Customer spending patterns

Question: What is the driving force to what a customer is willing to pay, and how can we use it to our advantage?

Approach: We will do data exploration. What trends exist? Is there any obvious significance in our data? Regression tree vs. logistic regression for a possible pricing model that will allow for predictions in the future.

The Big Bang: An interactive tool that gives a user diagnostics in which will allow a business user to understand trends and model predictions of ranges of values in which a customer is likely to purchase.

Abstract

Central to development of society is transportation, more specifically freight and good transportation. As our society has grown so too has our technology. Currently technology and data is growing at an alarming rate. Petabytes of information exists, and few people know how to utilize it. Databases have become massive and extremely expensive. For multiple reasons: security, confidentiality, and many others; companies are not willing to move their data to high efficiency data storage centers (such as Hadoop). Transportation data is collected at extremely high rates, which is more than a single person can analyze. It has become crucial to squeeze as many pennies out of the data as possible. Currently intermodal (multiple means of transporting goods) companies have flat rate pricing systems, but it is their desire to incorporate a more dynamic pricing model which utilizes statistical methods and data visualization. It is this projects goal to attempt to understand the consumer of intermodal transportation services and develop a deployable interactive tool in which we can interactively observe consumers buying habits.

1 Introduction:

The most essential part of big data is ensuring reproducible of data products by any (business or otherwise) user. This is a difficult task. Everyone is different, and no two people have the exact same skills or the same understanding of data. However, for any study it becomes crucial to understand the data, how it is stored, and where it is coming from. In this article we will first define some terms that are common to the transportation business. Then, we will explore the data in order to fully understand everything that will be presented in this project. Last, we will analyze the data, create a data product, and will discuss the results.

1.1 Understanding Intermodal Transportation

Transportation business is extremely complicated. Millions of moving and working parts are constantly in motion. Each part can be collected and stored as observable data. Clearly any data from such a complicated industry needs to

have a common language. So, we must first define a few common transportation terms. These words will be used throughout the paper and are essential to understanding our objectives.

1. Intermodal transportation - Intermodal transportation is the movement of freight by more than one type of carrier. Carriers include trains, trucks, barge, etc.

2. Drayage - Location where freight is moved from one transportation type to another: train to truck, truck to barge, or any other transportation combination.

3. Ramp - defined by city, state, and three letter acronym giving location and specific ramp for the transaction.

4. Broker LOB - Stands for "broker type and line of business". There are three main categories: management firm, brokerage, intermodal company.

5. Bill to name - Company which the transportation services were purchased from. Often when dealing with brokers they act as an intermediate between two companies in order to find the cheapest means of transportation.

1.2 Understanding Intermodal Data

This data This data was offered for this research from a door to door intermodal sales company. The company is door to door in the sense that each purchase will consist of transportation where, from origin truck delivers freight to a train at a drayage location, then train delivers to truck at another drayage location, last truck delivers the freight to it's final destination. This can be layered and more complicated especially including multiple different types of transportation. We will only focus on truck to train and train to truck transactions. Due to the extreme levels of confidentiality in which the data was originally stored, we have eliminated all columns of which could be identified to any individual. We will show a few of the rows in the "exploration of the data" section.

2 Exploration of the data

Exploration of the data is a major component of this project. The data contains various fields of how a person interacted with the website for transportation services. Each click, interaction and view produces a single row of data. When

an individual logs into the website they are requested to fill out personal information. We will not concern our selves with this information due to customer privacy. However, when an individual first logs into the system they will create an unique Customer ID. This ID starts with an X followed by three letters and three numbers. Each time that Customer logs in they create a phantom contract. Inorder for a contract to be created the individual needs to select a location and day for freight transportation. At this point a contract is created and the customer is then guided towards purchasing signing terms of agreement. Also, at this point various fields are filled in including revenue, first origin to drayage cost ($ORIG\_DRAY\_COST$), second drayage to destination cost ($DEST\_DRAY\_COST$), rail cost, profit (COC), first origin to drayage miles, second drayage to destination miles, rail miles, total miles, visit date, customer type, bill to city, drayage ramp locations. Lastly, if the individual accepts and purchases a Load Number is create.

