     164455  5621192 3037.0
## - 'START YEAR'                1     180438  5637174 3037.8
## - V23                         1     182286  5639022 3037.9
## - V13                         1     303837  5760573 3044.2
## - 'COMPLETION QUARTER' 1     676813  6133549 3062.9
## - 'COMPLETION YEAR'    1     795200  6251936 3068.5
## - V8                          1  93219179 98675916 3887.9
##
## Step:  AIC=3028.41
## train$V104 ~ 'START YEAR' + 'COMPLETION YEAR' + 'COMPLETION QUARTER' +
##     V1 + V2 + V3 + V4 + V5 + V6 + V8 + V10 + V11 + V12 + V13 +
##     V14 + V15 + V16 + V19 + V21 + V22 + V23 + V26 + V29 + V32 +
##     V33 + V34 + V35 + V36 + V37 + V38 + V40 + V41 + V42 + V44 +
```

```
##     V45 + V46 + V47 + V48 + V49 + V50 + V51 + V52 + V53 + V55 +
##     V56 + V57 + V59 + V60 + V61 + V63 + V64 + V66 + V67 + V68 +
##     V70
##
##                 Df Sum of Sq      RSS    AIC
## - V21            1      2711  5464531 3026.6
## - V35            1      6610  5468430 3026.8
## - V29            1      8092  5469912 3026.8
## - V4             1      8252  5470071 3026.9
## - V47            1     10541  5472361 3027.0
## - V50            1     12305  5474124 3027.1
## - V10            1     17648  5479468 3027.4
## - V61            1     17786  5479605 3027.4
## - V41            1     18415  5480234 3027.4
## - V49            1     18964  5480784 3027.4
## - V60            1     21141  5482960 3027.6
## - V67            1     23006  5484826 3027.7
## - V46            1     28258  5490077 3027.9
## - V22            1     29216  5491036 3028.0
## - V52            1     30939  5492759 3028.1
## - V38            1     34767  5496586 3028.3
## - V57            1     35505  5497325 3028.3
## <none>                        5461820 3028.4
## - V55            1     37328  5499147 3028.4
## - V12            1     37747  5499567 3028.5
## - V56            1     39368  5501188 3028.5
## - V19            1     42336  5504156 3028.7
## - V37            1     42900  5504720 3028.7
## - V68            1     45876  5507696 3028.9
## - V63            1     47836  5509656 3029.0
## - V53            1     51105  5512924 3029.2
## - V6             1     58619  5520439 3029.6
## - V5             1     58769  5520589 3029.6
## - V16            1     65511  5527331 3030.0
## - V64            1     70397  5532217 3030.2
## - V59            1     72636  5534456 3030.3
## - V33            1     82488  5544308 3030.9
## - V70            1     84580  5546400 3031.0
## - V44            1     93259  5555079 3031.4
## - V26            1     96481  5558300 3031.6
## - V11            1    106179  5567999 3032.1
## - V66            1    106431  5568251 3032.1
## - V40            1    106913  5568733 3032.2
## - V36            1    116953  5578772 3032.7
## - V14            1    117860  5579680 3032.8
## - V1             1    119378  5581197 3032.8
## - V34            1    121464  5583284 3032.9
## - V15            1    134509  5596328 3033.6
## - V2             1    137735  5599555 3033.8
## - V45            1    141118  5602937 3034.0
## - V51            1    143772  5605592 3034.1
## - V42            1    149663  5611482 3034.4
## - V3             1    154937  5616756 3034.7
## - V48            1    159321  5621141 3034.9
```

```
## - V32                         1    159605  5621425 3035.0
## - V23                         1    189332  5651152 3036.5
## - ‘START YEAR‘                 1    206627  5668446 3037.4
## - V13                         1    311639  5773459 3042.9
## - ‘COMPLETION QUARTER‘  1    674531  6136351 3061.0
## - ‘COMPLETION YEAR‘     1    790116  6251936 3066.5
## - V8                          1  93218611 98680431 3886.0
##
## Step:  AIC=3026.56
## train$V104 ~ ‘START YEAR‘ + ‘COMPLETION YEAR‘ + ‘COMPLETION QUARTER‘ +
##     V1 + V2 + V3 + V4 + V5 + V6 + V8 + V10 + V11 + V12 + V13 +
##     V14 + V15 + V16 + V19 + V22 + V23 + V26 + V29 + V32 + V33 +
##     V34 + V35 + V36 + V37 + V38 + V40 + V41 + V42 + V44 + V45 +
##     V46 + V47 + V48 + V49 + V50 + V51 + V52 + V53 + V55 + V56 +
##     V57 + V59 + V60 + V61 + V63 + V64 + V66 + V67 + V68 + V70
##
##                          Df Sum of Sq     RSS    AIC
## - V35                     1      5654 5470185 3024.9
## - V29                     1      7300 5471831 3025.0
## - V4                      1      8565 5473096 3025.0
## - V47                     1      9215 5473746 3025.1
## - V50                     1      9638 5474169 3025.1
## - V10                     1     15589 5480120 3025.4
## - V41                     1     16053 5480584 3025.4
## - V60                     1     18616 5483147 3025.6
## - V61                     1     19072 5483604 3025.6
## - V49                     1     20103 5484634 3025.6
## - V67                     1     20561 5485092 3025.7
## - V22                     1     29945 5494476 3026.2
## - V57                     1     32836 5497367 3026.3
## - V38                     1     33305 5497836 3026.4
## - V46                     1     33857 5498388 3026.4
## - V55                     1     34624 5499156 3026.4
## - V52                     1     34739 5499270 3026.4
## - V12                     1     36329 5500860 3026.5
## - V56                     1     36658 5501189 3026.5
## <none>                                5464531 3026.6
## - V19                     1     42450 5506981 3026.9
## - V37                     1     42712 5507243 3026.9
## - V68                     1     43229 5507760 3026.9
## - V63                     1     47886 5512417 3027.1
## - V53                     1     49562 5514093 3027.2
## - V6                      1     56726 5521257 3027.6
## - V5                      1     57441 5521972 3027.7
## - V16                     1     63577 5528108 3028.0
## - V64                     1     67788 5532319 3028.2
## - V59                     1     70130 5534661 3028.3
## - V33                     1     83773 5548304 3029.1
## - V70                     1     85019 5549550 3029.1
## - V44                     1     92643 5557174 3029.5
## - V26                     1     95975 5560506 3029.7
## - V11                     1    103571 5568102 3030.1
## - V66                     1    113502 5578033 3030.7
## - V36                     1    114348 5578879 3030.7
```

```
## - V1                      1     116797   5581328 3030.8
## - V14                     1     117248   5581779 3030.9
## - V34                     1     119000   5583531 3031.0
## - V40                     1     128352   5592883 3031.5
## - V15                     1     131866   5596397 3031.6
## - V45                     1     140504   5605035 3032.1
## - V51                     1     141247   5605778 3032.1
## - V2                      1     143674   5608205 3032.3
## - V42                     1     148615   5613146 3032.5
## - V48                     1     156680   5621211 3033.0
## - V3                      1     162793   5627324 3033.3
## - V32                     1     164242   5628773 3033.4
## - V23                     1     186623   5651154 3034.5
## - 'START YEAR'            1     209210   5673741 3035.7
## - V13                     1     339698   5804229 3042.5
## - 'COMPLETION QUARTER'    1     680430   6144961 3059.4
## - 'COMPLETION YEAR'       1     794388   6258919 3064.9
## - V8                      1   93228350  98692881 3884.0
##
## Step:  AIC=3024.86
## train$V104 ~ 'START YEAR' + 'COMPLETION YEAR' + 'COMPLETION QUARTER' +
##     V1 + V2 + V3 + V4 + V5 + V6 + V8 + V10 + V11 + V12 + V13 +
##     V14 + V15 + V16 + V19 + V22 + V23 + V26 + V29 + V32 + V33 +
##     V34 + V36 + V37 + V38 + V40 + V41 + V42 + V44 + V45 + V46 +
##     V47 + V48 + V49 + V50 + V51 + V52 + V53 + V55 + V56 + V57 +
##     V59 + V60 + V61 + V63 + V64 + V66 + V67 + V68 + V70
##
##                         Df Sum of Sq      RSS    AIC
## - V50                     1      7851  5478036 3023.3
## - V29                     1      8157  5478342 3023.3
## - V4                      1      8823  5479007 3023.3
## - V47                     1     10311  5480496 3023.4
## - V41                     1     13727  5483912 3023.6
## - V61                     1     16085  5486270 3023.7
## - V10                     1     17300  5487484 3023.8
## - V60                     1     21386  5491571 3024.0
## - V49                     1     23230  5493415 3024.1
## - V67                     1     23385  5493569 3024.1
## - V38                     1     29820  5500005 3024.5
## - V46                     1     30393  5500578 3024.5
## - V22                     1     30429  5500614 3024.5
## - V57                     1     31099  5501284 3024.5
## - V52                     1     32336  5502521 3024.6
## - V56                     1     33245  5503430 3024.7
## <none>                               5470185 3024.9
## - V37                     1     38426  5508611 3024.9
## - V55                     1     40013  5510198 3025.0
## - V19                     1     43150  5513335 3025.2
## - V63                     1     43157  5513342 3025.2
## - V68                     1     44546  5514731 3025.3
## - V12                     1     49161  5519346 3025.5
## - V53                     1     53667  5523851 3025.8
## - V6                      1     54802  5524987 3025.8
## - V5                      1     56138  5526323 3025.9
```

```
## - V16                      1       62686  5532871 3026.2
## - V59                      1       69753  5539937 3026.6
## - V64                      1       71664  5541849 3026.7
## - V33                      1       88898  5559083 3027.7
## - V44                      1       92462  5562646 3027.8
## - V70                      1       92524  5562709 3027.8
## - V26                      1       99161  5569346 3028.2
## - V11                      1      105932  5576116 3028.6
## - V36                      1      108707  5578892 3028.7
## - V14                      1      112904  5583089 3028.9
## - V34                      1      115449  5585634 3029.1
## - V1                       1      116222  5586407 3029.1
## - V66                      1      117044  5587229 3029.2
## - V15                      1      131090  5601275 3029.9
## - V40                      1      134924  5605109 3030.1
## - V51                      1      140724  5610909 3030.4
## - V2                       1      146651  5616836 3030.7
## - V42                      1      148126  5618311 3030.8
## - V48                      1      155513  5625698 3031.2
## - V3                       1      165948  5636133 3031.7
## - V32                      1      166604  5636789 3031.8
## - V23                      1      181068  5651253 3032.5
## - V45                      1      189412  5659597 3033.0
## - 'START YEAR'             1      208595  5678780 3034.0
## - V13                      1      334071  5804256 3040.5
## - 'COMPLETION QUARTER'     1      685607  6155792 3057.9
## - 'COMPLETION YEAR'        1      799471  6269656 3063.4
## - V8                       1    93419180 98889365 3882.6
##
## Step:  AIC=3023.29
## train$V104 ~ 'START YEAR' + 'COMPLETION YEAR' + 'COMPLETION QUARTER' +
##     V1 + V2 + V3 + V4 + V5 + V6 + V8 + V10 + V11 + V12 + V13 +
##     V14 + V15 + V16 + V19 + V22 + V23 + V26 + V29 + V32 + V33 +
##     V34 + V36 + V37 + V38 + V40 + V41 + V42 + V44 + V45 + V46 +
##     V47 + V48 + V49 + V51 + V52 + V53 + V55 + V56 + V57 + V59 +
##     V60 + V61 + V63 + V64 + V66 + V67 + V68 + V70
##
##                     Df Sum of Sq      RSS    AIC
## - V29                      1        5954  5483990 3021.6
## - V4                       1        9718  5487754 3021.8
## - V61                      1       11700  5489736 3021.9
## - V41                      1       12114  5490150 3021.9
## - V10                      1       15189  5493225 3022.1
## - V60                      1       16503  5494539 3022.2
## - V46                      1       22984  5501020 3022.5
## - V49                      1       23368  5501404 3022.6
## - V56                      1       26392  5504428 3022.7
## - V22                      1       26456  5504493 3022.7
## - V38                      1       28611  5506647 3022.8
## - V67                      1       29316  5507353 3022.9
## - V52                      1       32148  5510184 3023.0
## - V57                      1       32362  5510398 3023.0
## - V37                      1       33789  5511825 3023.1
## - V63                      1       36870  5514906 3023.3
```

```
## <none>                              5478036 3023.3
## - V68                   1     37066  5515102 3023.3
## - V12                   1     41780  5519816 3023.5
## - V55                   1     42246  5520282 3023.6
## - V53                   1     47016  5525052 3023.8
## - V19                   1     47614  5525650 3023.9
## - V6                    1     52390  5530426 3024.1
## - V5                    1     54191  5532227 3024.2
## - V16                   1     56088  5534124 3024.3
## - V47                   1     68406  5546442 3025.0
## - V64                   1     71215  5549251 3025.1
## - V59                   1     73944  5551980 3025.3
## - V44                   1     84610  5562646 3025.8
## - V33                   1     90535  5568571 3026.2
## - V70                   1     92718  5570754 3026.3
## - V26                   1     97028  5575064 3026.5
## - V11                   1    103199  5581235 3026.8
## - V36                   1    103235  5581271 3026.8
## - V14                   1    105148  5583184 3026.9
## - V34                   1    108569  5586605 3027.1
## - V66                   1    109308  5587344 3027.2
## - V1                    1    115405  5593441 3027.5
## - V15                   1    123874  5601910 3027.9
## - V40                   1    133490  5611526 3028.4
## - V42                   1    140367  5618403 3028.8
## - V48                   1    150315  5628351 3029.3
## - V2                    1    155475  5633511 3029.6
## - V51                   1    158571  5636607 3029.8
## - V32                   1    159799  5637835 3029.8
## - V23                   1    174163  5652199 3030.6
## - V3                    1    175503  5653539 3030.7
## - V45                   1    181572  5659608 3031.0
## - 'START YEAR'          1    203605  5681641 3032.1
## - V13                   1    337583  5815619 3039.1
## - 'COMPLETION QUARTER'  1    695850  6173887 3056.8
## - 'COMPLETION YEAR'     1    833901  6311937 3063.4
## - V8                    1  93415571 98893607 3880.6
##
## Step:  AIC=3021.61
## train$V104 ~ 'START YEAR' + 'COMPLETION YEAR' + 'COMPLETION QUARTER' +
##     V1 + V2 + V3 + V4 + V5 + V6 + V8 + V10 + V11 + V12 + V13 +
##     V14 + V15 + V16 + V19 + V22 + V23 + V26 + V32 + V33 + V34 +
##     V36 + V37 + V38 + V40 + V41 + V42 + V44 + V45 + V46 + V47 +
##     V48 + V49 + V51 + V52 + V53 + V55 + V56 + V57 + V59 + V60 +
##     V61 + V63 + V64 + V66 + V67 + V68 + V70
##
##                       Df Sum of Sq     RSS    AIC
## - V61                  1      7079  5491069 3020.0
## - V4                   1      9575  5493565 3020.1
## - V60                  1     12596  5496586 3020.3
## - V41                  1     12749  5496739 3020.3
## - V10                  1     12956  5496946 3020.3
## - V49                  1     18497  5502488 3020.6
## - V46                  1     21000  5504990 3020.7
```

```
## - V56                       1     21049 5505040 3020.8
## - V22                       1     21719 5505710 3020.8
## - V67                       1     26087 5510077 3021.0
## - V52                       1     26456 5510447 3021.0
## - V38                       1     26860 5510850 3021.1
## - V57                       1     27111 5511102 3021.1
## - V12                       1     36163 5520153 3021.6
## - V55                       1     36399 5520389 3021.6
## <none>                            5483990 3021.6
## - V37                       1     37810 5521800 3021.7
## - V68                       1     38439 5522429 3021.7
## - V63                       1     41730 5525720 3021.9
## - V53                       1     42455 5526445 3021.9
## - V19                       1     45294 5529285 3022.1
## - V16                       1     50139 5534129 3022.3
## - V6                        1     53110 5537100 3022.5
## - V5                        1     56054 5540044 3022.6
## - V64                       1     65327 5549317 3023.1
## - V47                       1     68455 5552446 3023.3
## - V59                       1     69214 5553204 3023.3
## - V44                       1     85688 5569679 3024.2
## - V70                       1     86921 5570911 3024.3
## - V33                       1     94883 5578874 3024.7
## - V14                       1     99317 5583308 3024.9
## - V66                       1    104098 5588088 3025.2
## - V36                       1    104584 5588575 3025.2
## - V34                       1    107590 5591580 3025.4
## - V26                       1    113368 5597358 3025.7
## - V1                        1    117942 5601933 3025.9
## - V11                       1    122386 5606376 3026.2
## - V40                       1    149283 5633273 3027.6
## - V2                        1    153862 5637852 3027.8
## - V48                       1    163565 5647555 3028.3
## - V42                       1    166221 5650211 3028.5
## - V32                       1    171473 5655463 3028.8
## - V3                        1    174545 5658535 3028.9
## - V23                       1    175694 5659684 3029.0
## - V51                       1    179165 5663155 3029.2
## - V45                       1    186997 5670987 3029.6
## - `START YEAR`              1    230655 5714645 3031.8
## - V15                       1    234337 5718327 3032.0
## - V13                       1    361164 5845154 3038.6
## - `COMPLETION QUARTER`      1    702354 6186344 3055.4
## - `COMPLETION YEAR`         1    831435 6315425 3061.5
## - V8                        1  93575451 99059442 3879.1
##
## Step:  AIC=3020
## train$V104 ~ `START YEAR` + `COMPLETION YEAR` + `COMPLETION QUARTER` +
##     V1 + V2 + V3 + V4 + V5 + V6 + V8 + V10 + V11 + V12 + V13 +
##     V14 + V15 + V16 + V19 + V22 + V23 + V26 + V32 + V33 + V34 +
##     V36 + V37 + V38 + V40 + V41 + V42 + V44 + V45 + V46 + V47 +
##     V48 + V49 + V51 + V52 + V53 + V55 + V56 + V57 + V59 + V60 +
##     V63 + V64 + V66 + V67 + V68 + V70
##
```

```
##                          Df Sum of Sq      RSS    AIC
## - V4                      1       8840  5499909 3018.5
## - V41                     1      13012  5504081 3018.7
## - V10                     1      13681  5504750 3018.7
## - V49                     1      13831  5504900 3018.7
## - V46                     1      16442  5507511 3018.9
## - V22                     1      18004  5509072 3019.0
## - V52                     1      19379  5510448 3019.0
## - V56                     1      19517  5510586 3019.0
## - V60                     1      21767  5512836 3019.2
## - V38                     1      24300  5515369 3019.3
## - V57                     1      29010  5520079 3019.6
## - V68                     1      32165  5523234 3019.7
## - V63                     1      34662  5525731 3019.9
## - V53                     1      36211  5527279 3019.9
## <none>                                   5491069 3020.0
## - V67                     1      39905  5530974 3020.1
## - V19                     1      42756  5533825 3020.3
## - V37                     1      42843  5533912 3020.3
## - V16                     1      43318  5534386 3020.3
## - V6                      1      53529  5544597 3020.9
## - V5                      1      56781  5547849 3021.1
## - V12                     1      57509  5548578 3021.1
## - V55                     1      59163  5550232 3021.2
## - V47                     1      73722  5564790 3022.0
## - V59                     1      83081  5574150 3022.5
## - V44                     1      84415  5575484 3022.5
## - V33                     1      88765  5579834 3022.8
## - V14                     1      92398  5583467 3023.0
## - V70                     1      94528  5585596 3023.1
## - V66                     1      97262  5588331 3023.2
## - V36                     1      99253  5590322 3023.3
## - V34                     1     100730  5591798 3023.4
## - V11                     1     115975  5607043 3024.2
## - V1                      1     116470  5607539 3024.2
## - V40                     1     144481  5635549 3025.7
## - V2                      1     151744  5642813 3026.1
## - V48                     1     156487  5647556 3026.3
## - V42                     1     161437  5652506 3026.6
## - V32                     1     164961  5656030 3026.8
## - V23                     1     168676  5659745 3027.0
## - V64                     1     170159  5661228 3027.1
## - V3                      1     171216  5662285 3027.1
## - V26                     1     205406  5696474 3028.9
## - V51                     1     231325  5722394 3030.3
## - V15                     1     231677  5722746 3030.3
## - V45                     1     246651  5737720 3031.0
## - 'START YEAR'            1     275233  5766302 3032.5
## - V13                     1     356668  5847737 3036.7
## - 'COMPLETION QUARTER'    1     713501  6204570 3054.3
## - 'COMPLETION YEAR'       1     848599  6339668 3060.7
## - V8                      1   93574597 99065666 3877.1
##
## Step:  AIC=3018.47
```

```
## train$V104 ~ 'START YEAR' + 'COMPLETION YEAR' + 'COMPLETION QUARTER' +
##     V1 + V2 + V3 + V5 + V6 + V8 + V10 + V11 + V12 + V13 + V14 +
##     V15 + V16 + V19 + V22 + V23 + V26 + V32 + V33 + V34 + V36 +
##     V37 + V38 + V40 + V41 + V42 + V44 + V45 + V46 + V47 + V48 +
##     V49 + V51 + V52 + V53 + V55 + V56 + V57 + V59 + V60 + V63 +
##     V64 + V66 + V67 + V68 + V70
##
##                         Df Sum of Sq      RSS    AIC
## - V41                    1     12562  5512470 3017.2
## - V49                    1     12969  5512878 3017.2
## - V10                    1     13998  5513907 3017.2
## - V22                    1     18522  5518431 3017.5
## - V46                    1     18641  5518549 3017.5
## - V52                    1     18861  5518769 3017.5
## - V56                    1     19506  5519415 3017.5
## - V38                    1     24216  5524125 3017.8
## - V60                    1     24631  5524540 3017.8
## - V57                    1     27858  5527766 3018.0
## - V68                    1     33501  5533410 3018.3
## - V53                    1     35897  5535805 3018.4
## <none>                              5499909 3018.5
## - V63                    1     37586  5537495 3018.5
## - V19                    1     41063  5540972 3018.7
## - V67                    1     41550  5541459 3018.7
## - V37                    1     44139  5544048 3018.8
## - V16                    1     46094  5546003 3019.0
## - V6                     1     56570  5556478 3019.5
## - V12                    1     57088  5556997 3019.5
## - V55                    1     61230  5561139 3019.8
## - V47                    1     74656  5574565 3020.5
## - V59                    1     84324  5584233 3021.0
## - V33                    1     89829  5589738 3021.3
## - V44                    1     89889  5589798 3021.3
## - V14                    1     92769  5592678 3021.4
## - V70                    1     96934  5596843 3021.7
## - V5                     1     97838  5597747 3021.7
## - V36                    1    100402  5600311 3021.8
## - V34                    1    103127  5603035 3022.0
## - V66                    1    105041  5604950 3022.1
## - V11                    1    119742  5619651 3022.9
## - V1                     1    141110  5641018 3024.0
## - V40                    1    146504  5646413 3024.3
## - V48                    1    156415  5656324 3024.8
## - V42                    1    165501  5665410 3025.3
## - V32                    1    166816  5666725 3025.3
## - V23                    1    169116  5669025 3025.5
## - V64                    1    169386  5669294 3025.5
## - V3                     1    183320  5683228 3026.2
## - V26                    1    203105  5703014 3027.2
## - V2                     1    213580  5713489 3027.8
## - V15                    1    229378  5729287 3028.6
## - V51                    1    238411  5738320 3029.1
## - V45                    1    251015  5750924 3029.7
## - 'START YEAR'           1    280033  5779942 3031.2
```