We have also created three vaiables at this time: profit per mile, cost per mile, revenue per mile. These variables standardize purchasing details. Distance of transportation is the driving factor of cost. Later we will augment the data inorder to look at an individual purchasing patterns we will create a buyrare variable.

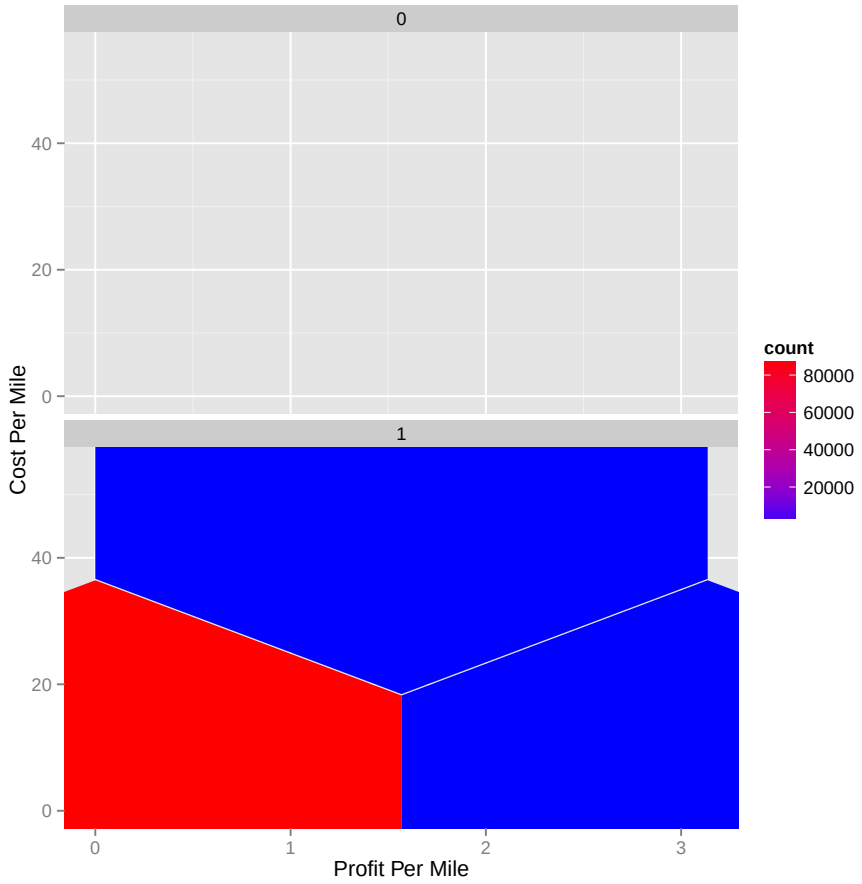

Figure 1: This is a honeycomb plot of profit per mile versus cost per mile. It demonstrates the density of where individual would buy.

This is a hexagonal plot or otherwise known as honeycomb plot. It is informative in the case where density and occurrence want to be demonstrated. In this graph we were interested in seeing where a majority of the purchasing is occurring. We separated Loads (Confirmed purchases) from Search (Has not purchased). On the x-axis we have profit per mile and on the y-axis is the cost per mile. The data was standardized so that some one transporting commodities on a greater distance would not look like an outlier. As distance is often the primary factor that would increase the rail cost significantly. Other factors that could have significance on cost in which are not easily demonstrated include: geography, weather, union strikes, and others that are more rare (union strikes, etc).

By plotting profit vs cost we can observe the revenue. We can see that the margin is very tight in transportation as red demonstrates high density. The darkest red is just right of $0 profit. It is also shown that the density of the buyers are almost exactly in the same region as the searchers, however; the outliers for cost and for profit are seldomly purchased. Notice that there is also negative profits. In many instances it is more profitable to take a loss in profit in order to get a rail car to an appropriate destination where it could make a profit. This is the rail theory headhaul versus backhaul in practice. We will want to investigate this in much more detail later.