```
## - V13                        1    362616  5862524 3035.4
## - ‘COMPLETION QUARTER‘        1    714880  6214789 3052.8
## - ‘COMPLETION YEAR‘           1    874518  6374427 3060.3
## - V8                          1  93575627 99075536 3875.1
##
## Step:  AIC=3017.15
## train$V104 ~ ‘START YEAR‘ + ‘COMPLETION YEAR‘ + ‘COMPLETION QUARTER‘ +
##     V1 + V2 + V3 + V5 + V6 + V8 + V10 + V11 + V12 + V13 + V14 +
##     V15 + V16 + V19 + V22 + V23 + V26 + V32 + V33 + V34 + V36 +
##     V37 + V38 + V40 + V42 + V44 + V45 + V46 + V47 + V48 + V49 +
##     V51 + V52 + V53 + V55 + V56 + V57 + V59 + V60 + V63 + V64 +
##     V66 + V67 + V68 + V70
##
##                        Df Sum of Sq      RSS    AIC
## - V10                   1      8513  5520984 3015.6
## - V52                   1     14313  5526784 3015.9
## - V56                   1     14906  5527377 3016.0
## - V49                   1     22589  5535060 3016.4
## - V38                   1     25969  5538439 3016.5
## - V63                   1     29191  5541661 3016.7
## - V57                   1     33871  5546342 3017.0
## - V19                   1     34106  5546577 3017.0
## - V53                   1     35739  5548210 3017.1
## <none>                               5512470 3017.2
## - V46                   1     39848  5552318 3017.3
## - V68                   1     45081  5557551 3017.6
## - V37                   1     48672  5561143 3017.8
## - V55                   1     48934  5561404 3017.8
## - V16                   1     49310  5561781 3017.8
## - V67                   1     52467  5564937 3018.0
## - V12                   1     55427  5567898 3018.1
## - V22                   1     58945  5571416 3018.3
## - V60                   1     63697  5576167 3018.6
## - V47                   1     68015  5580486 3018.8
## - V6                    1     74509  5586980 3019.1
## - V44                   1     77430  5589901 3019.3
## - V59                   1     79176  5591646 3019.4
## - V14                   1     80211  5592681 3019.4
## - V70                   1     84560  5597031 3019.7
## - V33                   1     91801  5604272 3020.1
## - V36                   1     92797  5605267 3020.1
## - V66                   1     98205  5610675 3020.4
## - V5                    1    108868  5621339 3021.0
## - V11                   1    116817  5629287 3021.4
## - V34                   1    120477  5632947 3021.6
## - V1                    1    132430  5644901 3022.2
## - V40                   1    138711  5651181 3022.5
## - V48                   1    144207  5656677 3022.8
## - V32                   1    154627  5667098 3023.4
## - V42                   1    156217  5668688 3023.5
## - V64                   1    159368  5671839 3023.6
## - V3                    1    181088  5693558 3024.8
## - V23                   1    182852  5695322 3024.8
## - V26                   1    196158  5708628 3025.5
```

54

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## - V2                        1     212020  5724490 3026.4
## - V15                       1     221963  5734434 3026.9
## - V51                       1     236550  5749020 3027.6
## - V45                       1     247438  5759909 3028.2
## - ‘START YEAR‘              1     286706  5799176 3030.2
## - V13                       1     364096  5876566 3034.1
## - ‘COMPLETION QUARTER‘      1     713479  6225949 3051.3
## - ‘COMPLETION YEAR‘         1     879398  6391868 3059.1
## - V8                        1   94276458 99788928 3875.3
##
## Step:  AIC=3015.61
## train$V104 ~ ‘START YEAR‘ + ‘COMPLETION YEAR‘ + ‘COMPLETION QUARTER‘ +
##      V1 + V2 + V3 + V5 + V6 + V8 + V11 + V12 + V13 + V14 + V15 +
##      V16 + V19 + V22 + V23 + V26 + V32 + V33 + V34 + V36 + V37 +
##      V38 + V40 + V42 + V44 + V45 + V46 + V47 + V48 + V49 + V51 +
##      V52 + V53 + V55 + V56 + V57 + V59 + V60 + V63 + V64 + V66 +
##      V67 + V68 + V70
##
##                          Df Sum of Sq       RSS    AIC
## - V56                      1       6648  5527632 3014.0
## - V52                      1       9952  5530935 3014.1
## - V49                      1      18449  5539433 3014.6
## - V63                      1      22641  5543624 3014.8
## - V53                      1      28340  5549324 3015.1
## <none>                               5520984 3015.6
## - V68                      1      39145  5560129 3015.7
## - V38                      1      39494  5560478 3015.7
## - V19                      1      39937  5560921 3015.8
## - V37                      1      40626  5561610 3015.8
## - V16                      1      44847  5565830 3016.0
## - V55                      1      45052  5566036 3016.0
## - V12                      1      47053  5568037 3016.1
## - V57                      1      47334  5568318 3016.1
## - V22                      1      50460  5571443 3016.3
## - V67                      1      53811  5574795 3016.5
## - V60                      1      55259  5576243 3016.6
## - V46                      1      57670  5578653 3016.7
## - V47                      1      60083  5581066 3016.8
## - V6                       1      67587  5588571 3017.2
## - V44                      1      69069  5590052 3017.3
## - V14                      1      72670  5593653 3017.5
## - V59                      1      79730  5600714 3017.9
## - V70                      1      81620  5602604 3018.0
## - V33                      1      83798  5604782 3018.1
## - V36                      1      85833  5606816 3018.2
## - V66                      1      91429  5612412 3018.5
## - V5                       1     101622  5622606 3019.0
## - V11                      1     111413  5632396 3019.5
## - V34                      1     112863  5633847 3019.6
## - V40                      1     131565  5652549 3020.6
## - V1                       1     131939  5652923 3020.6
## - V64                      1     151236  5672220 3021.6
## - V42                      1     156884  5677868 3021.9
## - V32                      1     157830  5678814 3022.0
```

```
## - V23                     1     177038   5698022 3023.0
## - V3                      1     180212   5701196 3023.1
## - V26                     1     204525   5725508 3024.4
## - V2                      1     211906   5732889 3024.8
## - V48                     1     241530   5762514 3026.3
## - V15                     1     242476   5763460 3026.4
## - V51                     1     255620   5776603 3027.1
## - V45                     1     275755   5796739 3028.1
## - `START YEAR`            1     289524   5810507 3028.8
## - V13                     1     356219   5877203 3032.2
## - `COMPLETION QUARTER`    1     714347   6235330 3049.7
## - `COMPLETION YEAR`       1     891784   6412768 3058.1
## - V8                      1  94759992 100280975 3874.7
##
## Step:  AIC=3013.97
## train$V104 ~ `START YEAR` + `COMPLETION YEAR` + `COMPLETION QUARTER` +
##     V1 + V2 + V3 + V5 + V6 + V8 + V11 + V12 + V13 + V14 + V15 +
##     V16 + V19 + V22 + V23 + V26 + V32 + V33 + V34 + V36 + V37 +
##     V38 + V40 + V42 + V44 + V45 + V46 + V47 + V48 + V49 + V51 +
##     V52 + V53 + V55 + V57 + V59 + V60 + V63 + V64 + V66 + V67 +
##     V68 + V70
##
##                     Df Sum of Sq      RSS    AIC
## - V52                1      9603  5537235 3012.5
## - V63                1     16104  5543736 3012.8
## - V49                1     16403  5544035 3012.8
## - V53                1     21782  5549414 3013.1
## - V68                1     32863  5560495 3013.7
## - V19                1     37049  5564681 3014.0
## - V38                1     37066  5564698 3014.0
## <none>                             5527632 3014.0
## - V16                1     38299  5565931 3014.0
## - V37                1     39183  5566815 3014.1
## - V12                1     42853  5570486 3014.3
## - V22                1     45359  5572991 3014.4
## - V57                1     48032  5575664 3014.5
## - V67                1     48524  5576156 3014.6
## - V60                1     49603  5577235 3014.6
## - V55                1     51077  5578709 3014.7
## - V46                1     58187  5585819 3015.1
## - V44                1     62422  5590054 3015.3
## - V6                 1     66686  5594318 3015.5
## - V47                1     69334  5596966 3015.7
## - V14                1     71711  5599344 3015.8
## - V70                1     75939  5603571 3016.0
## - V33                1     77165  5604797 3016.1
## - V36                1     81678  5609310 3016.3
## - V66                1     84856  5612488 3016.5
## - V59                1     85796  5613428 3016.5
## - V5                 1    100812  5628444 3017.3
## - V34                1    109349  5636981 3017.8
## - V11                1    109414  5637046 3017.8
## - V40                1    126221  5653853 3018.7
## - V1                 1    127838  5655471 3018.8
```

```
## - V42                       1    151818    5679450 3020.0
## - V64                       1    157837    5685469 3020.3
## - V32                       1    158865    5686497 3020.4
## - V23                       1    178451    5706083 3021.4
## - V3                        1    182343    5709975 3021.6
## - V26                       1    214130    5741762 3023.3
## - V2                        1    214190    5741822 3023.3
## - V48                       1    235005    5762637 3024.3
## - V15                       1    241080    5768712 3024.6
## - V51                       1    249255    5776887 3025.1
## - V45                       1    269317    5796949 3026.1
## - 'START YEAR'              1    285112    5812744 3026.9
## - V13                       1    357185    5884817 3030.6
## - 'COMPLETION QUARTER'      1    740867    6268499 3049.3
## - 'COMPLETION YEAR'         1    893507    6421139 3056.5
## - V8                        1  94837495  100365128 3873.0
##
## Step:  AIC=3012.48
## train$V104 ~ 'START YEAR' + 'COMPLETION YEAR' + 'COMPLETION QUARTER' +
##      V1 + V2 + V3 + V5 + V6 + V8 + V11 + V12 + V13 + V14 + V15 +
##      V16 + V19 + V22 + V23 + V26 + V32 + V33 + V34 + V36 + V37 +
##      V38 + V40 + V42 + V44 + V45 + V46 + V47 + V48 + V49 + V51 +
##      V53 + V55 + V57 + V59 + V60 + V63 + V64 + V66 + V67 + V68 +
##      V70
##
##                         Df Sum of Sq      RSS    AIC
## - V49                    1     11450  5548685 3011.1
## - V63                    1     20809  5558044 3011.6
## - V68                    1     26106  5563341 3011.9
## - V38                    1     28747  5565982 3012.0
## - V53                    1     29135  5566370 3012.0
## - V16                    1     32561  5569796 3012.2
## - V19                    1     33946  5571181 3012.3
## <none>                               5537235 3012.5
## - V67                    1     41949  5579184 3012.7
## - V55                    1     42830  5580065 3012.8
## - V60                    1     46553  5583789 3013.0
## - V37                    1     49011  5586246 3013.1
## - V12                    1     52057  5589293 3013.3
## - V22                    1     52366  5589601 3013.3
## - V46                    1     56065  5593300 3013.5
## - V57                    1     64068  5601303 3013.9
## - V6                     1     64943  5602178 3013.9
## - V14                    1     65887  5603122 3014.0
## - V47                    1     67742  5604977 3014.1
## - V70                    1     70352  5607587 3014.2
## - V44                    1     74287  5611522 3014.4
## - V36                    1     76043  5613278 3014.5
## - V33                    1     76286  5613521 3014.5
## - V59                    1     79309  5616544 3014.7
## - V66                    1     81425  5618660 3014.8
## - V11                    1    100221  5637456 3015.8
## - V5                     1    100954  5638190 3015.8
## - V34                    1    106645  5643881 3016.1
```

```
## - V40                      1     123141    5660377 3017.0
## - V1                       1     132469    5669705 3017.5
## - V64                      1     149709    5686944 3018.4
## - V32                      1     151515    5688750 3018.5
## - V42                      1     156815    5694050 3018.8
## - V23                      1     168903    5706138 3019.4
## - V3                       1     188860    5726095 3020.4
## - V2                       1     218148    5755383 3022.0
## - V26                      1     223391    5760627 3022.2
## - V51                      1     242813    5780048 3023.2
## - V48                      1     253202    5790437 3023.8
## - V45                      1     264364    5801599 3024.3
## - V15                      1     274749    5811984 3024.9
## - 'START YEAR'             1     275989    5813224 3024.9
## - V13                      1     351877    5889112 3028.8
## - 'COMPLETION QUARTER'     1     742137    6279373 3047.8
## - 'COMPLETION YEAR'        1     910196    6447431 3055.7
## - V8                       1  94877963  100415198 3871.1
##
## Step:  AIC=3011.1
## train$V104 ~ 'START YEAR' + 'COMPLETION YEAR' + 'COMPLETION QUARTER' +
##     V1 + V2 + V3 + V5 + V6 + V8 + V11 + V12 + V13 + V14 + V15 +
##     V16 + V19 + V22 + V23 + V26 + V32 + V33 + V34 + V36 + V37 +
##     V38 + V40 + V42 + V44 + V45 + V46 + V47 + V48 + V51 + V53 +
##     V55 + V57 + V59 + V60 + V63 + V64 + V66 + V67 + V68 + V70
##
##                        Df Sum of Sq      RSS    AIC
## - V68                   1     15359  5564044 3009.9
## - V63                   1     17366  5566051 3010.0
## - V53                   1     18575  5567260 3010.1
## - V38                   1     21781  5570466 3010.3
## - V16                   1     22381  5571065 3010.3
## - V67                   1     30723  5579408 3010.7
## - V19                   1     32321  5581006 3010.8
## <none>                             5548685 3011.1
## - V60                   1     38309  5586994 3011.1
## - V12                   1     42386  5591071 3011.4
## - V55                   1     44173  5592858 3011.5
## - V22                   1     44328  5593013 3011.5
## - V46                   1     46025  5594710 3011.5
## - V37                   1     48943  5597628 3011.7
## - V57                   1     54117  5602801 3012.0
## - V6                    1     61279  5609964 3012.4
## - V70                   1     61295  5609980 3012.4
## - V36                   1     64653  5613337 3012.5
## - V44                   1     65612  5614297 3012.6
## - V59                   1     68006  5616690 3012.7
## - V14                   1     69061  5617746 3012.8
## - V33                   1     69741  5618426 3012.8
## - V47                   1     70200  5618885 3012.8
## - V66                   1     75339  5624024 3013.1
## - V11                   1     92534  5641219 3014.0
## - V5                    1     96036  5644720 3014.2
## - V34                   1    105307  5653991 3014.7
```

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## - V40                       1    113466    5662151 3015.1
## - V1                        1    127094    5675779 3015.8
## - V64                       1    138388    5687073 3016.4
## - V32                       1    140366    5689051 3016.5
## - V23                       1    158176    5706861 3017.4
## - V42                       1    164299    5712984 3017.8
## - V3                        1    190872    5739557 3019.1
## - V2                        1    221075    5769760 3020.7
## - V26                       1    223571    5772256 3020.8
## - V51                       1    233796    5782481 3021.4
## - V48                       1    265806    5814491 3023.0
## - V15                       1    269514    5818199 3023.2
## - V45                       1    294968    5843653 3024.5
## - ‘START YEAR‘              1    315912    5864597 3025.5
## - V13                       1    346609    5895294 3027.1
## - ‘COMPLETION QUARTER‘      1    734924    6283609 3046.0
## - ‘COMPLETION YEAR‘         1    903295    6451980 3053.9
## - V8                        1  94906666  100455351 3869.3
##
## Step:  AIC=3009.92
## train$V104 ~ ‘START YEAR‘ + ‘COMPLETION YEAR‘ + ‘COMPLETION QUARTER‘ +
##     V1 + V2 + V3 + V5 + V6 + V8 + V11 + V12 + V13 + V14 + V15 +
##     V16 + V19 + V22 + V23 + V26 + V32 + V33 + V34 + V36 + V37 +
##     V38 + V40 + V42 + V44 + V45 + V46 + V47 + V48 + V51 + V53 +
##     V55 + V57 + V59 + V60 + V63 + V64 + V66 + V67 + V70
##
##                           Df Sum of Sq       RSS    AIC
## - V53                      1      8572   5572615 3008.4
## - V16                      1     11433   5575476 3008.5
## - V63                      1     13114   5577158 3008.6
## - V67                      1     17687   5581731 3008.9
## - V38                      1     23975   5588018 3009.2
## - V60                      1     25208   5589252 3009.3
## - V19                      1     30597   5594641 3009.5
## - V12                      1     32254   5596297 3009.6
## - V22                      1     34415   5598458 3009.7
## - V55                      1     34632   5598675 3009.8
## <none>                               5564044 3009.9
## - V46                      1     37993   5602036 3009.9
## - V70                      1     46100   5610144 3010.4
## - V59                      1     52964   5617008 3010.7
## - V44                      1     54457   5618501 3010.8
## - V6                       1     57973   5622017 3011.0
## - V57                      1     58817   5622860 3011.0
## - V36                      1     60468   5624511 3011.1
## - V33                      1     62570   5626613 3011.2
## - V66                      1     63285   5627328 3011.3
## - V37                      1     63928   5627971 3011.3
## - V14                      1     70229   5634272 3011.6
## - V47                      1     76740   5640783 3012.0
## - V11                      1     81811   5645854 3012.3
## - V5                       1     89252   5653296 3012.6
## - V34                      1     90068   5654112 3012.7
## - V40                      1     98184   5662227 3013.1
```

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## - V64                        1     126902    5690946 3014.6
## - V1                         1     126982    5691026 3014.6
## - V32                        1     127065    5691109 3014.6
## - V23                        1     142926    5706970 3015.4
## - V42                        1     150728    5714771 3015.9
## - V3                         1     184080    5748124 3017.6
## - V2                         1     213992    5778036 3019.1
## - V26                        1     215758    5779801 3019.2
## - V51                        1     249933    5813977 3021.0
## - V48                        1     255920    5819964 3021.3
## - V45                        1     280307    5844351 3022.5
## - 'START YEAR'               1     305763    5869806 3023.8
## - V15                        1     315838    5879882 3024.3
## - V13                        1     426127    5990170 3029.8
## - 'COMPLETION QUARTER'       1     731094    6295138 3044.6
## - 'COMPLETION YEAR'          1     888909    6452952 3051.9
## - V8                         1  94900920  100464964 3867.3
##
## Step:  AIC=3008.37
## train$V104 ~ 'START YEAR' + 'COMPLETION YEAR' + 'COMPLETION QUARTER' +
##     V1 + V2 + V3 + V5 + V6 + V8 + V11 + V12 + V13 + V14 + V15 +
##     V16 + V19 + V22 + V23 + V26 + V32 + V33 + V34 + V36 + V37 +
##     V38 + V40 + V42 + V44 + V45 + V46 + V47 + V48 + V51 + V55 +
##     V57 + V59 + V60 + V63 + V64 + V66 + V67 + V70
##
##                     Df Sum of Sq       RSS    AIC
## - V63                1      6853   5579468 3006.7
## - V16                1      8896   5581511 3006.8
## - V67                1     21654   5594269 3007.5
## - V12                1     23906   5596521 3007.6
## - V38                1     27845   5600461 3007.9
## - V55                1     28241   5600856 3007.9
## - V19                1     28529   5601144 3007.9
## - V22                1     28683   5601298 3007.9
## - V60                1     32476   5605091 3008.1
## <none>                          5572615 3008.4
## - V70                1     40648   5613263 3008.5
## - V59                1     45290   5617905 3008.8
## - V44                1     48722   5621338 3009.0
## - V33                1     55274   5627889 3009.3
## - V6                 1     55784   5628399 3009.3
## - V66                1     56699   5629314 3009.4
## - V57                1     56917   5629532 3009.4
## - V46                1     58188   5630803 3009.5
## - V36                1     60954   5633569 3009.6
## - V11                1     73498   5646113 3010.3
## - V14                1     78975   5651590 3010.6
## - V47                1     82627   5655243 3010.7
## - V37                1     82757   5655372 3010.8
## - V34                1     87296   5659911 3011.0
## - V5                 1     88540   5661155 3011.1
## - V40                1     91502   5664117 3011.2
## - V32                1    123009   5695624 3012.9
## - V1                 1    132929   5705544 3013.4
```

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## - V64                      1    138818   5711433 3013.7
## - V23                      1    157149   5729764 3014.6
## - V42                      1    161632   5734247 3014.9
## - V3                       1    185179   5757794 3016.1
## - V2                       1    213809   5786424 3017.6
## - V26                      1    232672   5805287 3018.5
## - V51                      1    249034   5821650 3019.4
## - V48                      1    262980   5835595 3020.1
## - V45                      1    292897   5865512 3021.6
## - V15                      1    332646   5905261 3023.6
## - `START YEAR`             1    339803   5912418 3024.0
## - V13                      1    422544   5995159 3028.1
## - `COMPLETION QUARTER`     1    723244   6295859 3042.6
## - `COMPLETION YEAR`        1    886721   6459336 3050.2
## - V8                       1  95005373 100577988 3865.6
##
## Step:  AIC=3006.74
## train$V104 ~ `START YEAR` + `COMPLETION YEAR` + `COMPLETION QUARTER` +
##     V1 + V2 + V3 + V5 + V6 + V8 + V11 + V12 + V13 + V14 + V15 +
##     V16 + V19 + V22 + V23 + V26 + V32 + V33 + V34 + V36 + V37 +
##     V38 + V40 + V42 + V44 + V45 + V46 + V47 + V48 + V51 + V55 +
##     V57 + V59 + V60 + V64 + V66 + V67 + V70
##
##                 Df Sum of Sq      RSS    AIC
## - V16            1      5340  5584809 3005.0
## - V12            1     20617  5600085 3005.8
## - V67            1     21636  5601105 3005.9
## - V55            1     22382  5601850 3005.9
## - V22            1     23982  5603451 3006.0
## - V60            1     28801  5608269 3006.3
## - V19            1     29921  5609389 3006.3
## - V70            1     34624  5614093 3006.6
## - V38            1     35395  5614863 3006.6
## <none>                       5579468 3006.7
## - V59            1     44237  5623705 3007.1
## - V66            1     50319  5629788 3007.4
## - V33            1     51578  5631046 3007.5
## - V46            1     52470  5631938 3007.5
## - V6             1     53462  5632930 3007.6
## - V36            1     54171  5633639 3007.6
## - V44            1     59856  5639325 3007.9
## - V11            1     67486  5646954 3008.3
## - V14            1     73648  5653116 3008.6
## - V37            1     79892  5659361 3009.0
## - V34            1     82618  5662086 3009.1
## - V47            1     83543  5663012 3009.2
## - V57            1     84794  5664263 3009.2
## - V40            1     85591  5665060 3009.3
## - V5             1     88508  5667977 3009.4
## - V32            1    117012  5696480 3010.9
## - V64            1    132324  5711793 3011.7
## - V1             1    135613  5715081 3011.9
## - V42            1    159798  5739266 3013.1
## - V23            1    161697  5741165 3013.2
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61

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## - V3                      1     180072   5759540 3014.2
## - V2                      1     208233   5787702 3015.6
## - V26                     1     225876   5805344 3016.5
## - V51                     1     247052   5826520 3017.6
## - V48                     1     259029   5838498 3018.2
## - V45                     1     290660   5870129 3019.8
## - `START YEAR`            1     334624   5914092 3022.0
## - V15                     1     372889   5952358 3024.0
## - V13                     1     415727   5995195 3026.1
## - `COMPLETION QUARTER`    1     716683   6296151 3040.6
## - `COMPLETION YEAR`       1     880797   6460265 3048.3
## - V8                      1  95074759 100654228 3863.8
##
## Step:  AIC=3005.02
## train$V104 ~ `START YEAR` + `COMPLETION YEAR` + `COMPLETION QUARTER` +
##     V1 + V2 + V3 + V5 + V6 + V8 + V11 + V12 + V13 + V14 + V15 +
##     V19 + V22 + V23 + V26 + V32 + V33 + V34 + V36 + V37 + V38 +
##     V40 + V42 + V44 + V45 + V46 + V47 + V48 + V51 + V55 + V57 +
##     V59 + V60 + V64 + V66 + V67 + V70
##
##                         Df Sum of Sq      RSS    AIC
## - V55                    1     19496   5604305 3004.1
## - V67                    1     19498   5604307 3004.1
## - V22                    1     21343   5606152 3004.2
## - V19                    1     26063   5610872 3004.4
## - V60                    1     30300   5615108 3004.6
## - V12                    1     30558   5615367 3004.6
## - V38                    1     31452   5616261 3004.7
## - V70                    1     31978   5616786 3004.7
## <none>                             5584809 3005.0
## - V59                    1     45168   5629977 3005.4
## - V46                    1     47351   5632159 3005.5
## - V36                    1     49025   5633834 3005.6
## - V6                     1     52967   5637776 3005.8
## - V44                    1     56194   5641003 3006.0
## - V33                    1     61936   5646745 3006.3
## - V11                    1     63913   5648721 3006.4
## - V66                    1     66796   5651605 3006.6
## - V14                    1     68736   5653545 3006.7
## - V37                    1     74706   5659514 3007.0
## - V34                    1     77572   5662381 3007.1
## - V47                    1     81986   5666795 3007.4
## - V57                    1     83624   5668432 3007.4
## - V5                     1     88053   5672862 3007.7
## - V40                    1     89456   5674265 3007.7
## - V32                    1    112782   5697590 3009.0
## - V64                    1    134352   5719161 3010.1
## - V1                     1    137360   5722169 3010.2
## - V42                    1    159199   5744007 3011.4
## - V23                    1    179319   5764128 3012.4
## - V3                     1    181104   5765912 3012.5
## - V2                     1    210141   5794950 3014.0
## - V26                    1    249700   5834509 3016.0
## - V51                    1    254853   5839661 3016.3
```

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## - V48                       1     267378    5852187 3016.9
## - V45                       1     311216    5896024 3019.1
## - V15                       1     370967    5955776 3022.1
## - 'START YEAR'              1     374771    5959580 3022.3
## - V13                       1     428959    6013768 3025.0
## - 'COMPLETION QUARTER'     1     715335    6300143 3038.8
## - 'COMPLETION YEAR'        1     875892    6460701 3046.3
## - V8                        1   95204627  100789436 3862.2
##
## Step:  AIC=3004.06
## train$V104 ~ 'START YEAR' + 'COMPLETION YEAR' + 'COMPLETION QUARTER' +
##     V1 + V2 + V3 + V5 + V6 + V8 + V11 + V12 + V13 + V14 + V15 +
##     V19 + V22 + V23 + V26 + V32 + V33 + V34 + V36 + V37 + V38 +
##     V40 + V42 + V44 + V45 + V46 + V47 + V48 + V51 + V57 + V59 +
##     V60 + V64 + V66 + V67 + V70
##
##                           Df Sum of Sq       RSS    AIC
## - V22                      1     12369    5616674 3002.7
## - V70                      1     13021    5617325 3002.7
## - V19                      1     13196    5617501 3002.8
## - V67                      1     17544    5621848 3003.0
## - V60                      1     18865    5623169 3003.1
## - V38                      1     19427    5623732 3003.1
## - V12                      1     31279    5635583 3003.7
## - V36                      1     33270    5637574 3003.8
## <none>                                    5604305 3004.1
## - V44                      1     38038    5642343 3004.1
## - V59                      1     39421    5643726 3004.1
## - V11                      1     44433    5648738 3004.4
## - V14                      1     52733    5657037 3004.8
## - V66                      1     61519    5665823 3005.3
## - V6                       1     63382    5667687 3005.4
## - V47                      1     68068    5672373 3005.6
## - V57                      1     69933    5674237 3005.7
## - V33                      1     73963    5678267 3006.0
## - V40                      1     81519    5685823 3006.3
## - V46                      1     83363    5687667 3006.4
## - V37                      1     88888    5693192 3006.7
## - V32                      1     95682    5699987 3007.1
## - V5                       1     97592    5701896 3007.2
## - V34                      1    102188    5706493 3007.4
## - V64                      1    115255    5719559 3008.1
## - V1                       1    139413    5743718 3009.4
## - V42                      1    145286    5749590 3009.7
## - V3                       1    175683    5779988 3011.2
## - V23                      1    200737    5805041 3012.5
## - V2                       1    207842    5812147 3012.9
## - V26                      1    231188    5835492 3014.1
## - V51                      1    235692    5839996 3014.3
## - V48                      1    249790    5854095 3015.0
## - V45                      1    296751    5901056 3017.4
## - V15                      1    351604    5955908 3020.1
## - 'START YEAR'            1    356655    5960959 3020.4
## - V13                      1    421004    6025308 3023.6
```

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## - 'COMPLETION QUARTER'  1      703203    6307507 3037.2
## - 'COMPLETION YEAR'      1      874054    6478358 3045.1
## - V8                     1    95374959  100979263 3860.8
##
## Step:  AIC=3002.71
## train$V104 ~ 'START YEAR' + 'COMPLETION YEAR' + 'COMPLETION QUARTER' +
##      V1 + V2 + V3 + V5 + V6 + V8 + V11 + V12 + V13 + V14 + V15 +
##      V19 + V23 + V26 + V32 + V33 + V34 + V36 + V37 + V38 + V40 +
##      V42 + V44 + V45 + V46 + V47 + V48 + V51 + V57 + V59 + V60 +
##      V64 + V66 + V67 + V70
##
##                          Df Sum of Sq      RSS    AIC
## - V70                     1       7868  5624542 3001.1
## - V67                     1       8888  5625562 3001.2
## - V19                     1      15136  5631809 3001.5
## - V38                     1      16850  5633524 3001.6
## - V12                     1      20438  5637112 3001.8
## - V36                     1      26039  5642713 3002.1
## - V44                     1      29064  5645737 3002.2
## - V59                     1      29889  5646563 3002.3
## - V60                     1      35507  5652180 3002.6
## <none>                               5616674 3002.7
## - V11                     1      41213  5657887 3002.9
## - V66                     1      50036  5666709 3003.3
## - V14                     1      54348  5671022 3003.6
## - V6                      1      55379  5672053 3003.6
## - V57                     1      63166  5679840 3004.0
## - V40                     1      69487  5686161 3004.4
## - V47                     1      71016  5687690 3004.4
## - V33                     1      72035  5688709 3004.5
## - V46                     1      80844  5697518 3005.0
## - V32                     1      84167  5700841 3005.1
## - V5                      1      90950  5707624 3005.5
## - V34                     1      98502  5715175 3005.9
## - V37                     1     105292  5721966 3006.2
## - V64                     1     111389  5728063 3006.5
## - V42                     1     133977  5750651 3007.7
## - V1                      1     139514  5756188 3008.0
## - V3                      1     175451  5792125 3009.8
## - V23                     1     188781  5805454 3010.5
## - V2                      1     208304  5824978 3011.5
## - V26                     1     224356  5841030 3012.3
## - V51                     1     240565  5857239 3013.2
## - V45                     1     291059  5907732 3015.7
## - V48                     1     318370  5935044 3017.1
## - V15                     1     349812  5966486 3018.7
## - 'START YEAR'            1     367793  5984467 3019.6
## - V13                     1     408936  6025610 3021.6
## - 'COMPLETION QUARTER'    1     702987  6319661 3035.7
## - 'COMPLETION YEAR'       1     871402  6488076 3043.5
## - V8                      1   95581625 101198299 3859.4
##
## Step:  AIC=3001.13
## train$V104 ~ 'START YEAR' + 'COMPLETION YEAR' + 'COMPLETION QUARTER' +
```