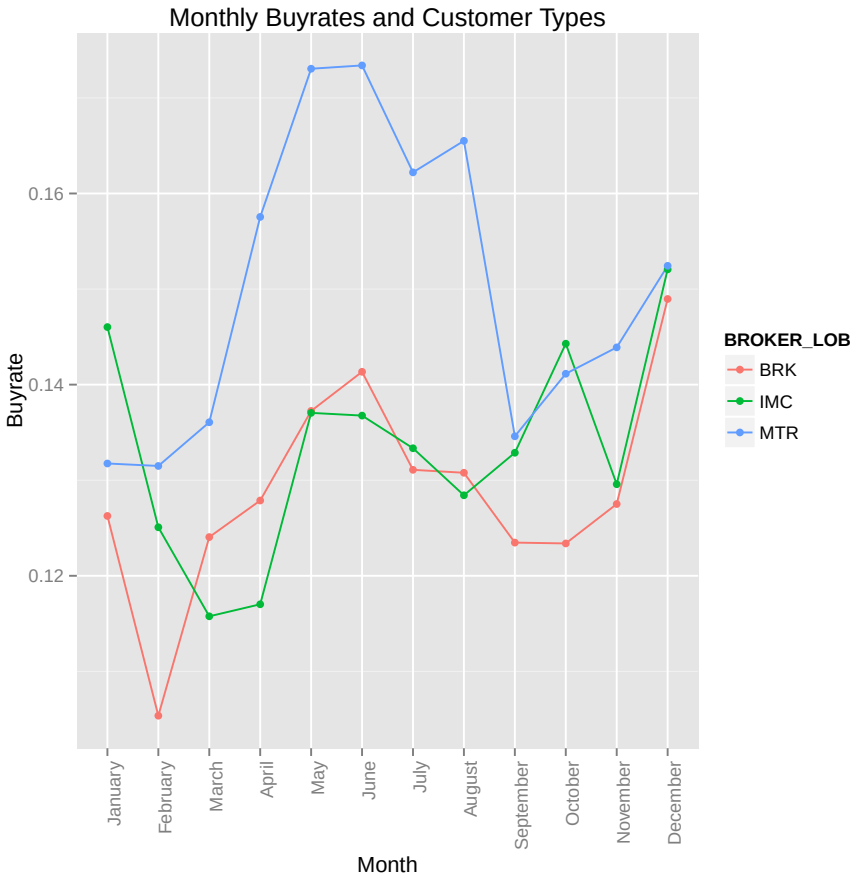

Figure 2: This plot over time shows that MTR buyers are different than IMC and BRK buyers during the summer months.

This is a time series of customer buying rates. There are a few expected occurances. For one, holiday months should have higher buy rates. This is most noticable in the month of December. When there is a need to transport a large amount of goods, there should be an increase in buyrates as transportation becomes constraint and demand is on a rise. Specifically, during this time there is more of a demand then there is availability.

We were expecting that all of the customer types would have similar or the same buyrates across the months. However, this is not the case here. MTR during the months of March through August seem to increase their buying patterns. This is interesting, this tells us that there are different buying patterns for each of the customer types. We will need to separate the customer groups when we build our statistical models.