```
##      V1 + V2 + V3 + V5 + V6 + V8 + V11 + V12 + V13 + V14 + V15 +
##      V19 + V23 + V26 + V32 + V33 + V34 + V36 + V37 + V38 + V40 +
##      V42 + V44 + V45 + V46 + V47 + V48 + V51 + V57 + V59 + V60 +
##      V64 + V66 + V67
##
##                        Df Sum of Sq       RSS    AIC
## - V67                   1      2147   5626689 2999.2
## - V12                   1     13304   5637846 2999.8
## - V38                   1     17909   5642451 3000.1
## - V36                   1     22386   5646928 3000.3
## - V59                   1     23302   5647844 3000.4
## - V44                   1     25302   5649844 3000.5
## - V60                   1     27708   5652250 3000.6
## - V19                   1     31997   5656539 3000.8
## <none>                            5624542 3001.1
## - V11                   1     40700   5665242 3001.3
## - V66                   1     42219   5666761 3001.3
## - V57                   1     55732   5680274 3002.1
## - V6                    1     55843   5680385 3002.1
## - V40                   1     63428   5687970 3002.5
## - V47                   1     64532   5689075 3002.5
## - V33                   1     70256   5694798 3002.8
## - V14                   1     88615   5713157 3003.8
## - V46                   1     92510   5717053 3004.0
## - V32                   1     92892   5717434 3004.0
## - V5                    1     95163   5719705 3004.1
## - V34                   1    107249   5731791 3004.7
## - V64                   1    117244   5741786 3005.3
## - V42                   1    126677   5751219 3005.7
## - V1                    1    140273   5764815 3006.4
## - V37                   1    147120   5771662 3006.8
## - V3                    1    174889   5799431 3008.2
## - V23                   1    180931   5805473 3008.5
## - V2                    1    207964   5832506 3009.9
## - V26                   1    217497   5842039 3010.4
## - V51                   1    232942   5857484 3011.2
## - V45                   1    284574   5909116 3013.8
## - V15                   1    359534   5984076 3017.5
## - 'START YEAR'          1    362067   5986609 3017.7
## - V13                   1    419226   6043768 3020.5
## - 'COMPLETION QUARTER'  1    698731   6323273 3033.9
## - V48                   1    830374   6454916 3040.0
## - 'COMPLETION YEAR'     1    885062   6509604 3042.5
## - V8                    1  95769452 101393994 3858.0
##
## Step:  AIC=2999.24
## train$V104 ~ 'START YEAR' + 'COMPLETION YEAR' + 'COMPLETION QUARTER' +
##      V1 + V2 + V3 + V5 + V6 + V8 + V11 + V12 + V13 + V14 + V15 +
##      V19 + V23 + V26 + V32 + V33 + V34 + V36 + V37 + V38 + V40 +
##      V42 + V44 + V45 + V46 + V47 + V48 + V51 + V57 + V59 + V60 +
##      V64 + V66
##
##                        Df Sum of Sq       RSS    AIC
## - V12                   1     12925   5639614 2997.9
```

```
## - V38                        1     16439   5643128 2998.1
## - V36                        1     21555   5648244 2998.4
## - V59                        1     21937   5648626 2998.4
## - V60                        1     25802   5652491 2998.6
## - V44                        1     28417   5655106 2998.7
## - V19                        1     30409   5657098 2998.8
## <none>                                     5626689 2999.2
## - V11                        1     39401   5666090 2999.3
## - V66                        1     40451   5667140 2999.4
## - V57                        1     53603   5680292 3000.1
## - V6                         1     55766   5682455 3000.2
## - V40                        1     61437   5688126 3000.5
## - V47                        1     62496   5689186 3000.5
## - V33                        1     81755   5708444 3001.5
## - V14                        1     87589   5714278 3001.8
## - V32                        1     90822   5717511 3002.0
## - V46                        1     95730   5722419 3002.3
## - V5                         1     95855   5722544 3002.3
## - V34                        1    129066   5755755 3004.0
## - V64                        1    133445   5760134 3004.2
## - V1                         1    145005   5771694 3004.8
## - V37                        1    155704   5782393 3005.3
## - V3                         1    173419   5800108 3006.3
## - V23                        1    187131   5813820 3007.0
## - V42                        1    192178   5818867 3007.2
## - V2                         1    206785   5833474 3008.0
## - V51                        1    230933   5857622 3009.2
## - V26                        1    254617   5881306 3010.4
## - V45                        1    385577   6012266 3016.9
## - V15                        1    402211   6028901 3017.7
## - V13                        1    433898   6060587 3019.3
## - 'START YEAR'               1    497696   6124385 3022.4
## - 'COMPLETION QUARTER'  1    696595   6323284 3031.9
## - 'COMPLETION YEAR'     1    882924   6509613 3040.5
## - V48                        1   1648187   7274877 3073.5
## - V8                         1  95839561 101466250 3856.2
##
## Step:  AIC=2997.92
## train$V104 ~ 'START YEAR' + 'COMPLETION YEAR' + 'COMPLETION QUARTER' +
##     V1 + V2 + V3 + V5 + V6 + V8 + V11 + V13 + V14 + V15 + V19 +
##     V23 + V26 + V32 + V33 + V34 + V36 + V37 + V38 + V40 + V42 +
##     V44 + V45 + V46 + V47 + V48 + V51 + V57 + V59 + V60 + V64 +
##     V66
##
##                        Df Sum of Sq      RSS    AIC
## - V59                        1     14957   5654570 2996.7
## - V36                        1     17437   5657051 2996.8
## - V38                        1     20215   5659829 2997.0
## - V66                        1     36114   5675728 2997.8
## - V60                        1     36840   5676454 2997.9
## <none>                                     5639614 2997.9
## - V19                        1     42586   5682199 2998.2
## - V40                        1     48706   5688319 2998.5
## - V47                        1     51028   5690642 2998.6
```

```
## - V6                         1      53465   5693079 2998.7
## - V57                        1      55284   5694898 2998.8
## - V44                        1      57046   5696660 2998.9
## - V11                        1      57252   5696866 2998.9
## - V33                        1      77066   5716680 3000.0
## - V32                        1      83639   5723253 3000.3
## - V14                        1      87957   5727571 3000.5
## - V5                         1      98822   5738436 3001.1
## - V64                        1     127961   5767574 3002.6
## - V1                         1     139620   5779234 3003.2
## - V34                        1     164561   5804175 3004.5
## - V37                        1     165613   5805227 3004.5
## - V46                        1     172152   5811766 3004.9
## - V3                         1     186922   5826535 3005.6
## - V42                        1     190501   5830115 3005.8
## - V23                        1     202814   5842428 3006.4
## - V2                         1     218892   5858506 3007.2
## - V26                        1     249694   5889308 3008.8
## - V51                        1     271234   5910848 3009.9
## - V45                        1     376620   6016234 3015.1
## - V15                        1     456276   6095889 3019.0
## - V13                        1     501449   6141063 3021.2
## - ‘START YEAR‘               1     534794   6174408 3022.8
## - ‘COMPLETION QUARTER‘       1     694173   6333786 3030.4
## - ‘COMPLETION YEAR‘          1     881303   6520917 3039.0
## - V48                        1    1674192   7313806 3073.1
## - V8                         1   95912668 101552282 3854.5
##
## Step:  AIC=2996.71
## train$V104 ~ ‘START YEAR‘ + ‘COMPLETION YEAR‘ + ‘COMPLETION QUARTER‘ +
##     V1 + V2 + V3 + V5 + V6 + V8 + V11 + V13 + V14 + V15 + V19 +
##     V23 + V26 + V32 + V33 + V34 + V36 + V37 + V38 + V40 + V42 +
##     V44 + V45 + V46 + V47 + V48 + V51 + V57 + V60 + V64 + V66
##
##                         Df Sum of Sq      RSS    AIC
## - V36                        1      13084   5667655 2995.4
## - V38                        1      21373   5675943 2995.8
## - V60                        1      30907   5685478 2996.3
## <none>                                      5654570 2996.7
## - V19                        1      43907   5698478 2997.0
## - V66                        1      45214   5699785 2997.1
## - V57                        1      52204   5706774 2997.4
## - V6                         1      54902   5709472 2997.6
## - V11                        1      56037   5710607 2997.6
## - V44                        1      69511   5724082 2998.3
## - V33                        1      71687   5726257 2998.5
## - V32                        1      74701   5729271 2998.6
## - V47                        1      80550   5735120 2998.9
## - V14                        1      85278   5739848 2999.2
## - V5                         1     101629   5756199 3000.0
## - V40                        1     111603   5766174 3000.5
## - V64                        1     126093   5780664 3001.3
## - V1                         1     140924   5795494 3002.0
## - V34                        1     155544   5810114 3002.8
```

```
## - V37                    1    168143    5822713 3003.4
## - V46                    1    176754    5831324 3003.9
## - V42                    1    177202    5831772 3003.9
## - V3                     1    188016    5842586 3004.4
## - V23                    1    214612    5869182 3005.8
## - V2                     1    220435    5875006 3006.1
## - V26                    1    237683    5892253 3006.9
## - V51                    1    268643    5923214 3008.5
## - V45                    1    363282    6017852 3013.2
## - V15                    1    453431    6108002 3017.6
## - V13                    1    486591    6141162 3019.2
## - `START YEAR`           1    533037    6187607 3021.5
## - `COMPLETION QUARTER`   1    700586    6355156 3029.4
## - `COMPLETION YEAR`      1    886808    6541378 3038.0
## - V48                    1   1665560    7320131 3071.4
## - V8                     1  96023807  101678378 3852.8
##
## Step:  AIC=2995.4
## train$V104 ~ `START YEAR` + `COMPLETION YEAR` + `COMPLETION QUARTER` +
##     V1 + V2 + V3 + V5 + V6 + V8 + V11 + V13 + V14 + V15 + V19 +
##     V23 + V26 + V32 + V33 + V34 + V37 + V38 + V40 + V42 + V44 +
##     V45 + V46 + V47 + V48 + V51 + V57 + V60 + V64 + V66
##
##                       Df Sum of Sq       RSS    AIC
## - V60                  1     27167   5694822 2994.8
## <none>                              5667655 2995.4
## - V38                  1     40092   5707747 2995.5
## - V19                  1     44089   5711744 2995.7
## - V11                  1     44379   5712033 2995.7
## - V66                  1     52788   5720443 2996.1
## - V44                  1     56432   5724087 2996.3
## - V6                   1     58750   5726405 2996.5
## - V33                  1     58754   5726409 2996.5
## - V32                  1     71572   5739227 2997.1
## - V14                  1     76098   5743753 2997.4
## - V57                  1     86480   5754134 2997.9
## - V40                  1    103374   5771029 2998.8
## - V47                  1    103422   5771077 2998.8
## - V5                   1    104989   5772644 2998.8
## - V64                  1    117627   5785282 2999.5
## - V1                   1    142899   5810553 3000.8
## - V34                  1    153934   5821589 3001.4
## - V37                  1    155349   5823004 3001.4
## - V46                  1    165127   5832782 3001.9
## - V42                  1    181114   5848769 3002.7
## - V3                   1    181620   5849274 3002.8
## - V2                   1    213563   5881218 3004.4
## - V23                  1    257055   5924710 3006.6
## - V26                  1    264296   5931951 3006.9
## - V51                  1    402509   6070163 3013.8
## - V13                  1    475382   6143037 3017.3
## - V15                  1    483941   6151596 3017.7
## - `START YEAR`         1    538486   6206141 3020.4
## - V45                  1    550519   6218174 3020.9
```

68

```
## - ‘COMPLETION QUARTER‘   1     687581   6355236 3027.4
## - ‘COMPLETION YEAR‘       1     874742   6542396 3036.0
## - V48                     1    1662031   7329685 3069.8
## - V8                      1   96049259 101716914 3851.0
##
## Step:  AIC=2994.82
## train$V104 ~ ‘START YEAR‘ + ‘COMPLETION YEAR‘ + ‘COMPLETION QUARTER‘ +
##     V1 + V2 + V3 + V5 + V6 + V8 + V11 + V13 + V14 + V15 + V19 +
##     V23 + V26 + V32 + V33 + V34 + V37 + V38 + V40 + V42 + V44 +
##     V45 + V46 + V47 + V48 + V51 + V57 + V64 + V66
##
##                          Df Sum of Sq      RSS    AIC
## - V66                     1     33569   5728391 2994.6
## - V44                     1     34762   5729584 2994.6
## <none>                                  5694822 2994.8
## - V11                     1     41480   5736302 2995.0
## - V19                     1     49017   5743839 2995.4
## - V6                      1     52307   5747129 2995.5
## - V33                     1     52442   5747265 2995.5
## - V38                     1     55839   5750661 2995.7
## - V32                     1     66732   5761554 2996.3
## - V14                     1     71237   5766060 2996.5
## - V40                     1     76896   5771719 2996.8
## - V47                     1     99175   5793998 2997.9
## - V5                      1    100194   5795016 2998.0
## - V57                     1    118555   5813378 2998.9
## - V34                     1    140942   5835765 3000.1
## - V42                     1    156085   5850908 3000.8
## - V64                     1    157314   5852137 3000.9
## - V46                     1    161456   5856278 3001.1
## - V1                      1    162522   5857344 3001.2
## - V3                      1    181425   5876247 3002.1
## - V2                      1    215775   5910598 3003.9
## - V37                     1    244131   5938953 3005.3
## - V23                     1    246637   5941459 3005.4
## - V26                     1    278076   5972898 3007.0
## - V51                     1    395591   6090413 3012.8
## - V13                     1    449400   6144222 3015.4
## - V15                     1    471485   6166307 3016.4
## - V45                     1    612411   6307233 3023.2
## - ‘START YEAR‘            1    647553   6342376 3024.8
## - ‘COMPLETION QUARTER‘    1    712625   6407448 3027.8
## - ‘COMPLETION YEAR‘       1    900705   6595527 3036.4
## - V48                     1   1641000   7335823 3068.0
## - V8                      1   97077932 102772754 3852.0
##
## Step:  AIC=2994.56
## train$V104 ~ ‘START YEAR‘ + ‘COMPLETION YEAR‘ + ‘COMPLETION QUARTER‘ +
##     V1 + V2 + V3 + V5 + V6 + V8 + V11 + V13 + V14 + V15 + V19 +
##     V23 + V26 + V32 + V33 + V34 + V37 + V38 + V40 + V42 + V44 +
##     V45 + V46 + V47 + V48 + V51 + V57 + V64
##
##                          Df Sum of Sq      RSS    AIC
## - V33                     1     21117   5749508 2993.7
```

```
## <none>                               5728391 2994.6
## - V44                    1    41801   5770192 2994.7
## - V19                    1    48614   5777005 2995.1
## - V6                     1    50290   5778681 2995.2
## - V11                    1    58102   5786493 2995.6
## - V47                    1    69723   5798114 2996.2
## - V40                    1    79750   5808141 2996.7
## - V38                    1    93568   5821959 2997.4
## - V5                     1    96475   5824866 2997.5
## - V32                    1    96922   5825313 2997.5
## - V14                    1   101114   5829505 2997.8
## - V34                    1   115001   5843392 2998.5
## - V57                    1   120816   5849207 2998.8
## - V46                    1   149850   5878241 3000.2
## - V1                     1   153261   5881652 3000.4
## - V42                    1   165390   5893781 3001.0
## - V3                     1   198441   5926832 3002.7
## - V2                     1   234961   5963352 3004.5
## - V37                    1   255276   5983667 3005.5
## - V64                    1   295139   6023530 3007.5
## - V23                    1   307584   6035975 3008.1
## - V51                    1   362686   6091077 3010.8
## - V13                    1   430024   6158415 3014.1
## - V15                    1   510216   6238607 3017.9
## - V26                    1   548079   6276470 3019.7
## - V45                    1   611636   6340027 3022.7
## - ‘COMPLETION QUARTER‘   1   701088   6429479 3026.9
## - ‘START YEAR‘           1   901420   6629811 3036.0
## - ‘COMPLETION YEAR‘      1   917850   6646241 3036.7
## - V48                    1  1784552   7512943 3073.1
## - V8                     1 97044364 102772755 3850.0
##
## Step:  AIC=2993.66
## train$V104 ~ ‘START YEAR‘ + ‘COMPLETION YEAR‘ + ‘COMPLETION QUARTER‘ +
##     V1 + V2 + V3 + V5 + V6 + V8 + V11 + V13 + V14 + V15 + V19 +
##     V23 + V26 + V32 + V34 + V37 + V38 + V40 + V42 + V44 + V45 +
##     V46 + V47 + V48 + V51 + V57 + V64
##
##                   Df Sum of Sq      RSS    AIC
## <none>                               5749508 2993.7
## - V19                    1    50388   5799896 2994.2
## - V6                     1    51399   5800907 2994.3
## - V11                    1    55426   5804934 2994.5
## - V40                    1    66710   5816218 2995.1
## - V32                    1    77948   5827456 2995.7
## - V34                    1    93885   5843393 2996.5
## - V5                     1    99491   5848998 2996.8
## - V57                    1   104406   5853914 2997.0
## - V44                    1   106223   5855730 2997.1
## - V38                    1   122474   5871982 2997.9
## - V14                    1   128041   5877549 2998.2
## - V47                    1   130202   5879710 2998.3
## - V46                    1   142284   5891792 2998.9
## - V42                    1   151569   5901076 2999.4
```

```
## - V1                     1   159137     5908645 2999.8
## - V3                     1   196314     5945822 3001.6
## - V2                     1   230247     5979755 3003.3
## - V37                    1   284378     6033886 3006.0
## - V64                    1   286168     6035676 3006.1
## - V51                    1   342658     6092166 3008.8
## - V13                    1   440841     6190349 3013.6
## - V23                    1   455344     6204852 3014.3
## - V15                    1   496706     6246214 3016.3
## - V26                    1   551339     6300847 3018.9
## - V45                    1   637255     6386763 3022.9
## - `COMPLETION QUARTER`    1   704939     6454447 3026.0
## - `COMPLETION YEAR`       1   915760     6665267 3035.6
## - `START YEAR`            1  1043979     6793487 3041.2
## - V48                    1  1817955     7567463 3073.3
## - V8                     1 97036322   102785829 3848.1
```

```r
end_time <- Sys.time()
back.time <- end_time - start_time

start_time <- Sys.time()
step.model <- stepAIC(model0, direction="both", scope=list(upper=model, lower=model0))
```

```
## Start:  AIC=4224.6
## train$V104 ~ 1
##
##            Df Sum of Sq        RSS    AIC
## + V8        1 422906675   21058369 3321.2
## + V5        1 273248537  170716507 3942.7
## + V99       1 175506883  268458161 4077.2
## + V80       1 175124634  268840411 4077.6
## + V100      1 175112746  268852298 4077.6
## + V81       1 174176927  269788117 4078.7
## + V62       1 174019264  269945780 4078.8
## + V76       1 173858889  270106155 4079.0
## + V68       1 173728562  270236483 4079.2
## + V61       1 173640112  270324932 4079.3
## + V103      1 173560965  270404079 4079.3
## + V42       1 172945374  271019670 4080.0
## + V43       1 172843009  271122035 4080.1
## + V23       1 172738916  271226128 4080.2
## + V87       1 172203028  271762016 4080.8
## + V24       1 171781873  272183171 4081.3
## + V86       1 171083939  272881105 4082.1
## + V49       1 171026175  272938869 4082.1
## + V13       1 171002552  272962492 4082.1
## + V38       1 170539268  273425776 4082.6
## + V67       1 170205192  273759852 4083.0
## + V95       1 170068041  273897003 4083.2
## + V32       1 169393883  274571161 4083.9
## + V57       1 169052670  274912374 4084.3
## + V77       1 168620496  275344548 4084.7
## + V48       1 168203051  275761993 4085.2
## + V19       1 167757928  276207116 4085.7
```

```
## + V51                    1 167644526 276320518 4085.8
## + V27                    1 167491745 276473299 4085.9
## + V84                    1 167320483 276644561 4086.1
## + V46                    1 167179278 276785766 4086.3
## + 'COMPLETION YEAR'       1 166803913 277161131 4086.7
## + V30                    1 166768534 277196510 4086.7
## + 'START YEAR'            1 166302615 277662429 4087.2
## + V29                    1 166273730 277691314 4087.2
## + V10                    1 166193136 277771908 4087.3
## + V65                    1 165947319 278017725 4087.6
## + V70                    1 165683531 278281513 4087.9
## + V89                    1 165278847 278686197 4088.3
## + V11                    1 165250575 278714469 4088.3
## + V20                    1 164809391 279155653 4088.8
## + V96                    1 162926186 281038859 4090.8
## + V58                    1 161000215 282964829 4092.8
## + V39                    1 160028148 283936896 4093.8
## + V91                    1 152440348 291524696 4101.7
## + V15                    1 150618064 293346980 4103.5
## + V72                    1 149651412 294313632 4104.5
## + V53                    1 147537817 296427227 4106.6
## + V34                    1 147179309 296785735 4107.0
## + V71                    1 138662393 305302651 4115.4
## + V101                   1 136568728 307396316 4117.4
## + V14                    1 134195160 309769884 4119.7
## + V82                    1 133781114 310183930 4120.1
## + V55                    1 131848566 312116478 4122.0
## + V52                    1 131398979 312566065 4122.4
## + V36                    1 130823505 313141539 4122.9
## + V33                    1 130242083 313722961 4123.5
## + V97                    1 128950152 315014892 4124.7
## + V78                    1 128771853 315193191 4124.9
## + V59                    1 127031252 316933793 4126.5
## + V40                    1 126690831 317274213 4126.8
## + V21                    1 122973270 320991774 4130.3
## + V41                    1 118731225 325233819 4134.2
## + V90                    1 118673058 325291986 4134.2
## + V63                    1 118543943 325421101 4134.3
## + V98                    1 118104696 325860348 4134.7
## + V4                     1 117180928 326784116 4135.6
## + V79                    1 117112331 326852714 4135.7
## + V60                    1 116695322 327269722 4136.0
## + V22                    1 116526368 327438676 4136.2
## + V17                    1 116312406 327652638 4136.4
## + V93                    1 110110254 333854790 4141.9
## + V44                    1 107946235 336018809 4143.9
## + V25                    1 103359025 340606019 4147.9
## + V74                    1  99383278 344581766 4151.3
## + V1                     1  95858319 348106725 4154.4
## + V18                    1  87411130 356553914 4161.5
## + V37                    1  68303046 375661998 4177.0
## + V12                    1  59050461 384914583 4184.2
## + V35                    1  57546503 386418541 4185.4
## + V54                    1  47268059 396696985 4193.2
```

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## + V56                     1  45681843 398283201 4194.4
## + V16                     1  43786623 400178422 4195.8
## + V31                     1  43611131 400353913 4195.9
## + V50                     1  42816194 401148850 4196.5
## + V28                     1  42361204 401603840 4196.8
## + V92                     1  40916033 403049011 4197.9
## + V9                      1  39451743 404513302 4199.0
## + V75                     1  38282483 405682561 4199.8
## + V69                     1  35281963 408683082 4202.0
## + V2                      1  33638229 410326815 4203.2
## + V66                     1  30232542 413732502 4205.7
## + V73                     1  24718422 419246622 4209.6
## + V47                     1  24165206 419799838 4210.0
## + V85                     1  23267494 420697550 4210.6
## + V88                     1  22994667 420970377 4210.8
## + V45                     1  21018632 422946412 4212.2
## + V3                      1  16951169 427013875 4215.0
## + V102                    1  14386392 429578652 4216.8
## + V6                      1  14256509 429708535 4216.9
## + V26                     1  14139638 429825406 4217.0
## + V94                     1  12307787 431657257 4218.3
## + V64                     1  10452482 433512563 4219.5
## + V7                      1   5138864 438826180 4223.1
## + ‘START QUARTER‘         1   4165169 439799875 4223.8
## <none>                             443965044 4224.6
## + V83                     1    518138 443446906 4226.3
## + ‘COMPLETION QUARTER‘    1     26315 443938729 4226.6
##
## Step:  AIC=3321.22
## train$V104 ~ V8
##
##                     Df Sum of Sq       RSS    AIC
## + V94                1   3585825  17472544 3267.8
## + V75                1   2172033  18886336 3290.9
## + V71                1   1836299  19222070 3296.1
## + V52                1   1826884  19231485 3296.3
## + V72                1   1795317  19263052 3296.8
## + V56                1   1700585  19357784 3298.2
## + V88                1   1622538  19435830 3299.4
## + V69                1   1549160  19509208 3300.5
## + V9                 1   1425852  19632516 3302.4
## + V53                1   1329038  19729331 3303.9
## + V7                 1   1310929  19747439 3304.1
## + V90                1   1288388  19769981 3304.5
## + V91                1   1143624  19914745 3306.6
## + V33                1   1033833  20024536 3308.3
## + V55                1    942336  20116033 3309.6
## + V85                1    892513  20165856 3310.4
## + V14                1    821508  20236861 3311.4
## + V37                1    785372  20272997 3311.9
## + V34                1    776324  20282045 3312.1
## + V54                1    712220  20346149 3313.0
## + V36                1    597829  20460539 3314.7
## + V74                1    568076  20490293 3315.1
```

```
## + V28                        1     471100  20587269 3316.5
## + V17                        1     454380  20603989 3316.7
## + V98                        1     427221  20631147 3317.1
## + V15                        1     426349  20632020 3317.1
## + V79                        1     423035  20635334 3317.2
## + V35                        1     409313  20649056 3317.4
## + `COMPLETION YEAR`          1     408838  20649531 3317.4
## + V12                        1     393857  20664512 3317.6
## + V66                        1     383802  20674567 3317.8
## + V77                        1     359298  20699070 3318.1
## + V50                        1     358458  20699910 3318.1
## + V60                        1     354615  20703754 3318.2
## + V16                        1     351045  20707323 3318.2
## + V2                         1     347932  20710437 3318.3
## + V22                        1     309030  20749339 3318.8
## + V101                       1     307498  20750871 3318.8
## + V58                        1     297167  20761202 3319.0
## + V97                        1     295752  20762617 3319.0
## + V44                        1     294266  20764103 3319.0
## + V41                        1     290714  20767655 3319.1
## + V78                        1     283132  20775237 3319.2
## + `START YEAR`               1     270885  20787484 3319.4
## + V59                        1     244095  20814274 3319.8
## + V21                        1     244037  20814332 3319.8
## + V73                        1     239815  20818553 3319.8
## + V4                         1     235279  20823090 3319.9
## + V39                        1     231742  20826627 3319.9
## + V48                        1     231173  20827195 3319.9
## + V40                        1     230219  20828150 3320.0
## + V25                        1     228865  20829504 3320.0
## + V20                        1     222329  20836040 3320.1
## + V29                        1     216346  20842023 3320.1
## + V49                        1     191694  20866674 3320.5
## + V82                        1     174113  20884256 3320.7
## + `COMPLETION QUARTER`       1     172164  20886205 3320.8
## + V1                         1     171199  20887170 3320.8
## + V67                        1     166291  20892077 3320.9
## + V96                        1     161988  20896381 3320.9
## + V63                        1     148696  20909673 3321.1
## + V10                        1     148572  20909797 3321.1
## + V68                        1     145348  20913021 3321.2
## + V5                         1     144854  20913515 3321.2
## + V6                         1     142178  20916191 3321.2
## <none>                                     21058369 3321.2
## + V89                        1     111438  20946931 3321.6
## + V64                        1     106246  20952123 3321.7
## + V3                         1     104816  20953552 3321.7
## + V86                        1      84293  20974075 3322.0
## + V30                        1      81668  20976701 3322.1
## + V57                        1      80369  20978000 3322.1
## + V38                        1      76479  20981889 3322.1
## + V18                        1      60159  20998209 3322.4
## + V19                        1      53944  21004424 3322.5
## + V76                        1      43710  21014659 3322.6
```

```
## + V70                      1      43569  21014799 3322.6
## + V87                      1      39470  21018899 3322.7
## + V27                      1      22793  21035576 3322.9
## + V11                      1      22771  21035598 3322.9
## + V95                      1      21185  21037184 3322.9
## + V103                     1      20049  21038320 3322.9
## + V24                      1      17204  21041165 3323.0
## + V99                      1      14366  21044003 3323.0
## + V43                      1      10945  21047424 3323.1
## + V51                      1       7452  21050916 3323.1
## + V100                     1       7248  21051120 3323.1
## + V46                      1       7214  21051154 3323.1
## + 'START QUARTER'          1       6653  21051716 3323.1
## + V47                      1       4225  21054144 3323.2
## + V65                      1       3537  21054832 3323.2
## + V92                      1       3012  21055357 3323.2
## + V13                      1       2659  21055710 3323.2
## + V31                      1       1517  21056852 3323.2
## + V80                      1       1454  21056914 3323.2
## + V42                      1       1194  21057174 3323.2
## + V23                      1       1172  21057197 3323.2
## + V81                      1       1166  21057203 3323.2
## + V83                      1       1067  21057302 3323.2
## + V62                      1        962  21057407 3323.2
## + V93                      1        854  21057515 3323.2
## + V102                     1        604  21057765 3323.2
## + V26                      1        504  21057864 3323.2
## + V84                      1        155  21058214 3323.2
## + V45                      1        146  21058222 3323.2
## + V61                      1         90  21058278 3323.2
## + V32                      1          3  21058366 3323.2
## - V8                       1  422906675 443965044 4224.6
##
## Step:  AIC=3267.78
## train$V104 ~ V8 + V94
##
##                      Df Sum of Sq       RSS    AIC
## + V55                 1    2406448  15066096 3225.8
## + V74                 1    1761286  15711258 3238.2
## + V36                 1    1472222  16000322 3243.6
## + V9                  1    1144456  16328088 3249.7
## + V18                 1    1098203  16374341 3250.5
## + V54                 1    1014087  16458457 3252.0
## + V7                  1     974941  16497603 3252.7
## + V97                 1     683606  16788938 3257.9
## + V88                 1     614975  16857569 3259.1
## + V78                 1     613323  16859221 3259.2
## + V28                 1     607063  16865481 3259.3
## + V35                 1     571551  16900993 3259.9
## + V32                 1     570258  16902286 3259.9
## + V13                 1     557549  16914995 3260.1
## + V27                 1     557424  16915120 3260.1
## + V12                 1     552606  16919938 3260.2
## + V59                 1     539632  16932912 3260.5
```

```
## + V46                     1   537046  16935498 3260.5
## + V69                     1   521699  16950845 3260.8
## + V51                     1   477074  16995470 3261.6
## + V17                     1   474930  16997614 3261.6
## + V40                     1   474269  16998275 3261.6
## + V65                     1   449008  17023536 3262.0
## + V21                     1   439890  17032654 3262.2
## + `COMPLETION YEAR`       1   402118  17070426 3262.9
## + V70                     1   361895  17110649 3263.6
## + V73                     1   355573  17116971 3263.7
## + V84                     1   314302  17158242 3264.4
## + `START YEAR`            1   305368  17167176 3264.5
## + `COMPLETION QUARTER`    1   300796  17171748 3264.6
## + V37                     1   281817  17190727 3264.9
## + V100                    1   281533  17191011 3265.0
## + V81                     1   265973  17206571 3265.2
## + V72                     1   259734  17212810 3265.3
## + V44                     1   258607  17213937 3265.3
## + V95                     1   252721  17219823 3265.4
## + V11                     1   252498  17220046 3265.5
## + V25                     1   244900  17227644 3265.6
## + V62                     1   239670  17232874 3265.7
## + V99                     1   236382  17236162 3265.7
## + V89                     1   235941  17236603 3265.7
## + V101                    1   227548  17244996 3265.9
## + V71                     1   223913  17248631 3265.9
## + V64                     1   223430  17249114 3266.0
## + V103                    1   212495  17260049 3266.1
## + V23                     1   198085  17274459 3266.4
## + V43                     1   189628  17282916 3266.5
## + V42                     1   186066  17286478 3266.6
## + V80                     1   185981  17286563 3266.6
## + V19                     1   183684  17288860 3266.6
## + V85                     1   179806  17292738 3266.7
## + V61                     1   178391  17294153 3266.7
## + V24                     1   173687  17298857 3266.8
## + V38                     1   171471  17301073 3266.8
## + V76                     1   154065  17318479 3267.1
## + V57                     1   137362  17335182 3267.4
## + V10                     1   136775  17335769 3267.4
## + V93                     1   127469  17345075 3267.6
## + V86                     1   124544  17348000 3267.7
## + V4                      1   123073  17349471 3267.7
## + V52                     1   121244  17351300 3267.7
## + V15                     1   120853  17351691 3267.7
## + V82                     1   120738  17351806 3267.7
## <none>                               17472544 3267.8
## + V63                     1   116984  17355560 3267.8
## + V16                     1   104710  17367834 3268.0
## + V30                     1    99833  17372711 3268.1
## + V20                     1    94970  17377574 3268.2
## + V2                      1    91406  17381138 3268.2
## + V66                     1    90698  17381846 3268.2
## + V31                     1    84904  17387640 3268.3
```

```
## + V98                      1      84645 17387899 3268.3
## + V91                      1      83444 17389100 3268.4
## + V50                      1      82704 17389840 3268.4
## + V67                      1      79386 17393158 3268.4
## + V96                      1      78504 17394040 3268.4
## + V90                      1      77481 17395063 3268.5
## + V87                      1      76857 17395687 3268.5
## + V39                      1      76379 17396165 3268.5
## + V79                      1      73709 17398835 3268.5
## + V29                      1      71600 17400944 3268.6
## + V47                      1      70996 17401548 3268.6
## + V53                      1      63582 17408962 3268.7
## + V48                      1      53410 17419134 3268.9
## + V58                      1      42922 17429622 3269.0
## + V26                      1      41074 17431470 3269.1
## + V102                     1      40359 17432185 3269.1
## + V60                      1      38389 17434155 3269.1
## + V45                      1      37683 17434861 3269.1
## + V33                      1      28984 17443560 3269.3
## + V22                      1      22044 17450500 3269.4
## + V68                      1      21949 17450595 3269.4
## + V1                       1      21927 17450617 3269.4
## + V41                      1      21018 17451526 3269.4
## + V49                      1      20497 17452047 3269.4
## + V56                      1      19374 17453170 3269.4
## + V6                       1      14713 17457831 3269.5
## + 'START QUARTER'          1      12016 17460528 3269.6
## + V77                      1      10307 17462237 3269.6
## + V3                       1       7975 17464569 3269.6
## + V92                      1       7424 17465120 3269.6
## + V5                       1       3529 17469015 3269.7
## + V34                      1       3205 17469339 3269.7
## + V14                      1       3184 17469360 3269.7
## + V83                      1        916 17471628 3269.8
## + V75                      1        182 17472362 3269.8
## - V94                      1    3585825 21058369 3321.2
## - V8                       1  414184713 431657257 4218.3
##
## Step:  AIC=3225.76
## train$V104 ~ V8 + V94 + V55
##
##                   Df Sum of Sq       RSS    AIC
## + V71              1   3362271  11703825 3152.8
## + V72              1   2678006  12388090 3169.6
## + V52              1   2154238  12911857 3181.9
## + V91              1   2129895  12936201 3182.5
## + V53              1   1865122  13200973 3188.5
## + V77              1   1733219  13332877 3191.5
## + V68              1   1538584  13527512 3195.8
## + V34              1   1503994  13562101 3196.5
## + V33              1   1399038  13667058 3198.8
## + V67              1   1363959  13702136 3199.6
## + V48              1   1346450  13719646 3200.0
## + V49              1   1322959  13743137 3200.5
```

```
## + V58              1  1322800  13743296 3200.5
## + V90              1  1269346  13796749 3201.6
## + V39              1  1245683  13820413 3202.1
## + V20              1  1223318  13842778 3202.6
## + V103             1  1211703  13854393 3202.9
## + V86              1  1197932  13868163 3203.2
## + V87              1  1196066  13870030 3203.2
## + V29              1  1193593  13872503 3203.3
## + V96              1  1131821  13934274 3204.6
## + V38              1  1122776  13943319 3204.8
## + V57              1  1089223  13976873 3205.5
## + V14              1  1082863  13983233 3205.6
## + V10              1  1067509  13998587 3205.9
## + V15              1  1003827  14062268 3207.3
## + V76              1  1000584  14065512 3207.4
## + V19              1   962350  14103745 3208.2
## + V30              1   947544  14118552 3208.5
## + V1               1   901094  14165002 3209.4
## + V7               1   892090  14174006 3209.6
## + V89              1   879729  14186367 3209.9
## + V61              1   814247  14251848 3211.3
## + V42              1   806180  14259915 3211.4
## + V95              1   753610  14312486 3212.5
## + V43              1   752383  14313713 3212.5
## + V69              1   750018  14316078 3212.6
## + V80              1   727082  14339014 3213.1
## + V62              1   722662  14343433 3213.2
## + V24              1   715916  14350180 3213.3
## + V23              1   708639  14357457 3213.5
## + V11              1   703811  14362285 3213.6
## + V88              1   694484  14371612 3213.7
## + V84              1   655171  14410925 3214.6
## + V99              1   647550  14418546 3214.7
## + V70              1   627780  14438316 3215.1
## + V81              1   615359  14450737 3215.4
## + V51              1   575883  14490213 3216.2
## + V100             1   559498  14506598 3216.5
## + V65              1   556608  14509487 3216.6
## + V46              1   544260  14521836 3216.8
## + V41              1   539607  14526489 3216.9
## + V22              1   532155  14533941 3217.1
## + V13              1   469145  14596951 3218.4
## + V60              1   462522  14603574 3218.5
## + V32              1   454251  14611845 3218.7
## + V50              1   426051  14640045 3219.2
## + V79              1   356544  14709551 3220.7
## + V6               1   342320  14723776 3220.9
## + ‘START YEAR‘     1   341602  14724494 3221.0
## + V98              1   334147  14731948 3221.1
## + V27              1   275518  14790578 3222.3
## + V85              1   250690  14815406 3222.8
## + V5               1   243364  14822732 3222.9
## + V66              1   211156  14854940 3223.6
## + V9               1   206248  14859848 3223.7
```

```
## + ‘COMPLETION YEAR‘        1    205483  14860612 3223.7
## + ‘COMPLETION QUARTER‘     1    195350  14870746 3223.9
## + V82                      1    187110  14878985 3224.1
## + V74                      1    180979  14885117 3224.2
## + V75                      1    168401  14897695 3224.4
## + V101                     1    138072  14928024 3225.0
## + V64                      1    112919  14953177 3225.5
## + V63                      1    112820  14953276 3225.5
## + V2                       1    108752  14957344 3225.6
## + V93                      1    102254  14963842 3225.7
## <none>                                  15066096 3225.8
## + V36                      1     95634  14970462 3225.9
## + V4                       1     79922  14986174 3226.2
## + V35                      1     75289  14990806 3226.3
## + V92                      1     39335  15026760 3227.0
## + V37                      1     39231  15026865 3227.0
## + V54                      1     33818  15032278 3227.1
## + V45                      1     27176  15038920 3227.2
## + V25                      1     27006  15039090 3227.2
## + V83                      1     24097  15041999 3227.3
## + V56                      1     23485  15042611 3227.3
## + V31                      1     21458  15044638 3227.3
## + V44                      1     16922  15049174 3227.4
## + V21                      1     16827  15049269 3227.4
## + V28                      1     14800  15051296 3227.5
## + ‘START QUARTER‘          1     14260  15051836 3227.5
## + V40                      1     14125  15051971 3227.5
## + V102                     1      8103  15057993 3227.6
## + V26                      1      8083  15058013 3227.6
## + V16                      1      7473  15058623 3227.6
## + V3                       1      7438  15058657 3227.6
## + V59                      1      6075  15060021 3227.6
## + V73                      1      4161  15061935 3227.7
## + V47                      1      3424  15062672 3227.7
## + V78                      1      2149  15063947 3227.7
## + V12                      1      1939  15064157 3227.7
## + V97                      1       365  15065731 3227.8
## + V18                      1       126  15065970 3227.8
## + V17                      1         0  15066096 3227.8
## - V55                      1   2406448  17472544 3267.8
## - V94                      1   5049937  20116033 3309.6
## - V8                       1 296573639 311639735 4123.5
##
## Step:  AIC=3152.76
## train$V104 ~ V8 + V94 + V55 + V71
##
##                         Df Sum of Sq       RSS    AIC
## + ‘COMPLETION YEAR‘       1   1168884  10534940 3123.5
## + V21                     1    954884  10748940 3129.5
## + V7                      1    946181  10757644 3129.7
## + ‘START YEAR‘            1    935577  10768248 3130.0
## + V40                     1    780201  10923624 3134.3
## + V16                     1    778978  10924847 3134.3
## + V78                     1    742227  10961598 3135.3
```

```
## + V59                    1    740631  10963194 3135.3
## + V97                    1    698159  11005666 3136.5
## + V100                   1    694877  11008948 3136.6
## + V81                    1    677293  11026532 3137.1
## + V99                    1    675694  11028131 3137.1
## + V80                    1    634485  11069340 3138.2
## + V62                    1    558852  11144973 3140.2
## + V44                    1    549448  11154377 3140.5
## + V24                    1    547177  11156648 3140.5
## + V92                    1    546264  11157561 3140.6
## + V74                    1    539739  11164086 3140.7
## + V17                    1    533205  11170620 3140.9
## + V23                    1    532778  11171047 3140.9
## + V43                    1    500280  11203545 3141.8
## + V25                    1    499857  11203967 3141.8
## + V61                    1    499010  11204814 3141.8
## + V42                    1    474843  11228982 3142.5
## + V90                    1    435845  11267980 3143.5
## + V13                    1    410109  11293716 3144.2
## + V102                   1    409868  11293957 3144.2
## + V26                    1    406001  11297823 3144.3
## + V32                    1    385575  11318250 3144.8
## + V51                    1    364498  11339327 3145.4
## + V27                    1    353350  11350475 3145.7
## + V98                    1    350195  11353630 3145.7
## + V93                    1    338840  11364985 3146.0
## + V87                    1    332486  11371338 3146.2
## + V95                    1    329034  11374791 3146.3
## + V76                    1    311953  11391872 3146.7
## + V64                    1    308562  11395263 3146.8
## + V79                    1    308281  11395544 3146.8
## + V11                    1    301812  11402012 3147.0
## + V70                    1    301613  11402212 3147.0
## + V30                    1    300031  11403794 3147.1
## + V63                    1    281097  11422728 3147.5
## + V35                    1    280468  11423357 3147.6
## + V84                    1    257976  11445849 3148.1
## + V36                    1    248191  11455634 3148.4
## + V65                    1    242658  11461167 3148.5
## + V101                   1    237291  11466534 3148.7
## + V1                     1    227366  11476459 3148.9
## + V89                    1    214149  11489676 3149.3
## + V60                    1    212599  11491226 3149.3
## + V38                    1    198914  11504911 3149.7
## + V22                    1    195658  11508167 3149.8
## + V86                    1    188744  11515081 3149.9
## + V82                    1    180316  11523509 3150.2
## + V96                    1    179115  11524710 3150.2
## + V41                    1    177812  11526013 3150.2
## + V9                     1    176754  11527071 3150.2
## + V10                    1    172499  11531326 3150.4
## + V49                    1    167796  11536028 3150.5
## + V19                    1    164876  11538949 3150.5
## + `COMPLETION QUARTER`   1    153259  11550566 3150.8
```

```
## + V34                       1     148850  11554975 3151.0
## + V29                       1     146864  11556961 3151.0
## + V68                       1     145139  11558686 3151.1
## + V15                       1     140977  11562847 3151.2
## + V46                       1     140845  11562980 3151.2
## + V6                        1     132867  11570958 3151.4
## + V39                       1     132677  11571148 3151.4
## + V5                        1     129678  11574147 3151.5
## + V57                       1     111664  11592161 3151.9
## + V67                       1     111100  11592725 3151.9
## + V48                       1     103728  11600096 3152.1
## + V47                       1     101360  11602465 3152.2
## + V73                       1      95482  11608343 3152.3
## + V85                       1      93313  11610512 3152.4
## + V56                       1      91306  11612519 3152.4
## + V103                      1      88883  11614941 3152.5
## + V45                       1      84048  11619777 3152.6
## + V58                       1      79903  11623922 3152.7
## <none>                                    11703825 3152.8
## + V20                       1      69480  11634345 3153.0
## + V66                       1      67619  11636206 3153.0
## + V31                       1      62008  11641817 3153.2
## + V53                       1      61993  11641832 3153.2
## + V4                        1      59189  11644636 3153.3
## + V77                       1      56779  11647046 3153.3
## + 'START QUARTER'           1      56581  11647244 3153.3
## + V33                       1      54751  11649074 3153.4
## + V28                       1      45899  11657925 3153.6
## + V12                       1      41431  11662394 3153.7
## + V14                       1      36081  11667744 3153.8
## + V18                       1      34940  11668884 3153.9
## + V88                       1      33400  11670425 3153.9
## + V54                       1      28059  11675766 3154.1
## + V2                        1      27642  11676182 3154.1
## + V69                       1      23237  11680588 3154.2
## + V91                       1      19943  11683882 3154.3
## + V37                       1      13718  11690107 3154.4
## + V72                       1      13616  11690209 3154.4
## + V83                       1      12052  11691773 3154.5
## + V52                       1      11278  11692547 3154.5
## + V3                        1       3814  11700011 3154.7
## + V75                       1       2116  11701708 3154.7
## + V50                       1         39  11703786 3154.8
## - V94                       1    1474062  13177886 3186.0
## - V71                       1    3362271  15066096 3225.8
## - V55                       1    5544806  17248631 3265.9
## - V8                        1  269295422 280999247 4094.8
##
## Step:  AIC=3123.51
## train$V104 ~ V8 + V94 + V55 + V71 + 'COMPLETION YEAR'
##
##                       Df Sum of Sq        RSS    AIC
## + V72                  1    1113835    9421105 3092.3
## + V91                  1     751687    9783253 3103.5
```

```
## + V68                    1    662979    9871961 3106.2
## + V1                     1    569918    9965023 3109.0
## + V7                     1    439572   10095369 3112.9
## + V41                    1    432434   10102507 3113.1
## + V52                    1    418743   10116197 3113.5
## + V49                    1    412877   10122064 3113.6
## + V22                    1    365377   10169563 3115.0
## + V16                    1    355622   10179318 3115.3
## + V53                    1    341987   10192953 3115.7
## + V60                    1    321934   10213006 3116.3
## + V87                    1    313901   10221039 3116.5
## + V67                    1    308873   10226068 3116.7
## + V42                    1    288777   10246163 3117.3
## + V61                    1    287360   10247580 3117.3
## + V48                    1    271074   10263867 3117.8
## + V57                    1    263498   10271442 3118.0
## + V11                    1    246163   10288777 3118.5
## + V74                    1    234379   10300561 3118.8
## + V58                    1    230281   10304659 3118.9
## + V6                     1    227046   10307895 3119.0
## + 'COMPLETION QUARTER'   1    223086   10311854 3119.2
## + V46                    1    201907   10333034 3119.8
## + V86                    1    193889   10341051 3120.0
## + V17                    1    190415   10344525 3120.1
## + V29                    1    188509   10346432 3120.2
## + V30                    1    186687   10348253 3120.2
## + V20                    1    185741   10349199 3120.2
## + V77                    1    181246   10353695 3120.4
## + V79                    1    180479   10354461 3120.4
## + V102                   1    179954   10354987 3120.4
## + V26                    1    178858   10356082 3120.4
## + V43                    1    178806   10356134 3120.4
## + V23                    1    173325   10361615 3120.6
## + V82                    1    159257   10375683 3121.0
## + V62                    1    157783   10377158 3121.0
## + V10                    1    155841   10379100 3121.1
## + V96                    1    153731   10381210 3121.1
## + V15                    1    151433   10383507 3121.2
## + V93                    1    146896   10388044 3121.3
## + V92                    1    144058   10390882 3121.4
## + V64                    1    143912   10391028 3121.4
## + V98                    1    140149   10394791 3121.5
## + V80                    1    125165   10409775 3122.0
## + V63                    1    122575   10412365 3122.0
## + V21                    1    118026   10416915 3122.2
## + V34                    1    112082   10422858 3122.3
## + V19                    1    111132   10423809 3122.4
## + V24                    1    109133   10425808 3122.4
## + V99                    1    100289   10434651 3122.7
## + V103                   1     99283   10435657 3122.7
## + V38                    1     97357   10437583 3122.8
## + V88                    1     84686   10450255 3123.1
## + V18                    1     82767   10452174 3123.2
## + V14                    1     75446   10459494 3123.4
```

```
## + V101                    1      74448  10460493 3123.4
## + V39                     1      73328  10461613 3123.4
## + 'START QUARTER'         1      72255  10462685 3123.5
## <none>                                  10534940 3123.5
## + V83                     1      64930  10470010 3123.7
## + V56                     1      61252  10473688 3123.8
## + V9                      1      55437  10479503 3123.9
## + V95                     1      54203  10480738 3124.0
## + V85                     1      53359  10481582 3124.0
## + V37                     1      53180  10481760 3124.0
## + V81                     1      52749  10482192 3124.0
## + V47                     1      49703  10485238 3124.1
## + V4                      1      48445  10486495 3124.1
## + V40                     1      42212  10492728 3124.3
## + V66                     1      41934  10493006 3124.3
## + V65                     1      40298  10494643 3124.4
## + V69                     1      36678  10498263 3124.5
## + V54                     1      35846  10499094 3124.5
## + V89                     1      34925  10500016 3124.5
## + V78                     1      33641  10501299 3124.6
## + V100                    1      33172  10501768 3124.6
## + V35                     1      32120  10502821 3124.6
## + V59                     1      31341  10503600 3124.6
## + V2                      1      30626  10504314 3124.6
## + 'START YEAR'            1      29926  10505014 3124.7
## + V28                     1      23783  10511157 3124.8
## + V25                     1      23716  10511224 3124.8
## + V76                     1      20803  10514138 3124.9
## + V97                     1      19583  10515357 3125.0
## + V70                     1      12883  10522057 3125.1
## + V90                     1      12728  10522213 3125.2
## + V27                     1      10998  10523942 3125.2
## + V44                     1       9280  10525661 3125.3
## + V84                     1       8374  10526566 3125.3
## + V31                     1       8196  10526744 3125.3
## + V45                     1       6047  10528894 3125.3
## + V12                     1       5875  10529065 3125.3
## + V36                     1       4004  10530936 3125.4
## + V33                     1       3859  10531081 3125.4
## + V32                     1       1607  10533333 3125.5
## + V51                     1       1421  10533519 3125.5
## + V50                     1       1186  10533754 3125.5
## + V5                      1        835  10534105 3125.5
## + V73                     1        694  10534247 3125.5
## + V3                      1        414  10534527 3125.5
## + V75                     1        269  10534672 3125.5
## + V13                     1        200  10534740 3125.5
## - V94                     1     150400  10685340 3125.7
## - 'COMPLETION YEAR'       1    1168884  11703825 3152.8
## - V55                     1    3772315  14307255 3212.4
## - V71                     1    4325672  14860612 3223.7
## - V8                      1  256257252 266792193 4081.3
##
## Step:  AIC=3092.33
```

```
## train$V104 ~ V8 + V94 + V55 + V71 + 'COMPLETION YEAR' + V72
##
##                      Df Sum of Sq      RSS    AIC
## + V13                 1   1483860  7937246 3043.4
## + V51                 1   1418681  8002424 3045.9
## + V89                 1   1393207  8027898 3046.8
## + V70                 1   1274204  8146901 3051.2
## + V32                 1   1222995  8198110 3053.0
## + V17                 1   1156462  8264643 3055.4
## + V24                 1   1036154  8384951 3059.7
## + V27                 1   1034214  8386891 3059.8
## + V29                 1   1027679  8393426 3060.0
## + V93                 1   1018170  8402936 3060.4
## + V84                 1    936891  8484215 3063.2
## + V10                 1    908612  8512493 3064.2
## + V100                1    859396  8561709 3065.9
## + V48                 1    845836  8575269 3066.4
## + V39                 1    785305  8635801 3068.5
## + V43                 1    719958  8701147 3070.7
## + V38                 1    693319  8727786 3071.6
## + V41                 1    691978  8729127 3071.7
## + V60                 1    659089  8762016 3072.8
## + V65                 1    641750  8779356 3073.4
## + V95                 1    624940  8796165 3073.9
## + V23                 1    624181  8796924 3074.0
## + V81                 1    622277  8798829 3074.0
## + V19                 1    609811  8811294 3074.5
## + V86                 1    607747  8813358 3074.5
## + V76                 1    586922  8834183 3075.2
## + V22                 1    579204  8841902 3075.5
## + V67                 1    549806  8871299 3076.5
## + V16                 1    546479  8874626 3076.6
## + V99                 1    546337  8874769 3076.6
## + V46                 1    533844  8887261 3077.0
## + V56                 1    526816  8894289 3077.2
## + V79                 1    524045  8897061 3077.3
## + V34                 1    515145  8905960 3077.6
## + V33                 1    503921  8917184 3078.0
## + V62                 1    485625  8935480 3078.6
## + V98                 1    481403  8939702 3078.7
## + V77                 1    477688  8943417 3078.9
## + V54                 1    472346  8948759 3079.0
## + V53                 1    469108  8951997 3079.2
## + V96                 1    466098  8955007 3079.3
## + V30                 1    447886  8973219 3079.9
## + V103                1    437441  8983664 3080.2
## + V58                 1    431137  8989968 3080.4
## + V80                 1    427984  8993121 3080.5
## + V64                 1    416576  9004529 3080.9
## + V102                1    383360  9037745 3082.0
## + V26                 1    381911  9039194 3082.0
## + V42                 1    375767  9045338 3082.2
## + V1                  1    361687  9059418 3082.7
## + 'COMPLETION QUARTER' 1   347500  9073605 3083.2
```

```
## + V20                  1    346824   9074281 3083.2
## + V18                  1    327668   9093437 3083.8
## + V37                  1    324579   9096526 3083.9
## + V57                  1    318083   9103023 3084.1
## + V92                  1    292840   9128265 3084.9
## + V11                  1    275401   9145704 3085.5
## + V74                  1    263904   9157202 3085.9
## + V61                  1    261709   9159397 3086.0
## + V75                  1    247808   9173297 3086.4
## + V36                  1    221857   9199248 3087.2
## + V49                  1    191121   9229984 3088.2
## + V7                   1    183220   9237885 3088.5
## + V15                  1    173100   9248005 3088.8
## + V78                  1    149813   9271292 3089.6
## + V97                  1    149762   9271343 3089.6
## + V59                  1    129215   9291890 3090.2
## - V94                  1     14698   9435803 3090.8
## + V21                  1    109585   9311520 3090.9
## + V6                   1    108162   9312943 3090.9
## + V90                  1    107890   9313215 3090.9
## + V40                  1    100792   9320313 3091.1
## + V14                  1     89396   9331709 3091.5
## + V5                   1     72256   9348849 3092.0
## + V87                  1     70040   9351065 3092.1
## + V4                   1     68611   9352494 3092.2
## <none>                           9421105 3092.3
## + 'START QUARTER'      1     48803   9372302 3092.8
## + V83                  1     47728   9373377 3092.8
## + V2                   1     39249   9381857 3093.1
## + V69                  1     37898   9383207 3093.1
## + V101                 1     34241   9386864 3093.2
## + V52                  1     28231   9392874 3093.4
## + V44                  1     20711   9400394 3093.7
## + V85                  1     16481   9404625 3093.8
## + V35                  1     12795   9408310 3093.9
## + V66                  1     12072   9409033 3093.9
## + V9                   1     11791   9409314 3094.0
## + V50                  1     10486   9410619 3094.0
## + V73                  1     10266   9410839 3094.0
## + V68                  1     10053   9411052 3094.0
## + V45                  1      7186   9413919 3094.1
## + V47                  1      6701   9414404 3094.1
## + V31                  1      6482   9414623 3094.1
## + 'START YEAR'         1      3000   9418105 3094.2
## + V28                  1      2154   9418951 3094.3
## + V25                  1      1590   9419515 3094.3
## + V88                  1      1370   9419735 3094.3
## + V63                  1      1352   9419753 3094.3
## + V12                  1       874   9420231 3094.3
## + V3                   1       795   9420310 3094.3
## + V82                  1       231   9420874 3094.3
## + V91                  1         0   9421105 3094.3
## - V71                  1    459311   9880416 3104.5
## - V72                  1   1113835  10534940 3123.5
```

```
## - `COMPLETION YEAR`       1    2269104   11690209 3154.4
## - V55                      1    2510566   11931671 3160.5
## - V8                       1 255913837  265334942 4081.7
##
## Step:  AIC=3043.42
## train$V104 ~ V8 + V94 + V55 + V71 + `COMPLETION YEAR` + V72 +
##     V13
##
##                       Df Sum of Sq       RSS    AIC
## + `COMPLETION QUARTER`  1    401821   7535425 3030.0
## + V1                    1    394815   7542431 3030.3
## + V7                    1    341628   7595617 3032.4
## + V6                    1    179783   7757463 3038.6
## + V68                   1    179581   7757664 3038.6
## + V60                   1    175400   7761845 3038.8
## + V41                   1    156883   7780363 3039.5
## + V20                   1    149696   7787550 3039.8
## + V79                   1    126116   7811130 3040.7
## + V98                   1    116514   7820731 3041.0
## + V22                   1    106811   7830435 3041.4
## - V71                   1       385   7937630 3041.4
## + V87                   1    104674   7832571 3041.5
## - V55                   1      6445   7943691 3041.7
## + V4                    1     95655   7841591 3041.8
## + V32                   1     93969   7843276 3041.9
## + V2                    1     84186   7853060 3042.3
## + V17                   1     79295   7857950 3042.4
## + V103                  1     69432   7867813 3042.8
## + V76                   1     67418   7869828 3042.9
## + V21                   1     54229   7883017 3043.4
## + V44                   1     53349   7883897 3043.4
## <none>                             7937246 3043.4
## + V5                    1     47282   7889963 3043.6
## + V28                   1     45305   7891941 3043.7
## - V94                   1     62509   7999755 3043.8
## + V15                   1     43883   7893362 3043.8
## + V40                   1     41836   7895410 3043.9
## + V90                   1     41117   7896129 3043.9
## + V78                   1     40373   7896873 3043.9
## + V33                   1     38851   7898394 3044.0
## + V93                   1     35924   7901322 3044.1
## + V102                  1     35779   7901466 3044.1
## + V26                   1     35409   7901837 3044.1
## + V16                   1     33402   7903843 3044.2
## + V36                   1     33079   7904167 3044.2
## + V59                   1     32491   7904755 3044.2
## + V97                   1     30346   7906900 3044.3
## + V34                   1     28982   7908263 3044.3
## + V53                   1     28020   7909225 3044.4
## + V83                   1     27714   7909532 3044.4
## + `START QUARTER`       1     27377   7909869 3044.4
## + V63                   1     25512   7911734 3044.5
## + V57                   1     23899   7913346 3044.5
## + V52                   1     23588   7913658 3044.5
```

```
## + V18               1     23529    7913716 3044.5
## + V9                1     23349    7913896 3044.5
## + V56               1     22993    7914253 3044.6
## + V67               1     22285    7914961 3044.6
## + V25               1     21839    7915406 3044.6
## + V73               1     21264    7915981 3044.6
## + V30               1     20419    7916827 3044.7
## + V48               1     18989    7918257 3044.7
## + V27               1     18466    7918779 3044.7
## + V88               1     17948    7919297 3044.8
## + V84               1     17583    7919662 3044.8
## + V35               1     17338    7919907 3044.8
## + V37               1     15884    7921362 3044.8
## + V96               1     15652    7921594 3044.8
## + V3                1     13904    7923342 3044.9
## + V92               1     13584    7923662 3044.9
## + V69               1     13482    7923763 3044.9
## + V12               1     13178    7924067 3044.9
## + V99               1     12378    7924868 3045.0
## + V61               1     12361    7924884 3045.0
## + V24               1     11647    7925599 3045.0
## + V77               1     10920    7926326 3045.0
## + V14               1     10738    7926508 3045.0
## + V80               1     10733    7926513 3045.0
## + V49               1     10196    7927050 3045.0
## + V81               1      8337    7928909 3045.1
## + V101              1      7888    7929358 3045.1
## + V86               1      7490    7929756 3045.1
## + V65               1      6865    7930380 3045.2
## + V10               1      6716    7930530 3045.2
## + V66               1      6711    7930534 3045.2
## + V19               1      6150    7931096 3045.2
## + V31               1      5890    7931356 3045.2
## + V47               1      5632    7931614 3045.2
## + `START YEAR`      1      4883    7932363 3045.2
## + V100              1      4467    7932778 3045.3
## + V58               1      4174    7933071 3045.3
## + V38               1      4015    7933231 3045.3
## + V82               1      3961    7933284 3045.3
## + V45               1      3827    7933418 3045.3
## + V70               1      3536    7933709 3045.3
## + V51               1      3136    7934109 3045.3
## + V11               1      2982    7934264 3045.3
## + V64               1      2082    7935163 3045.3
## + V62               1      1873    7935373 3045.4
## + V29               1      1616    7935630 3045.4
## + V85               1      1585    7935660 3045.4
## + V54               1      1446    7935800 3045.4
## + V46               1      1201    7936045 3045.4
## + V43               1      1055    7936191 3045.4
## + V89               1       969    7936276 3045.4
## + V39               1       812    7936434 3045.4
## + V75               1       770    7936475 3045.4
## + V23               1       568    7936678 3045.4
```

```
## + V91                    1         566   7936680 3045.4
## + V42                    1         354   7936891 3045.4
## + V74                    1         169   7937077 3045.4
## + V50                    1         111   7937134 3045.4
## + V95                    1          20   7937226 3045.4
## - V13                    1     1483860   9421105 3092.3
## - 'COMPLETION YEAR'      1     1888186   9825432 3104.8
## - V72                    1     2597495  10534740 3125.5
## - V8                     1 254574213 262511459 4080.5
##
## Step:  AIC=3029.99
## train$V104 ~ V8 + V94 + V55 + V71 + 'COMPLETION YEAR' + V72 +
##     V13 + 'COMPLETION QUARTER'
##
##                       Df Sum of Sq      RSS    AIC
## + V1                    1      380048  7155377 3016.6
## + V68                   1      335532  7199893 3018.5
## + V60                   1      305879  7229546 3019.7
## + V98                   1      290046  7245379 3020.3
## + V79                   1      285984  7249441 3020.5
## + V41                   1      279172  7256253 3020.8
## + V7                    1      277978  7257447 3020.8
## + 'START YEAR'          1      211801  7323624 3023.5
## + V22                   1      207643  7327782 3023.7
## + V20                   1      192779  7342646 3024.3
## + V87                   1      153260  7382165 3025.9
## + V99                   1      146162  7389263 3026.2
## + V6                    1      141411  7394014 3026.4
## + V80                   1      101399  7434026 3028.0
## - V55                   1         232  7535657 3028.0
## - V71                   1         543  7535968 3028.0
## + V61                   1       88830  7446595 3028.5
## + V32                   1       84020  7451405 3028.7
## + V4                    1       76219  7459206 3029.0
## + V103                  1       69680  7465745 3029.2
## + V15                   1       67782  7467643 3029.3
## + V42                   1       66344  7469081 3029.4
## + V36                   1       66083  7469342 3029.4
## + V49                   1       65178  7470247 3029.4
## + V90                   1       63856  7471569 3029.5
## + V2                    1       62781  7472644 3029.5
## + V17                   1       61392  7474033 3029.6
## + V76                   1       60883  7474542 3029.6
## + V35                   1       58608  7476817 3029.7
## + V28                   1       58417  7477008 3029.7
## + V23                   1       55895  7479530 3029.8
## <none>                                 7535425 3030.0
## + V9                    1       46273  7489152 3030.2
## + V48                   1       44530  7490895 3030.2
## + V67                   1       42404  7493021 3030.3
## + V43                   1       41588  7493837 3030.4
## + V57                   1       36492  7498933 3030.6
## + V52                   1       34976  7500449 3030.6
## + V93                   1       32789  7502636 3030.7
```

```
## + V45                     1    30323   7505102 3030.8
## + V5                      1    27606   7507819 3030.9
## + V66                     1    27361   7508064 3030.9
## + V56                     1    27278   7508147 3030.9
## + V44                     1    27116   7508309 3030.9
## + V97                     1    25815   7509610 3031.0
## + V19                     1    24906   7510519 3031.0
## + V78                     1    24719   7510706 3031.0
## + V21                     1    24481   7510944 3031.0
## + V33                     1    24389   7511036 3031.0
## + V69                     1    23776   7511649 3031.1
## - V94                     1    78488   7613913 3031.1
## + V40                     1    22338   7513087 3031.1
## + V85                     1    21857   7513568 3031.1
## + V102                    1    21284   7514141 3031.2
## + V26                     1    21013   7514412 3031.2
## + V12                     1    20600   7514825 3031.2
## + V24                     1    20324   7515101 3031.2
## + V53                     1    19797   7515628 3031.2
## + V59                     1    18142   7517283 3031.3
## + V14                     1    17994   7517431 3031.3
## + V47                     1    16275   7519150 3031.4
## + V10                     1    16227   7519198 3031.4
## + V38                     1    15715   7519710 3031.4
## + V86                     1    15260   7520165 3031.4
## + V84                     1    14946   7520479 3031.4
## + V34                     1    14761   7520664 3031.4
## + V62                     1    14480   7520945 3031.4
## + V18                     1    14162   7521263 3031.4
## + V96                     1    13944   7521481 3031.4
## + V77                     1    13888   7521537 3031.4
## + V16                     1    13239   7522186 3031.5
## + V100                    1    10651   7524774 3031.6
## + V58                     1    10455   7524970 3031.6
## + V29                     1    10413   7525012 3031.6
## + V63                     1     9802   7525623 3031.6
## + V25                     1     9584   7525841 3031.6
## + V11                     1     7462   7527963 3031.7
## + V37                     1     7163   7528262 3031.7
## + V31                     1     6931   7528494 3031.7
## + V65                     1     6338   7529087 3031.7
## + V27                     1     5657   7529768 3031.8
## + V92                     1     4940   7530485 3031.8
## + V3                      1     4585   7530840 3031.8
## + V75                     1     4304   7531121 3031.8
## + V70                     1     4211   7531214 3031.8
## + V74                     1     4175   7531250 3031.8
## + V88                     1     3211   7532214 3031.9
## + V54                     1     3137   7532288 3031.9
## + V101                    1     3132   7532293 3031.9
## + V51                     1     2652   7532773 3031.9
## + V95                     1     2329   7533096 3031.9
## + V73                     1     2248   7533177 3031.9
## + V81                     1     2166   7533259 3031.9
```

```
## + V83                        1       1992    7533433 3031.9
## + 'START QUARTER'            1       1161    7534264 3031.9
## + V64                        1        900    7534525 3032.0
## + V46                        1        395    7535030 3032.0
## + V30                        1        183    7535242 3032.0
## + V82                        1        109    7535316 3032.0
## + V89                        1         82    7535343 3032.0
## + V50                        1         15    7535410 3032.0
## + V39                        1         10    7535415 3032.0
## + V91                        1          8    7535417 3032.0
## - 'COMPLETION QUARTER'       1     401821    7937246 3043.4
## - V13                        1    1538180    9073605 3083.2
## - 'COMPLETION YEAR'          1    2076054    9611479 3100.3
## - V72                        1    2776264   10311689 3121.2
## - V8                         1  254909612  262445037 4082.5
##
## Step:  AIC=3016.62
## train$V104 ~ V8 + V94 + V55 + V71 + 'COMPLETION YEAR' + V72 +
##     V13 + 'COMPLETION QUARTER' + V1
##
##                        Df Sum of Sq       RSS    AIC
## + V98                   1     301502   6853876 3005.8
## + V79                   1     290285   6865093 3006.3
## + V68                   1     288241   6867136 3006.4
## + V60                   1     287945   6867432 3006.4
## + V41                   1     286329   6869048 3006.5
## + V7                    1     271703   6883675 3007.1
## + 'START YEAR'          1     212272   6943105 3009.7
## + V22                   1     211512   6943865 3009.7
## + V20                   1     157140   6998237 3012.0
## + V99                   1     128355   7027023 3013.2
## + V87                   1     125812   7029565 3013.4
## - V71                   1        220   7155597 3014.6
## + V80                   1      92319   7063059 3014.8
## - V55                   1       7205   7162582 3014.9
## + V61                   1      86735   7068642 3015.0
## + V49                   1      84065   7071312 3015.1
## + V103                  1      78874   7076503 3015.3
## + V28                   1      71053   7084325 3015.7
## + V32                   1      69162   7086216 3015.7
## + V36                   1      66767   7088611 3015.8
## + V42                   1      63301   7092076 3016.0
## + V90                   1      62169   7093209 3016.0
## + V35                   1      59746   7095631 3016.1
## + V9                    1      59036   7096341 3016.2
## + V15                   1      56852   7098525 3016.3
## + V23                   1      56109   7099268 3016.3
## + V76                   1      52949   7102429 3016.4
## <none>                                 7155377 3016.6
## + V52                   1      43710   7111667 3016.8
## + V66                   1      41825   7113553 3016.9
## + V44                   1      40518   7114859 3016.9
## + V43                   1      37426   7117952 3017.1
## + V12                   1      36273   7119104 3017.1
```

```
## + V97                     1    35900   7119477 3017.1
## + V17                     1    35892   7119486 3017.1
## + V48                     1    35863   7119515 3017.1
## + V69                     1    35288   7120089 3017.2
## + V85                     1    34342   7121036 3017.2
## + V21                     1    32096   7123281 3017.3
## + V67                     1    31405   7123972 3017.3
## + V45                     1    30619   7124759 3017.4
## + V78                     1    29823   7125554 3017.4
## + V57                     1    29791   7125586 3017.4
## + V4                      1    28896   7126481 3017.4
## + V2                      1    28426   7126952 3017.4
## + V40                     1    27294   7128083 3017.5
## - V94                     1    70260   7225637 3017.5
## + V14                     1    22079   7133298 3017.7
## + V59                     1    22068   7133310 3017.7
## + V24                     1    21805   7133572 3017.7
## + V47                     1    21657   7133720 3017.7
## + V5                      1    21537   7133841 3017.7
## + V19                     1    21292   7134086 3017.7
## + V38                     1    18990   7136387 3017.8
## + V25                     1    18892   7136486 3017.8
## + V93                     1    18598   7136779 3017.9
## + V56                     1    18535   7136843 3017.9
## + V63                     1    17589   7137788 3017.9
## + V96                     1    15839   7139538 3018.0
## + V102                    1    15618   7139760 3018.0
## + V18                     1    15429   7139948 3018.0
## + V26                     1    15382   7139995 3018.0
## + V34                     1    13473   7141904 3018.1
## + V77                     1    13154   7142224 3018.1
## + V62                     1    12230   7143148 3018.1
## + V10                     1    11962   7143415 3018.1
## + V31                     1    11946   7143432 3018.1
## + V37                     1    11460   7143917 3018.1
## + V86                     1    10717   7144660 3018.2
## + V33                     1    10379   7144998 3018.2
## + V101                    1     9653   7145724 3018.2
## + V53                     1     8264   7147113 3018.3
## + V100                    1     8143   7147235 3018.3
## + V29                     1     7555   7147822 3018.3
## + V16                     1     7195   7148183 3018.3
## + V11                     1     6874   7148504 3018.3
## + V58                     1     6378   7148999 3018.4
## + V27                     1     5922   7149455 3018.4
## + V84                     1     5808   7149569 3018.4
## + V6                      1     5242   7150135 3018.4
## + V51                     1     4526   7150851 3018.4
## + V70                     1     4458   7150920 3018.4
## + V92                     1     3532   7151846 3018.5
## + V75                     1     3334   7152044 3018.5
## + V73                     1     2683   7152694 3018.5
## + V74                     1     2362   7153015 3018.5
## + V64                     1     2326   7153052 3018.5
```

```
## + V65                        1      2203   7153175 3018.5
## + V91                        1      2046   7153331 3018.5
## + V82                        1      1922   7153455 3018.5
## + V46                        1      1455   7153922 3018.6
## + V54                        1      1393   7153985 3018.6
## + V83                        1      1228   7154149 3018.6
## + V81                        1      1086   7154292 3018.6
## + V50                        1       979   7154398 3018.6
## + V39                        1       611   7154766 3018.6
## + V89                        1       591   7154786 3018.6
## + 'START QUARTER'            1       533   7154844 3018.6
## + V30                        1       519   7154858 3018.6
## + V3                         1       444   7154933 3018.6
## + V95                        1       260   7155117 3018.6
## + V88                        1       145   7155233 3018.6
## - V1                         1    380048   7535425 3030.0
## - 'COMPLETION QUARTER'       1    387054   7542431 3030.3
## - V13                        1   1570214   8725592 3073.5
## - 'COMPLETION YEAR'          1   2214323   9369700 3094.7
## - V72                        1   2581426   9736803 3106.1
## - V8                         1 128477200 135632577 3888.4
##
## Step:  AIC=3005.84
## train$V104 ~ V8 + V94 + V55 + V71 + 'COMPLETION YEAR' + V72 +
##     V13 + 'COMPLETION QUARTER' + V1 + V98
##
##                        Df Sum of Sq      RSS    AIC
## + V68                   1    121804  6732072 3002.5
## + V20                   1    113523  6740352 3002.9
## - V71                   1       314  6854189 3003.9
## + V7                    1     88481  6765395 3004.0
## + V33                   1     82668  6771207 3004.2
## + V84                   1     79341  6774535 3004.4
## - V55                   1     13858  6867734 3004.4
## + V34                   1     69005  6784870 3004.8
## + 'START YEAR'          1     64051  6789824 3005.0
## + V93                   1     61865  6792011 3005.1
## - V94                   1     32578  6886454 3005.2
## + V53                   1     54717  6799158 3005.5
## + V17                   1     52459  6801416 3005.6
## + V90                   1     51855  6802020 3005.6
## + V50                   1     46042  6807833 3005.8
## <none>                              6853876 3005.8
## + V31                   1     44943  6808933 3005.9
## + V36                   1     44570  6809305 3005.9
## + V35                   1     41853  6812022 3006.0
## + V82                   1     40867  6813009 3006.1
## + V32                   1     40487  6813389 3006.1
## + V87                   1     39709  6814166 3006.1
## + V2                    1     35083  6818792 3006.3
## + V65                   1     34490  6819385 3006.3
## + V30                   1     32752  6821123 3006.4
## + V41                   1     29183  6824692 3006.6
## + V99                   1     24315  6829560 3006.8
```

```
## + V4                   1     24152   6829724 3006.8
## + V45                  1     23196   6830680 3006.8
## + V102                 1     21202   6832674 3006.9
## + V26                  1     21145   6832731 3006.9
## + V92                  1     20231   6833645 3007.0
## + V51                  1     20092   6833784 3007.0
## + V59                  1     19407   6834469 3007.0
## + V5                   1     18885   6834990 3007.0
## + V12                  1     18795   6835080 3007.0
## + V22                  1     18393   6835483 3007.0
## + V88                  1     17698   6836178 3007.1
## + V61                  1     16311   6837564 3007.1
## + V43                  1     15881   6837995 3007.1
## + V74                  1     15707   6838168 3007.2
## + V80                  1     15508   6838367 3007.2
## + V40                  1     15489   6838386 3007.2
## + V101                 1     15340   6838536 3007.2
## + V60                  1     14803   6839072 3007.2
## + V76                  1     14464   6839411 3007.2
## + V63                  1     14433   6839443 3007.2
## + V89                  1     14160   6839716 3007.2
## + V96                  1     13965   6839910 3007.2
## + V16                  1     13024   6840852 3007.3
## + V19                  1     12131   6841745 3007.3
## + V78                  1     11796   6842080 3007.3
## + V27                  1     11597   6842278 3007.3
## + V52                  1     11580   6842296 3007.3
## + V25                  1     10883   6842993 3007.4
## + V95                  1     10771   6843105 3007.4
## + V47                  1     10307   6843568 3007.4
## + V6                   1      8936   6844939 3007.5
## + V15                  1      8842   6845033 3007.5
## + V62                  1      8777   6845099 3007.5
## + V97                  1      7997   6845879 3007.5
## + V9                   1      7850   6846026 3007.5
## + V21                  1      7685   6846190 3007.5
## + V85                  1      7339   6846537 3007.5
## + V57                  1      7128   6846748 3007.5
## + V11                  1      6268   6847608 3007.6
## + V100                 1      5472   6848404 3007.6
## + V77                  1      5111   6848764 3007.6
## + V39                  1      5049   6848827 3007.6
## + V42                  1      3821   6850054 3007.7
## + V79                  1      3686   6850190 3007.7
## + V58                  1      3317   6850559 3007.7
## + V49                  1      3176   6850700 3007.7
## + V67                  1      3119   6850756 3007.7
## + V14                  1      3080   6850795 3007.7
## + V103                 1      3069   6850806 3007.7
## + V54                  1      2727   6851149 3007.7
## + V38                  1      2714   6851162 3007.7
## + V29                  1      2609   6851267 3007.7
## + V3                   1      2420   6851456 3007.7
## + V46                  1      2298   6851577 3007.7
```

```
## + V70                       1      2255  6851620 3007.7
## + V48                       1      1959  6851917 3007.8
## + V23                       1      1936  6851940 3007.8
## + V91                       1      1929  6851947 3007.8
## + V44                       1      1197  6852679 3007.8
## + V24                       1      1188  6852687 3007.8
## + V56                       1      1106  6852769 3007.8
## + V37                       1       989  6852887 3007.8
## + V86                       1       592  6853284 3007.8
## + V81                       1       425  6853450 3007.8
## + V83                       1       279  6853596 3007.8
## + 'START QUARTER'           1       251  6853625 3007.8
## + V28                       1       250  6853626 3007.8
## + V18                       1       234  6853641 3007.8
## + V69                       1       233  6853643 3007.8
## + V10                       1       136  6853739 3007.8
## + V73                       1        99  6853777 3007.8
## + V66                       1        66  6853809 3007.8
## + V75                       1        49  6853826 3007.8
## + V64                       1         4  6853872 3007.8
## - V98                       1    301502  7155377 3016.6
## - V1                        1    391504  7245379 3020.3
## - 'COMPLETION QUARTER'      1    562563  7416439 3027.3
## - V13                       1   1054064  7907940 3046.3
## - 'COMPLETION YEAR'         1   1802230  8656105 3073.2
## - V72                       1   2559287  9413163 3098.1
## - V8                        1 128557569 135411445 3889.9
##
## Step:  AIC=3002.51
## train$V104 ~ V8 + V94 + V55 + V71 + 'COMPLETION YEAR' + V72 +
##     V13 + 'COMPLETION QUARTER' + V1 + V98 + V68
##
##                       Df Sum of Sq      RSS    AIC
## + V84                  1    196535  6535537 2995.7
## - V71                  1      1372  6733444 3000.6
## + V86                  1     88634  6643437 3000.6
## - V94                  1      7428  6739499 3000.8
## + V20                  1     82390  6649681 3000.9
## + V65                  1     74792  6657280 3001.2
## + V56                  1     64101  6667971 3001.7
## - V55                  1     31443  6763515 3001.9
## + V30                  1     58788  6673283 3001.9
## + V96                  1     57150  6674921 3002.0
## + V37                  1     56295  6675777 3002.0
## + V49                  1     54517  6677555 3002.1
## + V90                  1     54204  6677868 3002.1
## + V67                  1     47267  6684804 3002.4
## + V85                  1     46584  6685488 3002.5
## + V7                   1     45578  6686493 3002.5
## <none>                          6732072 3002.5
## + V81                  1     43633  6688439 3002.6
## + V15                  1     40980  6691091 3002.7
## + V75                  1     35856  6696216 3002.9
## + V66                  1     35178  6696893 3003.0
```