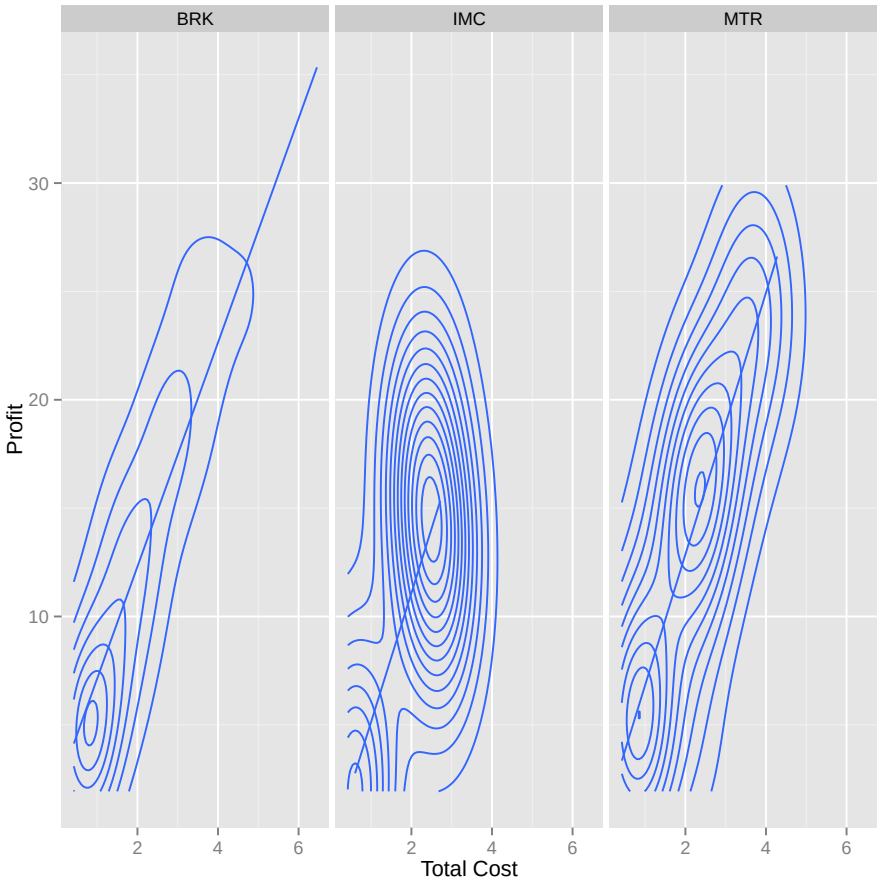

Figure 3: Faceted we can see that each of the the three groups that are priced have a linear trend. This is evidence that Cost is a flat rate.

This graphic provides proof that the flat rate system is enforced to some degree. There is some divergence but for the most part the data and our graphics is supporting this notion. Also, notice that the three customer types all have very similar linear trends. It is also interesting to note that the IMC has a very dense local point at just above 2 dollars per mile. They might be slightly more sensitive to price and have a lower cut off in their expenses. We will explore these trends and much more in our analysis section. This investigation into what each group is willing to pay will be important for the creation of our data product. As it will give some insight on what we could potentially charge without losing customers.

```
## Error in eval(expr, envir, enclos):  argument is missing, with no
default
```