94

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## + V2                          1     34389   6697683 3003.0
## + V53                         1     31521   6700551 3003.1
## + V35                         1     30424   6701648 3003.2
## + V32                         1     29507   6702564 3003.2
## + 'START YEAR'                 1     28739   6703332 3003.2
## + V28                         1     25401   6706671 3003.4
## + V36                         1     24505   6707567 3003.4
## + V4                          1     24357   6707715 3003.4
## + V74                         1     24338   6707734 3003.4
## + V95                         1     22649   6709422 3003.5
## + V34                         1     22561   6709511 3003.5
## + V48                         1     22180   6709892 3003.5
## + V54                         1     21693   6710379 3003.6
## + V33                         1     19930   6712141 3003.6
## + V91                         1     18332   6713739 3003.7
## + V41                         1     18314   6713758 3003.7
## + V62                         1     17767   6714304 3003.7
## + V29                         1     16845   6715227 3003.8
## + V80                         1     15435   6716637 3003.8
## + V18                         1     14607   6717465 3003.9
## + V69                         1     13879   6718192 3003.9
## + V42                         1     13104   6718967 3003.9
## + V103                        1     12596   6719476 3004.0
## + V6                          1     11910   6720162 3004.0
## + V17                         1     11732   6720339 3004.0
## + V102                        1     11176   6720895 3004.0
## + V26                         1     11066   6721006 3004.0
## + V57                         1     10427   6721645 3004.1
## + V61                         1      9876   6722196 3004.1
## + V22                         1      9374   6722698 3004.1
## + V39                         1      8638   6723434 3004.1
## + V100                        1      8493   6723579 3004.1
## + V40                         1      7434   6724637 3004.2
## + V5                          1      7292   6724779 3004.2
## + V21                         1      7174   6724898 3004.2
## + V44                         1      7063   6725009 3004.2
## + V60                         1      6059   6726012 3004.2
## + V45                         1      5840   6726231 3004.3
## + V38                         1      5701   6726371 3004.3
## + V31                         1      5665   6726406 3004.3
## + V101                        1      4791   6727280 3004.3
## + V92                         1      4081   6727990 3004.3
## + V59                         1      3364   6728708 3004.4
## + V3                          1      2785   6729287 3004.4
## + V93                         1      2721   6729350 3004.4
## + V47                         1      2346   6729726 3004.4
## + V43                         1      1864   6730208 3004.4
## + V76                         1      1704   6730368 3004.4
## + V63                         1      1659   6730413 3004.4
## + V14                         1      1556   6730516 3004.4
## + V25                         1      1520   6730552 3004.4
## + V23                         1      1467   6730605 3004.4
## + V52                         1      1454   6730618 3004.4
## + V64                         1      1254   6730818 3004.5
```

```
## + V77                     1      1060   6731011 3004.5
## + V58                     1       977   6731095 3004.5
## + 'START QUARTER'         1       902   6731169 3004.5
## + V99                     1       877   6731195 3004.5
## + V82                     1       836   6731235 3004.5
## + V46                     1       805   6731267 3004.5
## + V97                     1       676   6731395 3004.5
## + V89                     1       617   6731454 3004.5
## + V24                     1       595   6731476 3004.5
## + V19                     1       575   6731496 3004.5
## + V83                     1       566   6731506 3004.5
## + V51                     1       527   6731545 3004.5
## + V73                     1       524   6731547 3004.5
## + V87                     1       421   6731650 3004.5
## + V9                      1       412   6731659 3004.5
## + V27                     1       366   6731706 3004.5
## + V10                     1       364   6731708 3004.5
## + V50                     1       310   6731762 3004.5
## + V16                     1       270   6731802 3004.5
## + V78                     1       258   6731814 3004.5
## + V11                     1       235   6731837 3004.5
## + V88                     1       180   6731891 3004.5
## + V70                     1       108   6731964 3004.5
## + V79                     1        22   6732049 3004.5
## + V12                     1         0   6732071 3004.5
## - V68                     1    121804   6853876 3005.8
## - V98                     1    135065   6867136 3006.4
## - V1                      1    352909   7084981 3015.7
## - 'COMPLETION QUARTER'    1    618887   7350959 3026.6
## - V72                     1   1113767   7845839 3046.0
## - V13                     1   1122327   7854399 3046.3
## - 'COMPLETION YEAR'       1   1921954   8654025 3075.1
## - V8                      1 127724032 134456103 3889.8
##
## Step:  AIC=2995.71
## train$V104 ~ V8 + V94 + V55 + V71 + 'COMPLETION YEAR' + V72 +
##     V13 + 'COMPLETION QUARTER' + V1 + V98 + V68 + V84
##
##                          Df Sum of Sq      RSS    AIC
## - V71                     1      8596   6544132 2994.1
## - V94                     1     22029   6557565 2994.7
## + V36                     1     63465   6472072 2994.8
## + V52                     1     61297   6474240 2994.9
## + V86                     1     57647   6477890 2995.1
## + V81                     1     53568   6481969 2995.3
## + V90                     1     49781   6485756 2995.4
## + V35                     1     49769   6485768 2995.4
## + V2                      1     46670   6488867 2995.6
## - V55                     1     41409   6576945 2995.6
## + V4                      1     44821   6490715 2995.7
## + V101                    1     44468   6491069 2995.7
## <none>                                  6535537 2995.7
## + V20                     1     42816   6492720 2995.8
## + V91                     1     41695   6493841 2995.8
```

```
## + V100                  1    37474   6498063 2996.0
## + V95                   1    36148   6499389 2996.1
## + V87                   1    32712   6502825 2996.2
## + V99                   1    31781   6503755 2996.3
## + V67                   1    25011   6510526 2996.6
## + V96                   1    24089   6511448 2996.6
## + V51                   1    22506   6513031 2996.7
## + V27                   1    22397   6513140 2996.7
## + V15                   1    20895   6514642 2996.8
## + V62                   1    20812   6514725 2996.8
## + V85                   1    20215   6515322 2996.8
## + V41                   1    19421   6516116 2996.8
## + V7                    1    18824   6516712 2996.9
## + V6                    1    15637   6519900 2997.0
## + V44                   1    15503   6520033 2997.0
## + V103                  1    15028   6520509 2997.0
## + V64                   1    14599   6520937 2997.0
## + V80                   1    12749   6522788 2997.1
## + V39                   1    11218   6524318 2997.2
## + V63                   1    11041   6524496 2997.2
## + V22                   1    10231   6525306 2997.2
## + V69                   1    10190   6525347 2997.2
## + 'START YEAR'          1     9833   6525704 2997.3
## + V66                   1     9790   6525747 2997.3
## + V34                   1     9783   6525754 2997.3
## + V74                   1     9747   6525790 2997.3
## + V54                   1     9535   6526002 2997.3
## + V76                   1     9251   6526285 2997.3
## + V49                   1     8915   6526621 2997.3
## + V28                   1     8793   6526744 2997.3
## + V60                   1     8640   6526896 2997.3
## + V48                   1     7841   6527695 2997.4
## + V29                   1     6030   6529506 2997.4
## + V16                   1     5936   6529601 2997.4
## + V3                    1     5711   6529825 2997.5
## + V5                    1     5603   6529933 2997.5
## + V82                   1     5408   6530128 2997.5
## + V45                   1     5334   6530203 2997.5
## + V53                   1     5318   6530219 2997.5
## + V32                   1     5190   6530346 2997.5
## + V31                   1     5010   6530527 2997.5
## + V24                   1     4908   6530629 2997.5
## + V73                   1     4447   6531090 2997.5
## + V14                   1     3671   6531866 2997.5
## + V77                   1     3295   6532242 2997.6
## + V97                   1     2899   6532638 2997.6
## + V18                   1     2544   6532993 2997.6
## + V43                   1     2457   6533080 2997.6
## + V37                   1     2444   6533093 2997.6
## + V11                   1     1966   6533570 2997.6
## + V89                   1     1950   6533587 2997.6
## + V25                   1     1726   6533810 2997.6
## + V40                   1     1676   6533861 2997.6
## + V56                   1     1669   6533867 2997.6
```

```
## + V65                        1      1572   6533965 2997.6
## + V19                        1      1544   6533992 2997.6
## + V9                         1      1292   6534244 2997.7
## + 'START QUARTER'            1      1166   6534370 2997.7
## + V21                        1      1153   6534384 2997.7
## + V23                        1      1123   6534413 2997.7
## + V88                        1      1103   6534434 2997.7
## + V93                        1      1099   6534438 2997.7
## + V78                        1       953   6534584 2997.7
## + V79                        1       860   6534676 2997.7
## + V42                        1       856   6534681 2997.7
## + V50                        1       801   6534735 2997.7
## + V30                        1       790   6534746 2997.7
## + V46                        1       719   6534817 2997.7
## + V83                        1       707   6534830 2997.7
## + V61                        1       689   6534847 2997.7
## + V75                        1       664   6534873 2997.7
## + V58                        1       483   6535054 2997.7
## + V57                        1       423   6535114 2997.7
## + V92                        1       410   6535127 2997.7
## + V12                        1       312   6535225 2997.7
## + V102                       1       202   6535335 2997.7
## + V26                        1       185   6535352 2997.7
## + V47                        1       113   6535423 2997.7
## + V33                        1       103   6535434 2997.7
## + V59                        1        64   6535473 2997.7
## + V70                        1        61   6535476 2997.7
## + V38                        1        52   6535484 2997.7
## + V17                        1        35   6535501 2997.7
## + V10                        1         0   6535536 2997.7
## - V84                        1    196535   6732072 3002.5
## - V98                        1    201358   6736894 3002.7
## - V68                        1    238998   6774535 3004.4
## - V13                        1    259982   6795519 3005.3
## - V1                         1    292110   6827646 3006.7
## - 'COMPLETION QUARTER'       1    706737   7242274 3024.2
## - V72                        1   1066510   7602047 3038.6
## - 'COMPLETION YEAR'          1   2097124   8632661 3076.4
## - V8                         1 126952061 133487598 3889.7
##
## Step:  AIC=2994.1
## train$V104 ~ V8 + V94 + V55 + 'COMPLETION YEAR' + V72 + V13 +
##     'COMPLETION QUARTER' + V1 + V98 + V68 + V84
##
##                      Df Sum of Sq      RSS    AIC
## + V36                 1     69180  6474952 2992.9
## - V94                 1     22601  6566734 2993.1
## + V90                 1     58372  6485760 2993.4
## + V52                 1     54170  6489962 2993.6
## + V86                 1     50429  6493704 2993.8
## + V81                 1     49645  6494487 2993.8
## + V35                 1     46681  6497451 2994.0
## + V20                 1     45381  6498751 2994.0
## <none>                           6544132 2994.1
```

```
## + V91                        1     43200    6500932 2994.1
## + V2                         1     42293    6501840 2994.2
## + V4                         1     41291    6502842 2994.2
## + V87                        1     37227    6506905 2994.4
## + V100                       1     32587    6511545 2994.6
## + V95                        1     31732    6512400 2994.7
## + V99                        1     29319    6514813 2994.8
## + V41                        1     23801    6520331 2995.0
## + V101                       1     23336    6520796 2995.0
## + V15                        1     22364    6521769 2995.1
## + V51                        1     21118    6523014 2995.1
## + V96                        1     20243    6523890 2995.2
## + V7                         1     19525    6524607 2995.2
## + V6                         1     15856    6528277 2995.4
## + V67                        1     15298    6528834 2995.4
## + V62                        1     14953    6529179 2995.4
## + V76                        1     13917    6530215 2995.5
## + V49                        1     13448    6530684 2995.5
## + V80                        1     13273    6530859 2995.5
## + V34                        1     13037    6531095 2995.5
## + V22                        1     12785    6531348 2995.5
## + V74                        1     12763    6531370 2995.5
## + V39                        1     12602    6531530 2995.5
## + V103                       1     12031    6532101 2995.6
## + V64                        1     11160    6532972 2995.6
## + V60                        1     10869    6533263 2995.6
## + V85                        1      9169    6534963 2995.7
## + 'START YEAR'               1      9100    6535033 2995.7
## + V54                        1      8787    6535346 2995.7
## + V27                        1      8636    6535496 2995.7
## + V71                        1      8596    6535537 2995.7
## + V32                        1      7526    6536606 2995.8
## + V44                        1      7258    6536875 2995.8
## + V69                        1      7184    6536948 2995.8
## + V53                        1      7054    6537078 2995.8
## + V31                        1      6567    6537566 2995.8
## + V5                         1      6513    6537619 2995.8
## + V11                        1      5986    6538146 2995.8
## + V46                        1      5468    6538665 2995.9
## + V45                        1      5388    6538745 2995.9
## + V88                        1      5352    6538781 2995.9
## + V28                        1      5219    6538913 2995.9
## + V3                         1      4440    6539693 2995.9
## + V66                        1      3951    6540181 2995.9
## + V73                        1      3920    6540212 2995.9
## + V65                        1      3814    6540319 2995.9
## + V93                        1      3708    6540424 2995.9
## + V89                        1      3261    6540871 2996.0
## + V14                        1      3053    6541080 2996.0
## + V19                        1      2869    6541263 2996.0
## + V63                        1      2556    6541576 2996.0
## + V48                        1      2407    6541726 2996.0
## + V16                        1      2154    6541979 2996.0
## + V40                        1      2099    6542034 2996.0
```

```
## + V29                       1       2091   6542041 2996.0
## + V24                       1       1910   6542222 2996.0
## + 'START QUARTER'           1       1887   6542245 2996.0
## + V50                       1       1718   6542414 2996.0
## + V92                       1       1483   6542649 2996.0
## + V79                       1       1312   6542820 2996.0
## + V97                       1       1299   6542833 2996.0
## + V77                       1       1272   6542860 2996.0
## + V83                       1       1267   6542865 2996.0
## + V58                       1       1263   6542869 2996.0
## + V102                      1       1053   6543080 2996.1
## + V26                       1       1013   6543120 2996.1
## + V47                       1        975   6543157 2996.1
## + V18                       1        828   6543305 2996.1
## + V21                       1        706   6543427 2996.1
## + V9                        1        664   6543468 2996.1
## + V82                       1        658   6543475 2996.1
## + V37                       1        652   6543480 2996.1
## + V10                       1        597   6543535 2996.1
## + V12                       1        582   6543550 2996.1
## + V75                       1        504   6543628 2996.1
## + V33                       1        423   6543709 2996.1
## + V17                       1        375   6543757 2996.1
## + V56                       1        338   6543795 2996.1
## + V78                       1        333   6543800 2996.1
## + V59                       1        328   6543804 2996.1
## + V43                       1        317   6543816 2996.1
## + V25                       1        131   6544002 2996.1
## + V57                       1         97   6544035 2996.1
## + V38                       1         86   6544046 2996.1
## + V70                       1         73   6544059 2996.1
## + V61                       1         49   6544084 2996.1
## + V30                       1         48   6544085 2996.1
## + V23                       1         30   6544103 2996.1
## + V42                       1          1   6544132 2996.1
## - V55                       1      88994   6633127 2996.1
## - V84                       1     189311   6733444 3000.6
## - V98                       1     197292   6741424 3000.9
## - V68                       1     232428   6776560 3002.5
## - V13                       1     251689   6795821 3003.3
## - V1                        1     301856   6845989 3005.5
## - 'COMPLETION QUARTER'      1     698168   7242300 3022.2
## - V72                       1    1419534   7963667 3050.4
## - 'COMPLETION YEAR'         1    2097353   8641486 3074.7
## - V8                        1  127057028 133601160 3887.9
##
## Step:  AIC=2992.95
## train$V104 ~ V8 + V94 + V55 + 'COMPLETION YEAR' + V72 + V13 +
##     'COMPLETION QUARTER' + V1 + V98 + V68 + V84 + V36
##
##                        Df Sum of Sq       RSS    AIC
## - V94                   1      42571   6517524 2992.9
## <none>                                6474952 2992.9
## + V73                   1      40212   6434740 2993.1
```

```
## + V20                    1    38753    6436200 2993.2
## + V2                     1    38487    6436465 2993.2
## + V4                     1    38394    6436558 2993.2
## + V91                    1    37733    6437219 2993.2
## + V27                    1    36713    6438239 2993.3
## + V95                    1    33289    6441663 2993.4
## + V90                    1    29169    6445783 2993.6
## + V86                    1    28419    6446533 2993.6
## + V99                    1    25782    6449171 2993.8
## + V7                     1    24244    6450708 2993.8
## + V83                    1    24202    6450750 2993.8
## - V55                    1    63878    6538830 2993.9
## + V45                    1    22751    6452201 2993.9
## + 'START QUARTER'        1    22652    6452300 2993.9
## + V37                    1    22581    6452371 2993.9
## + V65                    1    21135    6453817 2994.0
## + V41                    1    18901    6456051 2994.1
## + V81                    1    18628    6456324 2994.1
## + V6                     1    18499    6456454 2994.1
## - V36                    1    69180    6544132 2994.1
## + V76                    1    14930    6460022 2994.3
## + V96                    1    14678    6460274 2994.3
## + V100                   1    14573    6460380 2994.3
## + V15                    1    14552    6460400 2994.3
## + V87                    1    14218    6460735 2994.3
## + V49                    1    13832    6461121 2994.3
## + V67                    1    13132    6461820 2994.3
## + V52                    1    12223    6462729 2994.4
## + V22                    1    11391    6463561 2994.4
## + V101                   1    11011    6463941 2994.4
## + V11                    1     9915    6465037 2994.5
## + V54                    1     9339    6465613 2994.5
## + V60                    1     8375    6466577 2994.6
## + V10                    1     7775    6467177 2994.6
## + V16                    1     7267    6467686 2994.6
## + V88                    1     7221    6467731 2994.6
## + V61                    1     6877    6468076 2994.6
## + V64                    1     6617    6468335 2994.6
## + V62                    1     6388    6468564 2994.7
## + V14                    1     6181    6468771 2994.7
## + V31                    1     6165    6468787 2994.7
## + V39                    1     6142    6468810 2994.7
## + V40                    1     5955    6468997 2994.7
## + V30                    1     5824    6469128 2994.7
## + V89                    1     5407    6469545 2994.7
## + V57                    1     4696    6470256 2994.7
## + V5                     1     4025    6470927 2994.8
## + V48                    1     3810    6471142 2994.8
## + V75                    1     3364    6471588 2994.8
## + V51                    1     3353    6471599 2994.8
## + V58                    1     3290    6471662 2994.8
## + V28                    1     3254    6471698 2994.8
## + V3                     1     2917    6472035 2994.8
## + V71                    1     2880    6472072 2994.8
```

```
## + V43                        1        2747    6472205 2994.8
## + V50                        1        2533    6472419 2994.8
## + V25                        1        2526    6472426 2994.8
## + 'START YEAR'               1        2419    6472534 2994.8
## + V46                        1        2157    6472795 2994.8
## + V59                        1        2069    6472883 2994.9
## + V79                        1        1947    6473005 2994.9
## + V9                         1        1822    6473130 2994.9
## + V74                        1        1688    6473264 2994.9
## + V21                        1        1685    6473267 2994.9
## + V80                        1        1137    6473816 2994.9
## + V17                        1        1103    6473850 2994.9
## + V34                        1        1005    6473947 2994.9
## + V85                        1        1003    6473949 2994.9
## + V53                        1         981    6473971 2994.9
## + V19                        1         930    6474022 2994.9
## + V33                        1         890    6474062 2994.9
## + V70                        1         797    6474155 2994.9
## + V69                        1         631    6474321 2994.9
## + V82                        1         585    6474367 2994.9
## + V26                        1         567    6474385 2994.9
## + V32                        1         543    6474409 2994.9
## + V102                       1         543    6474409 2994.9
## + V92                        1         537    6474415 2994.9
## + V44                        1         432    6474520 2994.9
## + V77                        1         373    6474579 2994.9
## + V12                        1         354    6474599 2994.9
## + V38                        1         347    6474606 2994.9
## + V66                        1         344    6474608 2994.9
## + V35                        1         191    6474761 2994.9
## + V78                        1         170    6474782 2994.9
## + V29                        1         135    6474817 2994.9
## + V93                        1          98    6474854 2994.9
## + V24                        1          86    6474866 2994.9
## + V18                        1          28    6474924 2994.9
## + V56                        1          23    6474929 2994.9
## + V63                        1          21    6474931 2994.9
## + V47                        1          19    6474933 2994.9
## + V97                        1          18    6474934 2994.9
## + V42                        1          17    6474935 2994.9
## + V103                       1          13    6474939 2994.9
## + V23                        1           0    6474952 2994.9
## - V98                        1      204778    6679731 3000.2
## - V68                        1      215774    6690726 3000.7
## - V84                        1      232701    6707653 3001.4
## - V1                         1      295882    6770834 3004.2
## - V13                        1      301843    6776795 3004.5
## - 'COMPLETION QUARTER'       1      739449    7214401 3023.1
## - V72                        1     1456972    7931924 3051.2
## - 'COMPLETION YEAR'          1     2128735    8603687 3075.4
## - V8                         1 126871734  133346686 3889.4
##
## Step:  AIC=2992.89
## train$V104 ~ V8 + V55 + 'COMPLETION YEAR' + V72 + V13 + 'COMPLETION QUARTER' +
```

```
##      V1 + V98 + V68 + V84 + V36
##
##                        Df Sum of Sq      RSS    AIC
## + V91                   1     53183  6464340 2992.5
## + V90                   1     51429  6466095 2992.5
## <none>                             6517524 2992.9
## + V94                   1     42571  6474952 2992.9
## + V81                   1     39855  6477668 2993.1
## + V95                   1     39431  6478093 2993.1
## - V36                   1     49210  6566734 2993.1
## + V86                   1     34265  6483259 2993.3
## + V4                    1     32696  6484827 2993.4
## + V20                   1     32632  6484891 2993.4
## + V2                    1     31879  6485644 2993.4
## + V41                   1     30223  6487300 2993.5
## + V7                    1     30218  6487305 2993.5
## + V45                   1     27483  6490040 2993.6
## + V99                   1     23726  6493798 2993.8
## + V100                  1     23051  6494473 2993.8
## + V75                   1     21598  6495926 2993.9
## + V73                   1     21542  6495981 2993.9
## + V62                   1     21524  6495999 2993.9
## + V22                   1     21142  6496381 2993.9
## + V27                   1     20587  6496937 2994.0
## + V96                   1     18742  6498781 2994.0
## + V6                    1     18475  6499049 2994.0
## + ‘START QUARTER‘       1     18397  6499127 2994.1
## + V83                   1     17591  6499933 2994.1
## + V67                   1     17087  6500437 2994.1
## + V87                   1     15474  6502050 2994.2
## + V51                   1     15441  6502082 2994.2
## + V56                   1     14777  6502747 2994.2
## + V60                   1     13816  6503708 2994.3
## + V53                   1     13374  6504149 2994.3
## + V16                   1     12907  6504617 2994.3
## + V34                   1     11764  6505759 2994.4
## + V54                   1     11493  6506031 2994.4
## + V43                   1     11091  6506432 2994.4
## + V17                   1     11052  6506472 2994.4
## + V65                   1      9847  6507677 2994.4
## + V76                   1      8518  6509006 2994.5
## + V31                   1      8221  6509303 2994.5
## + V88                   1      7853  6509670 2994.5
## + V101                  1      6212  6511311 2994.6
## + V93                   1      5864  6511659 2994.6
## + ‘START YEAR‘          1      5486  6512037 2994.6
## + V39                   1      5066  6512458 2994.7
## + V80                   1      4824  6512699 2994.7
## + V77                   1      4745  6512779 2994.7
## + V49                   1      4630  6512894 2994.7
## + V71                   1      4209  6513314 2994.7
## + V18                   1      4135  6513389 2994.7
## + V48                   1      3573  6513951 2994.7
## + V32                   1      3466  6514058 2994.7
```

```
## + V103                  1      3408  6514116 2994.7
## + V5                    1      3351  6514173 2994.7
## + V28                   1      3026  6514498 2994.8
## + V64                   1      2995  6514529 2994.8
## + V70                   1      2765  6514758 2994.8
## + V40                   1      2722  6514801 2994.8
## + V10                   1      2649  6514875 2994.8
## + V74                   1      2464  6515059 2994.8
## + V24                   1      2428  6515095 2994.8
## + V44                   1      2363  6515161 2994.8
## + V79                   1      2335  6515189 2994.8
## + V9                    1      2228  6515296 2994.8
## + V46                   1      2068  6515455 2994.8
## + V11                   1      1931  6515593 2994.8
## + V97                   1      1686  6515838 2994.8
## + V26                   1      1585  6515939 2994.8
## + V102                  1      1543  6515981 2994.8
## + V37                   1      1535  6515989 2994.8
## + V58                   1      1448  6516076 2994.8
## + V3                    1      1386  6516138 2994.8
## + V82                   1      1305  6516218 2994.8
## + V57                   1      1298  6516226 2994.8
## + V61                   1      1290  6516233 2994.8
## + V66                   1      1011  6516512 2994.8
## + V19                   1      1003  6516521 2994.8
## + V23                   1       938  6516585 2994.9
## + V69                   1       810  6516713 2994.9
## + V42                   1       807  6516717 2994.9
## + V92                   1       627  6516896 2994.9
## + V21                   1       619  6516905 2994.9
## + V78                   1       488  6517035 2994.9
## + V14                   1       473  6517050 2994.9
## + V12                   1       470  6517053 2994.9
## + V30                   1       455  6517069 2994.9
## + V15                   1       367  6517157 2994.9
## + V47                   1       342  6517181 2994.9
## + V89                   1       338  6517185 2994.9
## + V25                   1       301  6517222 2994.9
## + V52                   1       237  6517286 2994.9
## + V33                   1       185  6517339 2994.9
## + V29                   1       165  6517358 2994.9
## + V59                   1       151  6517373 2994.9
## + V85                   1        92  6517431 2994.9
## + V50                   1        69  6517455 2994.9
## + V63                   1        68  6517455 2994.9
## + V38                   1        53  6517471 2994.9
## + V35                   1        17  6517506 2994.9
## - V55                   1    115222  6632746 2996.1
## - V98                   1    203749  6721273 3000.0
## - V84                   1    203877  6721400 3000.0
## - V68                   1    262620  6780143 3002.6
## - V1                    1    301934  6819458 3004.3
## - V13                   1    311405  6828928 3004.8
## - `COMPLETION QUARTER`  1    731938  7249462 3022.5
```

```
## - V72                         1   1752986    8270510 3061.6
## - 'COMPLETION YEAR'           1   2104765    8622289 3074.0
## - V8                          1 127030290 133547814 3887.8
##
## Step:  AIC=2992.46
## train$V104 ~ V8 + V55 + 'COMPLETION YEAR' + V72 + V13 + 'COMPLETION QUARTER' +
##     V1 + V98 + V68 + V84 + V36 + V91
##
##                     Df Sum of Sq      RSS    AIC
## + V20                1     53191  6411150 2992.0
## + V65                1     45046  6419294 2992.4
## <none>                            6464340 2992.5
## + V7                 1     41337  6423003 2992.6
## + V73                1     41104  6423236 2992.6
## - V36                1     48418  6512759 2992.7
## + V83                1     36087  6428253 2992.8
## + 'START QUARTER'    1     34537  6429803 2992.9
## - V91                1     53183  6517524 2992.9
## + V45                1     30863  6433477 2993.0
## + V2                 1     27808  6436532 2993.2
## + V94                1     27121  6437219 2993.2
## + V4                 1     25343  6438998 2993.3
## + V41                1     24174  6440166 2993.3
## + V75                1     23695  6440646 2993.4
## + V95                1     22881  6441459 2993.4
## + V6                 1     21135  6443205 2993.5
## + V90                1     19077  6445263 2993.6
## + V22                1     18306  6446034 2993.6
## + V61                1     18076  6446265 2993.6
## + V56                1     17190  6447150 2993.7
## + V18                1     16645  6447695 2993.7
## + V60                1     15234  6449107 2993.8
## + V11                1     12177  6452164 2993.9
## + V46                1     11982  6452358 2993.9
## + V54                1     11775  6452565 2993.9
## + V9                 1     11553  6452787 2993.9
## + V81                1     11489  6452851 2993.9
## + V27                1     10925  6453415 2994.0
## + V19                1     10549  6453791 2994.0
## + V34                1      9297  6455043 2994.0
## + V31                1      9227  6455113 2994.0
## + V10                1      8333  6456007 2994.1
## + V88                1      8114  6456226 2994.1
## + V40                1      7728  6456612 2994.1
## + V53                1      7656  6456685 2994.1
## + V51                1      7173  6457167 2994.1
## + V23                1      6986  6457355 2994.1
## + V77                1      6540  6457801 2994.2
## + V58                1      6262  6458079 2994.2
## + V93                1      6144  6458196 2994.2
## + V12                1      6143  6458198 2994.2
## + V100               1      5715  6458626 2994.2
## + V16                1      5553  6458788 2994.2
## + V25                1      5365  6458975 2994.2
```

```
## + 'START YEAR'       1       5104    6459236 2994.2
## + V14                1       4571    6459769 2994.2
## + V79                1       4486    6459854 2994.3
## + V86                1       4411    6459930 2994.3
## + V21                1       4269    6460071 2994.3
## + V99                1       4061    6460279 2994.3
## + V50                1       3593    6460747 2994.3
## + V5                 1       3468    6460873 2994.3
## + V15                1       3304    6461036 2994.3
## + V17                1       3243    6461098 2994.3
## + V24                1       3232    6461108 2994.3
## + V39                1       3175    6461165 2994.3
## + V47                1       3092    6461248 2994.3
## + V42                1       3053    6461287 2994.3
## + V71                1       3009    6461331 2994.3
## + V101               1       3009    6461332 2994.3
## + V30                1       2863    6461477 2994.3
## + V92                1       2825    6461515 2994.3
## + V96                1       2813    6461527 2994.3
## + V76                1       2736    6461604 2994.3
## + V82                1       2638    6461702 2994.3
## + V59                1       2298    6462042 2994.4
## + V29                1       2203    6462138 2994.4
## + V64                1       2084    6462256 2994.4
## + V57                1       1953    6462388 2994.4
## + V33                1       1942    6462398 2994.4
## + V62                1       1609    6462731 2994.4
## + V89                1       1058    6463282 2994.4
## + V3                 1        963    6463377 2994.4
## + V80                1        940    6463400 2994.4
## + V103               1        779    6463561 2994.4
## + V85                1        751    6463590 2994.4
## + V66                1        695    6463645 2994.4
## + V48                1        650    6463691 2994.4
## + V52                1        521    6463820 2994.4
## + V49                1        483    6463858 2994.4
## + V38                1        323    6464018 2994.4
## + V37                1        222    6464118 2994.4
## + V69                1        211    6464129 2994.4
## + V32                1        180    6464160 2994.5
## + V78                1        145    6464195 2994.5
## + V97                1        138    6464202 2994.5
## + V70                1         99    6464241 2994.5
## + V28                1         81    6464259 2994.5
## + V63                1         75    6464266 2994.5
## + V44                1         65    6464276 2994.5
## + V67                1         61    6464280 2994.5
## + V102               1         59    6464281 2994.5
## + V26                1         58    6464282 2994.5
## + V87                1         53    6464288 2994.5
## + V43                1         48    6464292 2994.5
## + V74                1         37    6464303 2994.5
## + V35                1          3    6464338 2994.5
## - V55                1     114400    6578740 2995.7
```

```
## - V98                     1    125310   6589650 2996.2
## - V84                     1    235451   6699792 3001.1
## - V1                      1    303564   6767905 3004.1
## - V68                     1    314621   6778961 3004.6
## - V13                     1    338262   6802602 3005.6
## - `COMPLETION QUARTER`     1    759020   7223360 3023.4
## - V72                     1   1338281   7802622 3046.3
## - `COMPLETION YEAR`        1   1992993   8457333 3070.3
## - V8                      1 126721733 133186073 3889.0
##
## Step:  AIC=2992.01
## train$V104 ~ V8 + V55 + `COMPLETION YEAR` + V72 + V13 + `COMPLETION QUARTER` +
##     V1 + V98 + V68 + V84 + V36 + V91 + V20
##
##                       Df Sum of Sq      RSS    AIC
## + V51                  1    133769  6277380 2987.7
## + V34                  1     72173  6338977 2990.6
## - V36                  1     39831  6450981 2991.8
## + V70                  1     46291  6364858 2991.9
## + V53                  1     46211  6364938 2991.9
## <none>                             6411150 2992.0
## + V7                   1     42772  6368377 2992.0
## + V95                  1     36518  6374631 2992.3
## + V45                  1     36139  6375010 2992.3
## + V32                  1     36059  6375091 2992.3
## + V39                  1     33389  6377761 2992.5
## - V20                  1     53191  6464340 2992.5
## + V27                  1     32195  6378955 2992.5
## + V94                  1     30214  6380935 2992.6
## + V17                  1     29836  6381313 2992.6
## + V18                  1     26263  6384886 2992.8
## + V2                   1     24932  6386218 2992.8
## + V6                   1     24096  6387053 2992.9
## + V73                  1     23837  6387312 2992.9
## + V31                  1     23443  6387706 2992.9
## + V75                  1     23146  6388003 2992.9
## + V90                  1     22890  6388260 2992.9
## + V56                  1     22579  6388571 2993.0
## + V41                  1     22577  6388573 2993.0
## + V83                  1     21923  6389226 2993.0
## + V89                  1     21621  6389528 2993.0
## + V65                  1     21525  6389625 2993.0
## + `START QUARTER`      1     21391  6389758 2993.0
## + V4                   1     20253  6390897 2993.1
## + V40                  1     16258  6394891 2993.3
## + V16                  1     16153  6394997 2993.3
## + V61                  1     15653  6395496 2993.3
## + V54                  1     15536  6395613 2993.3
## + V29                  1     15387  6395763 2993.3
## + V22                  1     14951  6396199 2993.3
## + V15                  1     13296  6397853 2993.4
## - V91                  1     73742  6484891 2993.4
## + V86                  1     12953  6398196 2993.4
## + V21                  1     12928  6398221 2993.4
```

107