3 Statistical Analysis:

From exploring our data it is evident that not every buyer group is looking for the same pricing. Also, there is a clear separation between headhaul and backhaul. However, because there is no set standard nor is it a stationary variable neither headhaul and backhaul will be considered for analysis. Headhaul and backhaul are dynamic and can change over time, by weather, or by rail availability. They may be a more integral part in a deeper investigation. Because headhaul and backhaul is not going to be a focus we can then combine the origin and the destination and make direction a nonimportant component to the analysis.

```
IMCDataSet2<-profitCostMod2

summary(profitCostMod2)
```

```
##       YRMO            Search       Buy          PHANTOM_CONTRACT
##  Min.   :201305   Min.   :1   Min.   :0.0000   Min.   :     0
##  1st Qu.:201307   1st Qu.:1   1st Qu.:0.0000   1st Qu.:     0
##  Median :201310   Median :1   Median :0.0000   Median :     0
##  Mean   :201339   Mean   :1   Mean   :0.1318   Mean   : 38135
##  3rd Qu.:201401   3rd Qu.:1   3rd Qu.:0.0000   3rd Qu.:     0
##  Max.   :201404   Max.   :1   Max.   :1.0000   Max.   :333555
##
##     CONTRACT        LOAD.NUMBER          LOAD           LH_REVENUE
##  Min.   :      0   #N/A   :617750   Min.   :0.00000   Min.   :  742
##  1st Qu.:      0   1457870:     1   1st Qu.:0.00000   1st Qu.: 2221
##  Median :      0   1458652:     1   Median :0.00000   Median : 2701
##  Mean   : 221889   1459711:     1   Mean   :0.07268   Mean   : 2779
##  3rd Qu.:      0   1461408:     1   3rd Qu.:0.00000   3rd Qu.: 3310
##  Max.   :1961447   1461555:     1   Max.   :1.00000   Max.   :16431
##                    (Other): 48411
##   ACC_REVENUE      TOTAL_REVENUE   ORIG_DRAY_COST   DEST_DRAY_COST
##  Min.   :  0.000   Min.   :  742   Min.   :   0.0   Min.   :    0.0
##  1st Qu.:  0.000   1st Qu.: 2222   1st Qu.: 203.1   1st Qu.:  199.1
##  Median :  0.000   Median : 2702   Median : 294.6   Median :  272.7
##  Mean   :  1.003   Mean   : 2780   Mean   : 405.0   Mean   :  402.7
##  3rd Qu.:  0.000   3rd Qu.: 3310   3rd Qu.: 507.3   3rd Qu.:  501.7
##  Max.   :330.000   Max.   :16431   Max.   :8166.8   Max.   :11047.8
##
##    RAIL_COST        TOTAL_COST           COC            ORIG_MILES
```

```
##  Min.   : 234.5   Min.   :  686.8   Min.   : -79.99   Min.   :  0.00
##  1st Qu.:1261.6   1st Qu.: 2082.5   1st Qu.:  95.05   1st Qu.: 18.00
##  Median :1574.5   Median : 2523.4   Median : 135.90   Median : 41.00
##  Mean   :1682.5   Mean   : 2610.3   Mean   : 168.49   Mean   : 81.66
##  3rd Qu.:2144.0   3rd Qu.: 3127.8   3rd Qu.: 195.60   3rd Qu.:117.00
##  Max.   :4749.3   Max.   :16115.1   Max.   :1520.58   Max.   :996.00
##
##    DEST_MILES       RAIL_MILES    TOTAL_MILES   OTR_EQUIV_MILES
##  Min.   :  0.00   Min.   :   0   Min.   :   0   Min.   :   0
##  1st Qu.: 15.00   1st Qu.:1513   1st Qu.:1699   1st Qu.:1548
##  Median : 35.00   Median :1997   Median :2164   Median :2027
##  Mean   : 78.75   Mean   :1956   Mean   :2116   Mean   :1984
##  3rd Qu.:110.00   3rd Qu.:2402   3rd Qu.:2559   3rd Qu.:2414
##  Max.   :994.00   Max.   :3252   Max.   :4117   Max.   :3716
##
##  TRUNC.QREC.CREATE_DT.  