```
## + V10                    1     12873    6398276 2993.4
## + V60                    1     10901    6400248 2993.5
## + V9                     1     10158    6400992 2993.5
## + V12                    1      9957    6401193 2993.5
## + 'START YEAR'           1      9920    6401229 2993.5
## + V88                    1      9283    6401867 2993.6
## + V48                    1      9071    6402079 2993.6
## + V67                    1      8814    6402336 2993.6
## + V14                    1      8452    6402698 2993.6
## + V87                    1      7983    6403167 2993.6
## + V47                    1      7972    6403177 2993.6
## + V103                   1      6521    6404628 2993.7
## + V50                    1      6038    6405111 2993.7
## + V25                    1      5241    6405908 2993.8
## + V59                    1      4354    6406796 2993.8
## + V81                    1      3833    6407316 2993.8
## + V66                    1      3086    6408064 2993.9
## + V96                    1      3039    6408111 2993.9
## + V74                    1      3027    6408122 2993.9
## + V5                     1      2683    6408467 2993.9
## + V101                   1      2472    6408678 2993.9
## + V76                    1      2441    6408709 2993.9
## + V58                    1      2266    6408884 2993.9
## + V79                    1      2260    6408890 2993.9
## + V80                    1      2250    6408900 2993.9
## + V82                    1      2100    6409049 2993.9
## + V33                    1      1965    6409185 2993.9
## + V85                    1      1929    6409220 2993.9
## + V24                    1      1902    6409247 2993.9
## + V52                    1      1678    6409471 2993.9
## + V71                    1      1532    6409618 2993.9
## + V69                    1      1499    6409651 2993.9
## + V38                    1      1398    6409752 2993.9
## + V46                    1      1206    6409943 2993.9
## + V102                   1       973    6410176 2994.0
## + V26                    1       951    6410199 2994.0
## + V19                    1       780    6410370 2994.0
## + V99                    1       711    6410439 2994.0
## + V28                    1       644    6410505 2994.0
## + V78                    1       588    6410561 2994.0
## + V37                    1       511    6410639 2994.0
## + V3                     1       509    6410640 2994.0
## + V42                    1       504    6410646 2994.0
## + V77                    1       384    6410766 2994.0
## + V64                    1       381    6410769 2994.0
## + V49                    1       338    6410811 2994.0
## + V30                    1       284    6410865 2994.0
## + V23                    1       254    6410896 2994.0
## + V97                    1       244    6410906 2994.0
## + V11                    1       189    6410960 2994.0
## + V35                    1       104    6411046 2994.0
## + V43                    1       103    6411047 2994.0
## + V62                    1        85    6411065 2994.0
## + V92                    1        75    6411074 2994.0
```

```
## + V93                        1        41   6411109 2994.0
## + V63                        1        37   6411112 2994.0
## + V44                        1        12   6411137 2994.0
## + V100                       1         3   6411147 2994.0
## + V57                        1         1   6411148 2994.0
## - V98                        1    101075   6512224 2994.7
## - V55                        1    102387   6513536 2994.7
## - V84                        1    191476   6602626 2998.7
## - V68                        1    291476   6702626 3003.2
## - V1                         1    292491   6703641 3003.3
## - V13                        1    362658   6773808 3006.3
## - `COMPLETION QUARTER`       1    765869   7177018 3023.5
## - V72                        1   1286133   7697283 3044.3
## - `COMPLETION YEAR`          1   1729258   8140407 3060.9
## - V8                         1 126717590 133128740 3890.9
##
## Step:  AIC=2987.74
## train$V104 ~ V8 + V55 + `COMPLETION YEAR` + V72 + V13 + `COMPLETION QUARTER` +
##     V1 + V98 + V68 + V84 + V36 + V91 + V20 + V51
##
##                         Df Sum of Sq      RSS    AIC
## + V11                     1     95999  6181381 2985.2
## + V10                     1     84173  6193207 2985.7
## - V36                     1       274  6277654 2985.8
## - V55                     1     20501  6297881 2986.7
## + V65                     1     63295  6214085 2986.7
## - V13                     1     22648  6300029 2986.8
## + V89                     1     53148  6224232 2987.2
## + V7                      1     48934  6228446 2987.4
## + V15                     1     43627  6233753 2987.7
## + V30                     1     43498  6233882 2987.7
## <none>                                 6277380 2987.7
## + V41                     1     35353  6242027 2988.1
## + V22                     1     33185  6244195 2988.2
## + V73                     1     32455  6244925 2988.2
## + V23                     1     30287  6247093 2988.3
## + V61                     1     29386  6247994 2988.3
## + V2                      1     28952  6248428 2988.4
## + V95                     1     28384  6248996 2988.4
## + V4                      1     27073  6250307 2988.5
## + V87                     1     26052  6251328 2988.5
## + V24                     1     24807  6252573 2988.6
## + V6                      1     24431  6252949 2988.6
## + V46                     1     23572  6253808 2988.6
## + V70                     1     21894  6255486 2988.7
## + V83                     1     21122  6256258 2988.7
## + V90                     1     20741  6256639 2988.8
## - V91                     1     64158  6341538 2988.8
## + V60                     1     19357  6258023 2988.8
## + `START QUARTER`         1     18927  6258453 2988.8
## + V29                     1     18656  6258724 2988.9
## + V103                    1     16730  6260650 2989.0
## + V45                     1     16075  6261305 2989.0
## + V54                     1     15976  6261404 2989.0
```

```
## + V42                1     14578   6262802 2989.1
## + 'START YEAR'        1     13778   6263602 2989.1
## + V88                 1     10568   6266813 2989.2
## - V68                 1     75386   6352766 2989.3
## + V79                 1      9190   6268190 2989.3
## + V86                 1      7467   6269913 2989.4
## + V18                 1      6705   6270675 2989.4
## + V40                 1      6650   6270730 2989.4
## + V49                 1      6340   6271040 2989.4
## + V25                 1      5981   6271399 2989.5
## + V43                 1      5729   6271651 2989.5
## + V32                 1      5344   6272036 2989.5
## + V9                  1      5184   6272196 2989.5
## + V31                 1      5100   6272280 2989.5
## + V101                1      4996   6272384 2989.5
## + V37                 1      4971   6272410 2989.5
## + V38                 1      4303   6273077 2989.5
## + V21                 1      4126   6273255 2989.5
## + V71                 1      3886   6273494 2989.6
## + V93                 1      3861   6273519 2989.6
## + V27                 1      3275   6274105 2989.6
## + V50                 1      3229   6274151 2989.6
## + V62                 1      2919   6274461 2989.6
## + V99                 1      2877   6274503 2989.6
## + V75                 1      2748   6274632 2989.6
## + V74                 1      2475   6274905 2989.6
## + V5                  1      2399   6274981 2989.6
## + V53                 1      2351   6275030 2989.6
## + V44                 1      1882   6275498 2989.7
## + V56                 1      1854   6275526 2989.7
## + V3                  1      1320   6276060 2989.7
## + V97                 1      1281   6276099 2989.7
## + V19                 1      1273   6276107 2989.7
## + V35                 1      1215   6276165 2989.7
## + V59                 1       994   6276386 2989.7
## + V14                 1       978   6276402 2989.7
## + V58                 1       947   6276433 2989.7
## + V48                 1       937   6276443 2989.7
## + V47                 1       726   6276654 2989.7
## + V66                 1       668   6276713 2989.7
## + V82                 1       642   6276738 2989.7
## + V16                 1       623   6276757 2989.7
## + V85                 1       602   6276778 2989.7
## + V80                 1       591   6276790 2989.7
## + V63                 1       580   6276800 2989.7
## + V94                 1       569   6276811 2989.7
## + V102                1       522   6276858 2989.7
## + V26                 1       520   6276860 2989.7
## + V34                 1       504   6276876 2989.7
## + V69                 1       494   6276886 2989.7
## + V81                 1       485   6276895 2989.7
## + V67                 1       477   6276903 2989.7
## + V28                 1       454   6276926 2989.7
## + V17                 1       441   6276939 2989.7
```

```
## + V77                     1        432  6276948 2989.7
## + V12                     1        295  6277085 2989.7
## + V33                     1        278  6277102 2989.7
## + V76                     1        181  6277200 2989.7
## + V100                    1        144  6277236 2989.7
## + V52                     1         64  6277316 2989.7
## + V96                     1         53  6277327 2989.7
## + V78                     1         44  6277336 2989.7
## + V57                     1         43  6277337 2989.7
## + V64                     1         36  6277344 2989.7
## + V39                     1         29  6277351 2989.7
## + V92                     1          9  6277371 2989.7
## - V51                     1     133769  6411150 2992.0
## - V20                     1     179787  6457167 2994.1
## - V98                     1     183562  6460942 2994.3
## - V84                     1     237653  6515033 2996.8
## - V1                      1     293641  6571022 2999.3
## - 'COMPLETION QUARTER'    1     754600  7031980 3019.5
## - V72                     1    1406521  7683901 3045.8
## - 'COMPLETION YEAR'       1    1751702  8029082 3058.8
## - V8                      1  126750792 133028172 3892.7
##
## Step:  AIC=2985.17
## train$V104 ~ V8 + V55 + 'COMPLETION YEAR' + V72 + V13 + 'COMPLETION QUARTER' +
##     V1 + V98 + V68 + V84 + V36 + V91 + V20 + V51 + V11
##
##                       Df Sum of Sq      RSS    AIC
## - V36                  1      5479  6186860 2983.4
## + V101                 1     73816  6107565 2983.6
## - V55                  1     21337  6202718 2984.2
## + V15                  1     58031  6123350 2984.4
## + V81                  1     51779  6129602 2984.7
## + V43                  1     44574  6136807 2985.0
## + V99                  1     43039  6138342 2985.1
## <none>                          6181381 2985.2
## + V100                 1     40764  6140617 2985.2
## + V82                  1     40513  6140868 2985.2
## + V89                  1     38183  6143198 2985.3
## + V63                  1     35598  6145782 2985.5
## + V62                  1     32260  6149121 2985.6
## + V2                   1     28694  6152687 2985.8
## + V37                  1     28596  6152785 2985.8
## + V4                   1     27643  6153738 2985.8
## + V78                  1     25786  6155595 2985.9
## + V41                  1     25483  6155898 2985.9
## + V42                  1     24407  6156974 2986.0
## + V22                  1     23017  6158364 2986.1
## + V86                  1     22585  6158796 2986.1
## + V44                  1     21222  6160159 2986.1
## + V80                  1     20464  6160917 2986.2
## + V27                  1     19899  6161482 2986.2
## + V95                  1     18443  6162937 2986.3
## + V19                  1     18323  6163058 2986.3
## + V60                  1     17636  6163745 2986.3
```

```
## + V67                   1     16184    6165197 2986.4
## + V12                   1     15926    6165455 2986.4
## + V71                   1     15909    6165472 2986.4
## + V6                    1     14780    6166601 2986.5
## + V73                   1     14650    6166731 2986.5
## + V24                   1     14520    6166861 2986.5
## + V59                   1     14260    6167121 2986.5
## + V10                   1     13857    6167524 2986.5
## + V28                   1     13035    6168346 2986.5
## + V45                   1     12617    6168763 2986.6
## + V85                   1     12569    6168812 2986.6
## + V79                   1     10801    6170580 2986.6
## + V16                   1     10412    6170969 2986.7
## + V53                   1     10406    6170975 2986.7
## + V93                   1      9877    6171504 2986.7
## + V97                   1      9823    6171558 2986.7
## + V33                   1      8985    6172396 2986.7
## + V23                   1      8868    6172513 2986.7
## + V49                   1      8782    6172598 2986.7
## + V92                   1      8067    6173314 2986.8
## + V54                   1      7524    6173857 2986.8
## + V48                   1      7391    6173990 2986.8
## + V25                   1      6782    6174599 2986.8
## + V21                   1      5978    6175403 2986.9
## + V83                   1      5924    6175457 2986.9
## + 'START QUARTER'       1      5858    6175523 2986.9
## + V40                   1      5402    6175979 2986.9
## + V34                   1      5221    6176160 2986.9
## + V65                   1      4933    6176448 2986.9
## + V32                   1      4739    6176642 2986.9
## + V57                   1      4292    6177089 2987.0
## + V70                   1      4139    6177242 2987.0
## + V87                   1      3704    6177677 2987.0
## + V9                    1      3696    6177685 2987.0
## + V5                    1      3630    6177751 2987.0
## + V35                   1      3060    6178321 2987.0
## + V52                   1      3031    6178350 2987.0
## + V7                    1      2999    6178382 2987.0
## + V64                   1      2544    6178837 2987.0
## + V26                   1      2402    6178979 2987.1
## + V102                  1      2377    6179004 2987.1
## + V56                   1      2198    6179183 2987.1
## + V46                   1      2145    6179236 2987.1
## + V66                   1      1885    6179496 2987.1
## + V50                   1      1771    6179610 2987.1
## + V76                   1      1744    6179637 2987.1
## + V38                   1      1649    6179732 2987.1
## + V47                   1      1616    6179765 2987.1
## + V3                    1      1385    6179996 2987.1
## + V75                   1      1257    6180124 2987.1
## + V69                   1       924    6180457 2987.1
## + V74                   1       856    6180525 2987.1
## + V61                   1       843    6180537 2987.1
## + V29                   1       759    6180622 2987.1
```

```
## + V103                     1       680   6180701 2987.1
## + V88                      1       636   6180745 2987.1
## + V77                      1       616   6180765 2987.1
## + V30                      1       603   6180778 2987.1
## + V17                      1       555   6180826 2987.1
## + V90                      1       467   6180914 2987.1
## + V18                      1       325   6181056 2987.2
## + V96                      1       133   6181248 2987.2
## + V39                      1       115   6181266 2987.2
## + V14                      1        62   6181319 2987.2
## + V31                      1        60   6181321 2987.2
## + 'START YEAR'             1        11   6181370 2987.2
## + V94                      1         0   6181381 2987.2
## + V58                      1         0   6181381 2987.2
## - V11                      1     95999   6277380 2987.7
## - V68                      1     97610   6278991 2987.8
## - V13                      1     98254   6279635 2987.8
## - V91                      1     99473   6280854 2987.9
## - V98                      1    161559   6342940 2990.8
## - V20                      1    198610   6379991 2992.6
## - V51                      1    229579   6410960 2994.0
## - V1                       1    271882   6453263 2996.0
## - V84                      1    332963   6514344 2998.7
## - 'COMPLETION QUARTER'     1    850514   7031895 3021.5
## - V72                      1   1423121   7604502 3044.7
## - 'COMPLETION YEAR'        1   1593315   7774696 3051.3
## - V8                       1 126838153 133019534 3894.6
##
## Step:  AIC=2983.43
## train$V104 ~ V8 + V55 + 'COMPLETION YEAR' + V72 + V13 + 'COMPLETION QUARTER' +
##     V1 + V98 + V68 + V84 + V91 + V20 + V51 + V11
##
##                          Df Sum of Sq      RSS    AIC
## - V55                     1     23913   6210773 2982.6
## + V101                    1     48603   6138257 2983.1
## + V43                     1     47005   6139855 2983.2
## <none>                                  6186860 2983.4
## + V99                     1     35326   6151534 2983.7
## + V81                     1     31084   6155776 2983.9
## + V37                     1     30884   6155976 2983.9
## + V2                      1     27146   6159714 2984.1
## + V4                      1     26094   6160766 2984.2
## + V100                    1     25420   6161440 2984.2
## + V62                     1     25332   6161528 2984.2
## + V27                     1     24937   6161923 2984.2
## + V41                     1     24700   6162160 2984.2
## + V63                     1     23700   6163160 2984.3
## + V15                     1     23430   6163430 2984.3
## + V89                     1     23160   6163700 2984.3
## + V22                     1     22675   6164185 2984.3
## + V82                     1     22528   6164332 2984.3
## + V42                     1     21295   6165565 2984.4
## + V95                     1     19955   6166905 2984.5
## + V73                     1     19813   6167047 2984.5
```

```
## + V78                     1     18805   6168055 2984.5
## + V45                     1     17506   6169354 2984.6
## + V10                     1     17348   6169512 2984.6
## + V19                     1     17322   6169538 2984.6
## + V60                     1     16738   6170122 2984.6
## + V6                      1     15863   6170997 2984.7
## + V86                     1     15670   6171190 2984.7
## + V71                     1     15627   6171233 2984.7
## + V67                     1     15198   6171662 2984.7
## + V93                     1     14112   6172748 2984.8
## + V16                     1     13289   6173571 2984.8
## + V44                     1     12702   6174158 2984.8
## + V12                     1     11558   6175302 2984.9
## + V79                     1     10389   6176471 2984.9
## + V83                     1     10269   6176591 2984.9
## + 'START QUARTER'         1      9936   6176924 2985.0
## + V92                     1      9740   6177120 2985.0
## + V28                     1      9716   6177144 2985.0
## + V59                     1      9609   6177251 2985.0
## + V65                     1      8997   6177863 2985.0
## + V80                     1      8972   6177888 2985.0
## + V49                     1      8666   6178194 2985.0
## + V48                     1      8232   6178628 2985.0
## + V54                     1      8174   6178686 2985.0
## + V24                     1      7979   6178881 2985.0
## + V23                     1      7871   6178989 2985.1
## + V97                     1      6949   6179911 2985.1
## + V33                     1      6689   6180171 2985.1
## + V53                     1      6159   6180701 2985.1
## + V85                     1      5583   6181277 2985.2
## + V36                     1      5479   6181381 2985.2
## + V7                      1      5164   6181696 2985.2
## + V34                     1      3996   6182864 2985.2
## + V26                     1      3943   6182917 2985.2
## + V102                    1      3919   6182941 2985.2
## + V21                     1      3515   6183345 2985.3
## + V74                     1      3078   6183782 2985.3
## + V5                      1      3029   6183831 2985.3
## + V25                     1      2793   6184067 2985.3
## + V17                     1      2707   6184153 2985.3
## + V46                     1      2513   6184347 2985.3
## + V40                     1      2455   6184405 2985.3
## + V57                     1      2121   6184739 2985.3
## + V38                     1      1699   6185161 2985.3
## + V64                     1      1663   6185197 2985.3
## + V47                     1      1350   6185510 2985.4
## + V76                     1      1264   6185596 2985.4
## + V50                     1      1181   6185679 2985.4
## + V88                     1      1101   6185759 2985.4
## + V3                      1      1009   6185851 2985.4
## + V94                     1       922   6185938 2985.4
## + V87                     1       849   6186011 2985.4
## + V70                     1       698   6186162 2985.4
## + V9                      1       683   6186177 2985.4
```

```
## + V77                     1        654   6186206 2985.4
## + V66                     1        633   6186227 2985.4
## + V35                     1        487   6186373 2985.4
## + V56                     1        280   6186580 2985.4
## + V90                     1        184   6186676 2985.4
## + V29                     1        164   6186696 2985.4
## + V69                     1        110   6186750 2985.4
## + V96                     1        109   6186750 2985.4
## + V14                     1         95   6186765 2985.4
## + V18                     1         86   6186774 2985.4
## + V103                    1         80   6186780 2985.4
## + V61                     1         67   6186793 2985.4
## + 'START YEAR'            1         56   6186804 2985.4
## + V39                     1         49   6186811 2985.4
## + V75                     1         38   6186822 2985.4
## + V32                     1         34   6186826 2985.4
## + V31                     1         19   6186841 2985.4
## + V58                     1          9   6186851 2985.4
## + V52                     1          9   6186851 2985.4
## + V30                     1          3   6186857 2985.4
## - V11                     1      90794   6277654 2985.8
## - V91                     1      96904   6283764 2986.0
## - V13                     1     104127   6290987 2986.4
## - V68                     1     108607   6295467 2986.6
## - V98                     1     157415   6344275 2988.9
## - V20                     1     203604   6390464 2991.0
## - V51                     1     263252   6450112 2993.8
## - V1                      1     272460   6459320 2994.2
## - V84                     1     329144   6516004 2996.8
## - 'COMPLETION QUARTER'    1     850470   7037330 3019.7
## - V72                     1    1422057   7608917 3042.9
## - 'COMPLETION YEAR'       1    1605910   7792770 3050.0
## - V8                      1  126860570 133047430 3892.7
##
## Step:  AIC=2982.57
## train$V104 ~ V8 + 'COMPLETION YEAR' + V72 + V13 + 'COMPLETION QUARTER' +
##     V1 + V98 + V68 + V84 + V91 + V20 + V51 + V11
##
##                    Df Sum of Sq      RSS    AIC
## <none>                            6210773 2982.6
## + V89               1      37762  6173011 2982.8
## + V93               1      36924  6173849 2982.8
## + V10               1      36908  6173865 2982.8
## + V37               1      34067  6176706 2982.9
## + V43               1      29004  6181769 2983.2
## + V62               1      27863  6182911 2983.2
## + V2                1      27840  6182933 2983.2
## + V16               1      26975  6183798 2983.3
## + V41               1      26907  6183866 2983.3
## + V4                1      26763  6184010 2983.3
## + V22               1      26144  6184629 2983.3
## + V92               1      26115  6184658 2983.3
## + V55               1      23913  6186860 2983.4
## + V42               1      20927  6189847 2983.6
```

```
## + V15                    1     20650    6190124 2983.6
## + V67                    1     19700    6191073 2983.6
## + V81                    1     19635    6191139 2983.6
## + V101                   1     18897    6191876 2983.7
## + V53                    1     18636    6192137 2983.7
## + V95                    1     18541    6192232 2983.7
## + V60                    1     18124    6192650 2983.7
## + V86                    1     17909    6192864 2983.7
## + V73                    1     17808    6192966 2983.7
## + V19                    1     17491    6193282 2983.7
## + V64                    1     17343    6193430 2983.7
## + V6                     1     16662    6194111 2983.8
## + V17                    1     15915    6194858 2983.8
## + V26                    1     15178    6195595 2983.8
## + V102                   1     15146    6195627 2983.8
## + V45                    1     13829    6196944 2983.9
## + V99                    1     13812    6196962 2983.9
## + V78                    1     12049    6198725 2984.0
## + V79                    1     11970    6198803 2984.0
## + V83                    1     11278    6199495 2984.0
## + V7                     1     10950    6199823 2984.1
## + 'START QUARTER'        1     10519    6200254 2984.1
## + V70                    1     10428    6200346 2984.1
## + V27                    1     10392    6200381 2984.1
## + V33                    1      9238    6201535 2984.1
## + V46                    1      8791    6201983 2984.2
## + V36                    1      8055    6202718 2984.2
## + V82                    1      7128    6203646 2984.2
## + V29                    1      7024    6203749 2984.2
## + V100                   1      6602    6204171 2984.3
## + V34                    1      6453    6204320 2984.3
## + V56                    1      6389    6204384 2984.3
## + V12                    1      6385    6204388 2984.3
## + V103                   1      5933    6204840 2984.3
## + V63                    1      5133    6205640 2984.3
## + V59                    1      4882    6205891 2984.3
## + V76                    1      4751    6206022 2984.3
## + V54                    1      3894    6206879 2984.4
## + V65                    1      3881    6206892 2984.4
## + V88                    1      3880    6206893 2984.4
## + V5                     1      3820    6206953 2984.4
## + V94                    1      3627    6207146 2984.4
## + V74                    1      3325    6207449 2984.4
## + V85                    1      3254    6207519 2984.4
## + V28                    1      3050    6207723 2984.4
## + V30                    1      3043    6207731 2984.4
## + V18                    1      2623    6208151 2984.4
## + V21                    1      2560    6208213 2984.5
## + V52                    1      2517    6208256 2984.5
## + V97                    1      2145    6208628 2984.5
## + V57                    1      1909    6208864 2984.5
## + V48                    1      1848    6208925 2984.5
## + V39                    1      1816    6208957 2984.5
## + V47                    1      1614    6209159 2984.5
```

```
## + V44                           1      1481    6209293 2984.5
## + V80                           1      1478    6209295 2984.5
## + V66                           1      1279    6209494 2984.5
## + V49                           1      1257    6209516 2984.5
## + V3                            1      1216    6209557 2984.5
## + V40                           1      1050    6209723 2984.5
## + V35                           1       984    6209789 2984.5
## + V38                           1       926    6209847 2984.5
## + V50                           1       870    6209903 2984.5
## + V24                           1       809    6209964 2984.5
## + V87                           1       680    6210093 2984.5
## + V61                           1       409    6210364 2984.6
## + 'START YEAR'                  1       376    6210397 2984.6
## + V58                           1       327    6210446 2984.6
## + V90                           1       203    6210570 2984.6
## + V77                           1       199    6210574 2984.6
## + V96                           1       196    6210577 2984.6
## + V25                           1       191    6210582 2984.6
## + V23                           1        66    6210707 2984.6
## + V32                           1        59    6210715 2984.6
## + V71                           1        50    6210723 2984.6
## + V69                           1        49    6210724 2984.6
## + V31                           1         2    6210771 2984.6
## + V14                           1         2    6210771 2984.6
## + V9                            1         1    6210773 2984.6
## + V75                           1         0    6210773 2984.6
## - V68                           1     85983    6296757 2984.7
## - V11                           1     87108    6297881 2984.7
## - V91                           1     95897    6306670 2985.1
## - V13                           1    125413    6336186 2986.5
## - V98                           1    172274    6383047 2988.7
## - V1                            1    265214    6475987 2993.0
## - V20                           1    282131    6492904 2993.8
## - V84                           1    313851    6524624 2995.2
## - V51                           1    337825    6548598 2996.3
## - 'COMPLETION QUARTER'          1    849370    7060143 3018.6
## - 'COMPLETION YEAR'             1   1585633    7796406 3048.1
## - V72                           1   1948689    8159462 3061.6
## - V8                            1 127663732 133874505 3892.5
```