CUSTOMER_ID     BROKER_LOB
##  10/1/2013:  3504      XTQN056: 10843   #N/A:   318
##  10/2/2013:  3480      XTQO072:  9961   0   :   449
##  10/3/2013:  3418      XTPO147:  9539   BRK :439034
##  2/6/2014 :  3354      XUPQ506:  7892   IMC :159006
##  6/13/2013:  3331      XTPC379:  7862   MTR : 67359
##  9/25/2013:  3314      XTPR022:  7780
##  (Other)  :645765      (Other):612289
##        BILL_TO_CITY    BILL_TO_STATE    ORIG_RAMP_LOCATION
##  NAPERVILLE  : 46584   IL     :134783   ELA    : 81003
##  JACKSONVILLE: 39157   CA     : 86061   LTH    : 53775
##  CONCORD     : 38861   FL     : 55859   COI    : 50112
##  SKOKIE      : 21470   TN     : 35010   DAL    : 39540
##  CHICAGO     : 21087   MI     : 24415   GB2    : 35611
##  MEMPHIS     : 18234   NJ     : 24349   GB1    : 35231
##  (Other)     :480773   (Other):305689   (Other):370894
##  DEST_RAMP_LOCATION   ProfitMile     CostMile      RevMile
##  ELA    : 75664     Min.   :  0   Min.   :  1   Min.   :  1
##  LTH    : 44461     1st Qu.:  0   1st Qu.:  1   1st Qu.:  1
##  GB1    : 36307     Median :  0   Median :  1   Median :  1
##  DAL    : 35113     Mean   :Inf   Mean   :Inf   Mean   :Inf
##  HOU    : 33142     3rd Qu.:  0   3rd Qu.:  1   3rd Qu.:  2
##  COI    : 31036     Max.   :Inf   Max.   :Inf   Max.   :Inf
##  (Other):410443
```

```
IMCDataSet3<-IMCDataSet2 %>%
  group_by(CUSTOMER_ID) %>%
  mutate(Buyrate=Buy/Search) %>%
  filter((BROKER_LOB=="BRK" | BROKER_LOB=="IMC" | BROKER_LOB=="MTR") & RevMile>0 &RevMile<15

x<-data.frame(orig=as.character(IMCDataSet3$ORIG_RAMP_LOCATION), dest=as.character(IMCDataSe
```

```r
x$orig<-as.character(x$orig)
x$dest<-as.character(x$dest)
x1<-sort(unique(c(x[,1],x[,2])))
x_ind<-data.frame(loc=x1, ind=1:length(x1))

xx<-sqldf("select a.*,b.ind as orig_ind from x as a left join x_ind as b on a.orig=b.loc")

## Loading required package:  tcltk

xxx<-sqldf("select a.*, b.ind as dest_ind from xx as a left join x_ind as b on a.dest=b.loc'

comb<-function(orig,dest,orig_ind,dest_ind){
  if(orig_ind<=dest_ind)
  {
    out<-paste(orig,dest, sep="-")
  } else
  {
    out<-paste(dest,orig,sep="-")
  }
  return(out)
}
orig_dest<-apply(xxx,1,function(x) comb(x[1],x[2],x[3],x[4]))
OD<-data.frame(xxx,orig_dest)
od<-OD$orig_dest
IMCDataSet3<-cbind(IMCDataSet3, od)

trainIndex<-createDataPartition(IMCDataSet3$CUSTOMER_ID, p=.8,
                                list = FALSE,
                                times=1)

DSTrain<-IMCDataSet3[trainIndex,]
DSTest<-IMCDataSet3[-trainIndex,]

dim(DSTrain)

## [1] 70355    32

dim(DSTest)

## [1] 17401    32

a<-unique(DSTrain$od)
b<-unique(DSTest$od)

identical(a,b)

## [1] FALSE
```

```
lm.fit<-lm(RevMile~BROKER_LOB+TOTAL_MILES+ORIG_RAMP_LOCATION,DSTrain)
summary(lm.fit)
```

```