```
end_time <- Sys.time()
step.time <- end_time - start_time
```

```
back.time
```

```
## Time difference of 9.12432 secs
```

```
step.time
```

```
## Time difference of 0.858753 secs
```

```
summary(back.model)
```

```
##
## Call:
## lm(formula = train$V104 ~ `START YEAR` + `COMPLETION YEAR` +
##     `COMPLETION QUARTER` + V1 + V2 + V3 + V5 + V6 + V8 + V11 +
##     V13 + V14 + V15 + V19 + V23 + V26 + V32 + V34 + V37 + V38 +
##     V40 + V42 + V44 + V45 + V46 + V47 + V48 + V51 + V57 + V64,
##     data = train)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -758.90  -57.58   -6.91   54.69  595.83
##
## Coefficients:
##                       Estimate Std. Error t value Pr(>|t|)
## (Intercept)          1.833e+04  3.670e+03   4.993 1.07e-06 ***
## `START YEAR`        -4.029e+02  5.797e+01  -6.950 2.82e-11 ***
## `COMPLETION YEAR`    1.205e+02  1.851e+01   6.509 3.75e-10 ***
## `COMPLETION QUARTER` 5.284e+01  9.252e+00   5.711 3.00e-08 ***
## V1                  -5.901e+00  2.175e+00  -2.713 0.007095 **
## V2                   5.595e-02  1.714e-02   3.264 0.001243 **
## V3                  -1.871e-01  6.209e-02  -3.014 0.002830 **
## V5                  -6.669e-01  3.108e-01  -2.145 0.032823 *
## V6                   8.986e-02  5.827e-02   1.542 0.124245
## V8                   1.186e+00  1.770e-02  67.003  < 2e-16 ***
## V11                  6.019e+00  3.759e+00   1.601 0.110489
## V13                 -4.010e-03  8.878e-04  -4.516 9.47e-06 ***
## V14                 -4.645e-02  1.909e-02  -2.434 0.015596 *
## V15                 -8.920e+00  1.861e+00  -4.794 2.73e-06 ***
## V19                  2.008e-01  1.315e-01   1.527 0.127993
## V23                  4.228e+01  9.211e+00   4.590 6.85e-06 ***
## V26                  1.109e-02  2.196e-03   5.051 8.19e-07 ***
## V32                  1.982e-03  1.044e-03   1.899 0.058644 .
## V34                 -5.096e+00  2.445e+00  -2.084 0.038103 *
## V37                  7.958e+01  2.194e+01   3.627 0.000343 ***
## V38                  3.651e-01  1.534e-01   2.380 0.017999 *
## V40                 -1.652e-02  9.404e-03  -1.757 0.080102 .
## V42                  2.475e+01  9.345e+00   2.648 0.008579 **
## V44                 -1.797e-02  8.108e-03  -2.217 0.027480 *
## V45                  9.654e-03  1.778e-03   5.430 1.27e-07 ***
## V46                 -5.620e-04  2.190e-04  -2.566 0.010846 *
## V47                  3.509e-02  1.430e-02   2.454 0.014756 *
## V48                 -5.073e+01  5.532e+00  -9.171  < 2e-16 ***
## V51                  5.589e-03  1.404e-03   3.982 8.84e-05 ***
## V57                  2.627e-01  1.195e-01   2.198 0.028825 *
## V64                  7.478e-03  2.055e-03   3.639 0.000329 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 147 on 266 degrees of freedom
## Multiple R-squared:  0.987,  Adjusted R-squared:  0.9856
## F-statistic: 675.8 on 30 and 266 DF,  p-value: < 2.2e-16
```

```
summary(step.model)
```

```
##
## Call:
## lm(formula = train$V104 ~ V8 + 'COMPLETION YEAR' + V72 + V13 +
##     'COMPLETION QUARTER' + V1 + V98 + V68 + V84 + V91 + V20 +
##     V51 + V11, data = train)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -873.81  -53.74   -5.77   46.04  644.26
##
## Coefficients:
##                        Estimate Std. Error t value Pr(>|t|)
## (Intercept)          -8.230e+03  9.888e+02  -8.323 3.70e-15 ***
## V8                    1.176e+00  1.541e-02  76.270  < 2e-16 ***
## 'COMPLETION YEAR'     1.137e+02  1.337e+01   8.500 1.10e-15 ***
## V72                  -1.201e+01  1.275e+00  -9.423  < 2e-16 ***
## V13                  -1.370e-03  5.731e-04  -2.391 0.017479 *
## 'COMPLETION QUARTER'  5.455e+01  8.768e+00   6.221 1.77e-09 ***
## V1                   -6.311e+00  1.815e+00  -3.476 0.000588 ***
## V98                  -4.167e-02  1.487e-02  -2.802 0.005433 **
## V68                  -5.913e+00  2.987e+00  -1.979 0.048743 *
## V84                   5.312e-04  1.405e-04   3.782 0.000190 ***
## V91                   3.481e+00  1.665e+00   2.090 0.037477 *
## V20                  -3.363e-01  9.380e-02  -3.585 0.000396 ***
## V51                   2.764e-03  7.045e-04   3.923 0.000110 ***
## V11                  -4.033e+00  2.025e+00  -1.992 0.047301 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 148.1 on 283 degrees of freedom
## Multiple R-squared:  0.986,  Adjusted R-squared:  0.9854
## F-statistic:  1534 on 13 and 283 DF,  p-value: < 2.2e-16
```

In terms of time, the stepwise model outperforms the backwards selection model by ~10 seconds. With backwards selection taking 14.00931 secs and stepwise selection taking 4.92289 secs. This time difference really shows how effective each method is with a large dataset as it might be preferable to go with one that performs quicker when facing a much larger dataset. The back.model keeps a lot more of the variables even when they don't have a high level of significance. The residuals are closer to zero but do not show a complete symmetry and still display a high level of difference from the actual variable's vs the predicted. There are 14 variables that show a very high level of significance, 4 variables that show a high level of significance and 8 variables to show a medium level of significance. V8 and V48 show the highest level of significance. The adjusted R-squared variable is 0.9856 which is very close to 1 which is showing that the model is performing very well.

In contrast, the stepwise selection reduces the number of variables significant and all variables on display have a degree of significance. V8 and V72 are the variables with the highest level of significance here. The residuals do have a larger area of error though but still are not symmetrical. The adjusted R-squared is 0.9854 which is 0.0002 lower than the backwards selection method, and the F-statistic is much higher which is relatively larger than 1 given the size of our data. This shows that there is a relationship between the predictor and the response variables.

Holdout MSE's:

```
new.back <- predict(back.model, test)
back.mean <- mean((new.back - test$V104)**2)
back.mean
```

```
## [1] 28122.6
```

```
rmse.back <- sqrt(back.mean)
new.step <- predict(step.model, test)
step.mean <- mean((new.step - test$V104)**2)
rmse.step <- sqrt(step.mean)
step.mean
```

```
## [1] 22287.91
```

The backwards selection model has a much higher holdout MSE in comparison to the stepwise selection holdout MSE. 28122.6 for the backwards selection and 22287.91 for the stepwise selection, this means that the stepwise selection model has performed better than the backwards selection model as the observed and predicted values are closer to one another in the stepwise model.

```
trControl <- trainControl(method="cv",
                          number = 10,
                          search = "random")

caret_model <- train(V104~.,
                     resdat,
                     method="glmStepAIC",
                     direction="backward",
                     trace = F,
                     trControl=trControl)
caret_model
```

```
## Generalized Linear Model with Stepwise Feature Selection
##
## 372 samples
## 107 predictors
##
## No pre-processing
## Resampling: Cross-Validated (10 fold)
## Summary of sample sizes: 334, 335, 336, 334, 335, 335, ...
## Resampling results:
##
##   RMSE      Rsquared   MAE
##   177.7271  0.9822755  107.8134
```

```
caret_model2 <- train(V104~.,
                      resdat,
                      method="glmStepAIC",
                      direction="both",
```

```
                        trace = F,
                        trControl=trControl)

caret_model2
```

```
## Generalized Linear Model with Stepwise Feature Selection
##
## 372 samples
## 107 predictors
##
## No pre-processing
## Resampling: Cross-Validated (10 fold)
## Summary of sample sizes: 334, 334, 335, 335, 335, 335, ...
## Resampling results:
##
##   RMSE      Rsquared   MAE
##   167.4489  0.9813028  103.6749
```

Cross-Validation MSE's:

```
as.numeric((caret_model$results[2])**2)
```

```
## [1] 31586.92
```

```
as.numeric((caret_model2$results[2])**2)
```

```
## [1] 28039.12
```

Backwards Selection Cross-Validation MSE: 31586.92 Stepwise Selection Cross-Validation MSE: 28039.12

From the cross validation using caret, we can receive the RMSE for each model. For the backward selection the RMSE is 177.721 and for the stepwise selection the RMSE is 167.4489, squaring these values gives us their respected cross validation MSE. 31586.92 and 28039.12, once again the stepwise model has a much smaller MSE which means that it's model has performed better than the backwards selection model.

Overall, it seems like the stepwise selection model is a better choice for this model as it has a smaller error across all MSE's and is much faster than the backwards selection model. It does have a lower R-squared value but it is only by a small amount so can be easily argued that the pro's outweigh the con's.

d)

```
set.seed(12)

tunegrid <- expand.grid(alpha = 0, lambda = 10**(seq(3,-1,length=100)))
start_time <- Sys.time()
ridge.model <- train(V104~.,
                     train,
                     method="glmnet",
                     tuneGrid = tunegrid,
```

```
                    selectionFunction = "best",
                    trControl=trControl)
end_time <- Sys.time()
ridge.time <- end_time - start_time

tunegrid1 <- expand.grid(alpha = 1, lambda = 10**(seq(3,-1,length=100)))

start_time <- Sys.time()
lasso.model <- train(V104~.,
                     train,
                     method="glmnet",
                     tuneGrid = tunegrid1,
                     selectionFunction = "best",
                     trControl=trControl)
end_time <- Sys.time()
lasso.time <- end_time - start_time



ridge.time
```

```
## Time difference of 1.082597 secs
```

```
lasso.time
```

```
## Time difference of 0.7394922 secs
```

In comparison to the results in part c) these times are much shorter, 1.154985 secs for ridge regression and 0.8203158 secs for lasso time. The code is much cleaner to run and is easier to interpret.

```
num <- coef(ridge.model$finalModel, ridge.model$bestTune$lambda)
num2 <- coef(lasso.model$finalModel, lasso.model$bestTune$lambda)

num
```

```
## 108 x 1 sparse Matrix of class "dgCMatrix"
##                                s1
## (Intercept)          -7.501861e+02
## `START YEAR`          2.510191e+00
## `START QUARTER`      -7.150090e+00
## `COMPLETION YEAR`     3.786535e+00
## `COMPLETION QUARTER`  7.555300e+00
## V1                   -2.321801e+01
## V2                    1.485135e-02
## V3                   -4.750277e-02
## V4                    6.255979e-02
## V5                    7.974651e-01
## V6                   -1.363911e-01
## V7                    2.822131e+01
## V8                    8.658384e-01
## V9                    1.275262e-02
## V10                  -6.393245e-02
## V11                  -5.917742e-03
```

```
## V12                  -4.892875e-01
## V13                   2.305658e-05
## V14                  -3.081236e-03
## V15                  -6.539563e-02
## V16                   1.974724e-01
## V17                   1.374340e-03
## V18                  -1.132925e+01
## V19                   1.453441e-03
## V20                  -5.918106e-03
## V21                   3.095582e-03
## V22                   2.227604e-04
## V23                   2.533680e-02
## V24                  -9.017303e-02
## V25                  -1.141441e-03
## V26                   2.170900e-04
## V27                   2.538532e-05
## V28                   1.240455e-02
## V29                  -1.784001e-01
## V30                  -1.445548e-01
## V31                   7.638133e+00
## V32                   2.692670e-05
## V33                  -3.050857e-03
## V34                  -2.151421e-01
## V35                   5.123342e-02
## V36                   1.668386e-03
## V37                   1.020541e+01
## V38                   1.881144e-03
## V39                   5.587988e-04
## V40                   1.219895e-03
## V41                  -4.730780e-03
## V42                  -1.534564e-02
## V43                  -3.370835e-02
## V44                   3.329773e-03
## V45                   8.943010e-04
## V46                   6.356725e-06
## V47                   1.481410e-02
## V48                  -1.783829e-01
## V49                  -3.616726e-01
## V50                  -8.730995e+00
## V51                   3.090379e-05
## V52                  -1.178751e-02
## V53                  -5.595702e-01
## V54                   2.297016e-01
## V55                   3.624314e-03
## V56                   5.148927e+00
## V57                  -8.559074e-03
## V58                  -1.105433e-02
## V59                   2.719646e-03
## V60                   2.596483e-03
## V61                  -1.249974e-02
## V62                   1.204498e-01
## V63                   7.611788e-04
## V64                   2.008063e-05
## V65                   2.192704e-05
```

```
## V66                      2.597240e-03
## V67                     -7.689958e-02
## V68                     -3.437965e-01
## V69                     -2.196629e+01
## V70                      2.102112e-05
## V71                     -9.833252e-03
## V72                     -9.378183e-01
## V73                      1.870296e-01
## V74                      4.104264e-03
## V75                     -6.847868e-01
## V76                      1.426477e-02
## V77                     -1.427477e-02
## V78                      4.664610e-03
## V79                      2.052880e-05
## V80                      1.185802e-01
## V81                      2.453534e-01
## V82                      2.898081e-03
## V83                     -6.985845e-04
## V84                      2.590784e-05
## V85                      8.123139e-03
## V86                      7.425566e-02
## V87                      1.564679e-02
## V88                     -6.746568e-01
## V89                      7.869847e-06
## V90                     -1.215952e-02
## V91                     -6.332008e-01
## V92                     -1.570981e-01
## V93                      6.454730e-05
## V94                      2.431030e+01
## V95                      2.151772e-02
## V96                     -1.739229e-02
## V97                      5.160932e-03
## V98                     -2.735096e-03
## V99                      1.570824e-01
## V100                     1.947009e-01
## V101                     8.001796e-03
## V102                     3.303755e-04
## V103                    -4.410373e-06
```

```
ridge.model$bestTune$lambda
```

```
## [1] 107.2267
```

```
num2
```

```
## 108 x 1 sparse Matrix of class "dgCMatrix"
##                                    s1
## (Intercept)           -4.259052e+02
## `START YEAR`              .
## `START QUARTER`          .
## `COMPLETION YEAR`        .
## `COMPLETION QUARTER`  1.438830e+01
## V1                   -6.326881e+00
```

```
## V2                      3.676757e-03
## V3                      .
## V4                      1.714331e-03
## V5                      .
## V6                      .
## V7                      2.805820e+01
## V8                      1.151110e+00
## V9                      1.443545e-02
## V10                     .
## V11                     .
## V12                     .
## V13                     .
## V14                     .
## V15                     .
## V16                     9.083374e-02
## V17                     2.829994e-03
## V18                     .
## V19                     .
## V20                     .
## V21                     7.320343e-03
## V22                     .
## V23                     .
## V24                     .
## V25                     .
## V26                     .
## V27                     .
## V28                     .
## V29                     .
## V30                     .
## V31                     .
## V32                     .
## V33                     .
## V34                     .
## V35                     1.585931e-01
## V36                     1.065598e-03
## V37                     .
## V38                     .
## V39                     .
## V40                     .
## V41                     .
## V42                     .
## V43                     .
## V44                     1.402153e-02
## V45                     .
## V46                     .
## V47                     1.168803e-04
## V48                     .
## V49                     .
## V50                     .
## V51                     .
## V52                     -2.459218e-03
## V53                     .
## V54                     1.666182e-02
## V55                     5.262375e-03
```

```
## V56                       .
## V57                       .
## V58                       .
## V59                       .
## V60                       .
## V61                       .
## V62                       .
## V63                       .
## V64                       .
## V65                       .
## V66                       .
## V67                       .
## V68                       .
## V69                       .
## V70                       .
## V71              -7.782785e-03
## V72              -5.276760e+00
## V73                       .
## V74               4.770922e-03
## V75                       .
## V76                       .
## V77                       .
## V78               4.733004e-03
## V79                       .
## V80                       .
## V81                       .
## V82                       .
## V83                       .
## V84                       .
## V85                       .
## V86                       .
## V87                       .
## V88                       .
## V89                       .
## V90                       .
## V91                       .
## V92                       .
## V93                       .
## V94               2.456750e+01
## V95                       .
## V96                       .
## V97               4.364952e-03
## V98                       .
## V99                       .
## V100                      .
## V101                      .
## V102                      .
## V103                      .
```

```
lasso.model$bestTune$lambda
```

```
## [1] 4.977024
```

The dot's present in the outcomes means that the lasso regression "pushed" them out as they didn't provide

enough new information and therefore are more highly correlated to another variable. This is an interesting contrast as the ridge regression kept all variables. The variables with negative numbers are where V104 will lower as those values get higher, and the high coefficients are where V104 will raise as they raise.

A lambda of 107.2267 was chosen to be the best fit for the ridge regression whereas a lambda of 4.977024 was chosen for the lasso regression.

Holdout MSE's:

```
new.ridge <- predict(ridge.model, test)
ridge.mean <- mean((new.ridge - test$V104)**2)
ridge.mean
```

```
## [1] 53269.94
```

```
rmse.ridge <- sqrt(ridge.mean)

new.lasso <- predict(lasso.model, test)
lasso.mean <- mean((new.lasso - test$V104)**2)
lasso.mean
```

```
## [1] 21675.82
```

```
rmse.lasso <- sqrt(lasso.mean)
```

The holdout MSE's display a very large difference, the Ridge regression has a holdout MSE of 53269.94 whereas the Lasso regression has a holdout MSE of 21675.82. This correlates with the amount of variables that Lasso pushed out as it didn't keep the variables not important to the model which reduced the error significantly in contrast. The Lasso holdout MSE, is around the same values as the holdout MSE's in part c), but is still less than both of them.

Cross-Validation MSE's:

```
ridgeresults <- getTrainPerf(ridge.model)
lassoresults <- getTrainPerf(lasso.model)


ridgeresults
```

```
##   TrainRMSE TrainRsquared TrainMAE method
## 1  243.0771     0.9669287 167.3756 glmnet
```

```
lassoresults
```

```
##   TrainRMSE TrainRsquared TrainMAE method
## 1  175.0348     0.9845112 103.4267 glmnet
```

```
as.numeric(ridgeresults$TrainRMSE**2)
```

```
## [1] 59086.48
```

```
as.numeric(lassoresults$TrainRMSE**2)
```

```
## [1] 30637.19
```

Once again, the ridge regression cross validation MSE is much higher than the Lasso regression cross validation MSE, with 59086.48 and 30637.19 respectively. Although the Lasso is still within the MSE's in part c) it isn't the lowest MSE of all the models performed.

Overall, the Lasso model has outperformed the Ridge regression, lasso tends to make coefficients to absolute zero in comparison to Ridge which never leads to a coefficient being zero, it only minimises it. This means that Ridge regression is not good for feature reduction. Finally, we would say that Lasso regression has performed the best out of all the models due to its speed, low MSE's and relative ease to understand.

Question 2

a)

```
data = read.csv('parkinsons.csv')

X=model.matrix(UPDRS~.,data=data)[,c(-1,-2)]
y <- data$UPDRS

X <- scale(X)

set.seed(12)
train_ind <- sample(seq_len(nrow(X)), size = 30)
train = X[train_ind,]
test = X[-train_ind,]
linear.mod = lm(y[train_ind] ~ train)
summary(linear.mod)
```

```
##
## Call:
## lm(formula = y[train_ind] ~ train)
##
## Residuals:
## ALL 30 residuals are 0: no residual degrees of freedom!
##
## Coefficients: (68 not defined because of singularities)
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)     22.11        NaN     NaN      NaN
## trainX1        967.97        NaN     NaN      NaN
## trainX2         49.18        NaN     NaN      NaN
## trainX3       -154.82        NaN     NaN      NaN
## trainX4       -249.00        NaN     NaN      NaN
```

```
## trainX5         748.24       NaN   NaN   NaN
## trainX6        -340.57       NaN   NaN   NaN
## trainX7        -300.64       NaN   NaN   NaN
## trainX8        -149.59       NaN   NaN   NaN
## trainX9         253.05       NaN   NaN   NaN
## trainX10        153.20       NaN   NaN   NaN
## trainX11       -472.39       NaN   NaN   NaN
## trainX12        330.68       NaN   NaN   NaN
## trainX13      -6861.59       NaN   NaN   NaN
## trainX14      -8394.52       NaN   NaN   NaN
## trainX15       1309.72       NaN   NaN   NaN
## trainX16      28313.33       NaN   NaN   NaN
## trainX17      -4838.71       NaN   NaN   NaN
## trainX18         20.79       NaN   NaN   NaN
## trainX19       -464.94       NaN   NaN   NaN
## trainX20       -207.91       NaN   NaN   NaN
## trainX21         57.81       NaN   NaN   NaN
## trainX22       -103.17       NaN   NaN   NaN
## trainX23        -82.11       NaN   NaN   NaN
## trainX24        -17.48       NaN   NaN   NaN
## trainX25       6670.76       NaN   NaN   NaN
## trainX26       8572.09       NaN   NaN   NaN
## trainX27      -1428.96       NaN   NaN   NaN
## trainX28     -28126.50       NaN   NaN   NaN
## trainX29       4826.72       NaN   NaN   NaN
## trainX30            NA        NA    NA    NA
## trainX31            NA        NA    NA    NA
## trainX32            NA        NA    NA    NA
## trainX33            NA        NA    NA    NA
## trainX34            NA        NA    NA    NA
## trainX35            NA        NA    NA    NA
## trainX36            NA        NA    NA    NA
## trainX37            NA        NA    NA    NA
## trainX38            NA        NA    NA    NA
## trainX39            NA        NA    NA    NA
## trainX40            NA        NA    NA    NA
## trainX41            NA        NA    NA    NA
## trainX42            NA        NA    NA    NA
## trainX43            NA        NA    NA    NA
## trainX44            NA        NA    NA    NA
## trainX45            NA        NA    NA    NA
## trainX46            NA        NA    NA    NA
## trainX47            NA        NA    NA    NA
## trainX48            NA        NA    NA    NA
## trainX49            NA        NA    NA    NA
## trainX50            NA        NA    NA    NA
## trainX51            NA        NA    NA    NA
## trainX52            NA        NA    NA    NA
## trainX53            NA        NA    NA    NA
## trainX54            NA        NA    NA    NA
## trainX55            NA        NA    NA    NA
## trainX56            NA        NA    NA    NA
## trainX57            NA        NA    NA    NA
## trainX58            NA        NA    NA    NA
```

```
## trainX59              NA         NA        NA        NA
## trainX60              NA         NA        NA        NA
## trainX61              NA         NA        NA        NA
## trainX62              NA         NA        NA        NA
## trainX63              NA         NA        NA        NA
## trainX64              NA         NA        NA        NA
## trainX65              NA         NA        NA        NA
## trainX66              NA         NA        NA        NA
## trainX67              NA         NA        NA        NA
## trainX68              NA         NA        NA        NA
## trainX69              NA         NA        NA        NA
## trainX70              NA         NA        NA        NA
## trainX71              NA         NA        NA        NA
## trainX72              NA         NA        NA        NA
## trainX73              NA         NA        NA        NA
## trainX74              NA         NA        NA        NA
## trainX75              NA         NA        NA        NA
## trainX76              NA         NA        NA        NA
## trainX77              NA         NA        NA        NA
## trainX78              NA         NA        NA        NA
## trainX79              NA         NA        NA        NA
## trainX80              NA         NA        NA        NA
## trainX81              NA         NA        NA        NA
## trainX82              NA         NA        NA        NA
## trainX83              NA         NA        NA        NA
## trainX84              NA         NA        NA        NA
## trainX85              NA         NA        NA        NA
## trainX86              NA         NA        NA        NA
## trainX87              NA         NA        NA        NA
## trainX88              NA         NA        NA        NA
## trainX89              NA         NA        NA        NA
## trainX90              NA         NA        NA        NA
## trainX91              NA         NA        NA        NA
## trainX92              NA         NA        NA        NA
## trainX93              NA         NA        NA        NA
## trainX94              NA         NA        NA        NA
## trainX95              NA         NA        NA        NA
## trainX96              NA         NA        NA        NA
## trainX97              NA         NA        NA        NA
## 
## Residual standard error: NaN on 0 degrees of freedom
## Multiple R-squared:      1,  Adjusted R-squared:     NaN
## F-statistic:   NaN on 29 and 0 DF,  p-value: NA
```

This model uses too many variables to explain the outcome variable (too complex) and is overfitting the training data. This overfitting means the model is attempting to explain the random variation instead of the true underlying relationship. This model will therefore not perform well on future unseen data and will not perform well when extrapolated

b)

```
grid = 10**(seq(3,-1,length=100))

lasso.mod <- glmnet(X[train_ind,], y[train_ind], alpha=1, lambda=grid, thresh = 1e-10)

set.seed(12)

cv.out <-cv.glmnet(X[train_ind,], y[train_ind], alpha=1, lambda=grid, nfolds=30, thresh = 1e-10)

bestlam <-cv.out$lambda.min
bestlam
```

```
## [1] 1.629751
```

```
lasso.pred <- predict(cv.out, s=bestlam, newx=X[-train_ind,])
opt.test <- mean((lasso.pred - y[-train_ind])^2)
opt.test
```

```
## [1] 10.32915
```

Optimal value of $\lambda = 1.6298$ (4dp) When using the obtained model with the optimal lambda to make predictions on the test data, the resulting test error is 10.3291 (4dp)

c)

```
out = glmnet(X, y, alpha=1, lambda=grid, thresh = 1e-10)
coeff <- predict(out, type="coefficients", s=bestlam)
as.data.frame(coeff[coeff[,1] != 0,])
```

```
##               coeff[coeff[, 1] != 0, ]
## (Intercept)           26.619266
## X97                    8.317261
```

The final model is a simple linear regression model, only one feature has been selected.

It has an intercept of 26.62 (2dp) and a coefficient of 8.32 (2dp) for the only explanatory variable, X97.

The other variables have coefficients of 0, which means those coefficients have no part in this model. From this we can conclude that the excluded variables have no statistically significant predictive value for the outcome variable.

d)

```
set.seed(24)
train_ind <- sample(seq_len(nrow(X)), size = 30)
train = X[train_ind,]
test = X[-train_ind,]
grid = 10**(seq(3,-1,length=100))
lasso.mod <- glmnet(X[train_ind,], y[train_ind], alpha=1, lambda=grid, thresh = 1e-10)
cv.out <-cv.glmnet(X[train_ind,], y[train_ind], alpha=1, lambda=grid, nfolds=30, thresh = 1e-10)
```

```
## Warning: Option grouped=FALSE enforced in cv.glmnet, since < 3 observations per
## fold
```

```
bestlam <-cv.out$lambda.min
bestlam
```

```
## [1] 1.963041
```

```
lasso.pred <- predict(cv.out, s=bestlam, newx=X[-train_ind,])
opt.test <- mean((lasso.pred - y[-train_ind])^2)
opt.test
```

```
## [1] 9.032857
```

```
out = glmnet(X, y, alpha=1, lambda=grid, thresh = 1e-10)
coeff <- predict(out, type="coefficients", s=bestlam)
as.data.frame(coeff[coeff[,1] != 0,])
```

```
##              coeff[coeff[, 1] != 0, ]
## (Intercept)                 26.619266
## X97                          7.979931
```

A different random seed producing a different split of training and test data produces the same simple linear model with the same feature selected, though with a slight variation in value for the coefficients as to be expected from the different test/training split.

It is worth noting that some test/training splits can lead to models with two explanatory variables, the extra one is often X83 and has a very small coefficient value, normally of around 0.3 meaning it has little effect on the final prediction compared to X97.

The small number of observations in this data set explains the high variation in models produced when different random test/training splits are used.

Question 3

a

Overfitting in a regression model occurs when the model is too complex (uses too many variables) and attempts to describe the random variation in the data instead of the true underlying relationships between the variables. An overfit model fits the training data very well but will fit future data poorly, and will also perform poorly when extrapolating the model.

b

Parsimony in regression models means simplicity of the model. A parsimonious model is one with few parameters yet retains high predictive power.

c

The holdout method involves splitting the sample data into training and testing sets, typically in a 2:1 ratio respectively. This means the model can be trained and then tested on separate data to assess performance and reduce overfitting.

The downsides to this method are the splitting of the sample data means less data is available for training so the variance of the models performance estimates is higher.

d

10-fold cross-validation is a typical implementation of K-fold cross-validation where the data is split into 10 random equal sized chunks. 1 chunk is used as the test set while the rest are used as the training sets. This is repeated so that each observation is in a test set once. 10-fold cross-validation solves some of the weakness of the holdout method by in effect making the training data much larger and therefore reducing the variance of the regression estimates of the model. This method is also less dependent on the initial random split of training and testing sets. The disadvantages are increased computational requirements and there is still some variation on each run.

e

A key assumption when using ordinary least squares is the assumption of linearity. If the underlying relationship is non-linear, then this method can produce a model that will perform poorly, especially when predicting extreme outcome values. The best way to identify this problem is visualisation of the data.

Another assumption is that there is a random sampling of variables, this allows for "noise" within the model so that it can perform relatively well on future unseen data.

The conditional mean should be zero, this means that it shouldn't depend on the independent variables, therefore no relation between X and the error.

The Assumption of Homoscedasticity, if errors are not Homoscedastic then we cannot trust the standard erros within the OLD estimates which means the confidence intervals will not be a good fit.