##
## Call:
## lm(formula = RevMile ~ BROKER_LOB + TOTAL_MILES + ORIG_RAMP_LOCATION,
##     data = DSTrain)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -0.6156 -0.1846 -0.0376  0.1382 27.5201
##
## Coefficients:
##                          Estimate Std. Error t value Pr(>|t|)
## (Intercept)             1.785e+00  1.648e-01  10.826  < 2e-16 ***
## BROKER_LOBIMC           6.745e-03  2.588e-03   2.607  0.00915 **
## BROKER_LOBMTR           7.670e-03  3.466e-03   2.213  0.02688 *
## TOTAL_MILES            -2.431e-04  2.458e-06 -98.903  < 2e-16 ***
## ORIG_RAMP_LOCATION2MN   3.588e-01  1.767e-01   2.031  0.04226 *
## ORIG_RAMP_LOCATION2TR   2.814e-02  1.902e-01   0.148  0.88238
## ORIG_RAMP_LOCATIONABY   1.927e-01  1.685e-01   1.144  0.25278
## ORIG_RAMP_LOCATIONATL -1.821e-01  1.715e-01  -1.062  0.28818
## ORIG_RAMP_LOCATIONAUS -1.038e-01  1.650e-01  -0.629  0.52941
## ORIG_RAMP_LOCATIONAYR -1.627e-01  1.651e-01  -0.985  0.32449
## ORIG_RAMP_LOCATIONBRK -1.192e-01  1.648e-01  -0.723  0.46965
## ORIG_RAMP_LOCATIONBTH -2.591e-01  1.654e-01  -1.567  0.11713
## ORIG_RAMP_LOCATIONBUF -1.440e-01  1.652e-01  -0.872  0.38341
## ORIG_RAMP_LOCATIONCBF   2.485e-01  1.661e-01   1.496  0.13466
## ORIG_RAMP_LOCATIONCHR -4.226e-02  1.654e-01  -0.256  0.79826
## ORIG_RAMP_LOCATIONCOI   2.533e-02  1.648e-01   0.154  0.87783
## ORIG_RAMP_LOCATIONCOL -1.314e-01  1.815e-01  -0.724  0.46927
## ORIG_RAMP_LOCATIONCRX   7.249e-02  3.295e-01   0.220  0.82586
## ORIG_RAMP_LOCATIONDAL -3.254e-01  1.648e-01  -1.975  0.04828 *
## ORIG_RAMP_LOCATIONDPO   8.311e-02  1.649e-01   0.504  0.61418
## ORIG_RAMP_LOCATIONDVR -1.544e-01  1.654e-01  -0.933  0.35060
## ORIG_RAMP_LOCATIONELA   1.034e-01  1.648e-01   0.628  0.53017
## ORIG_RAMP_LOCATIONELP   4.782e-01  1.670e-01   2.864  0.00419 **
## ORIG_RAMP_LOCATIONERL -2.583e-01  1.649e-01  -1.567  0.11719
## ORIG_RAMP_LOCATIONGB1 -2.868e-01  1.648e-01  -1.740  0.08185 .
## ORIG_RAMP_LOCATIONGB2   4.328e-02  1.648e-01   0.263  0.79288
## ORIG_RAMP_LOCATIONGB3 -1.689e-01  1.650e-01  -1.023  0.30610
## ORIG_RAMP_LOCATIONGB4   2.651e-02  1.648e-01   0.161  0.87224
## ORIG_RAMP_LOCATIONHAR -1.913e-01  1.650e-01  -1.159  0.24629
## ORIG_RAMP_LOCATIONHOU -2.127e-01  1.648e-01  -1.290  0.19691
## ORIG_RAMP_LOCATIONHUN   2.452e-01  3.295e-01   0.744  0.45671
## ORIG_RAMP_LOCATIONICT   1.084e-01  1.651e-01   0.657  0.51136
```

```
## ORIG_RAMP_LOCATIONJAX -7.366e-02  1.657e-01  -0.445  0.65667
## ORIG_RAMP_LOCATIONKAN  6.758e-03  1.649e-01   0.041  0.96731
## ORIG_RAMP_LOCATIONLTC  5.283e-01  1.648e-01   3.205  0.00135 **
## ORIG_RAMP_LOCATIONLTH  7.008e-02  1.648e-01   0.425  0.67062
## ORIG_RAMP_LOCATIONLVG  1.605e+00  2.330e-01   6.890 5.63e-12 ***
## ORIG_RAMP_LOCATIONMIA -7.650e-02  1.661e-01  -0.461  0.64507
## ORIG_RAMP_LOCATIONMRN -1.081e-01  1.649e-01  -0.655  0.51238
## ORIG_RAMP_LOCATIONMRV -2.225e-01  1.650e-01  -1.349  0.17742
## ORIG_RAMP_LOCATIONNFK  1.891e-01  1.674e-01   1.129  0.25884
## ORIG_RAMP_LOCATIONOAK  1.804e-01  1.650e-01   1.094  0.27416
## ORIG_RAMP_LOCATIONPIT  2.741e-02  1.652e-01   0.166  0.86825
## ORIG_RAMP_LOCATIONPLR  7.900e-02  1.652e-01   0.478  0.63253
## ORIG_RAMP_LOCATIONSEA -1.748e-04  1.652e-01  -0.001  0.99916
## ORIG_RAMP_LOCATIONSLC -9.282e-02  1.649e-01  -0.563  0.57344
## ORIG_RAMP_LOCATIONSPK  2.786e-01  1.661e-01   1.677  0.09358 .
## ORIG_RAMP_LOCATIONSTX  1.202e-01  1.664e-01   0.722  0.47015
## ORIG_RAMP_LOCATIONTAC -2.304e-01  1.648e-01  -1.397  0.16228
## ORIG_RAMP_LOCATIONTAY -2.972e-01  1.662e-01  -1.788  0.07380 .
## ORIG_RAMP_LOCATIONTOL  4.920e-02  1.661e-01   0.296  0.76704
## ORIG_RAMP_LOCATIONTTS -1.278e-01  1.674e-01  -0.763  0.44529
## ORIG_RAMP_LOCATIONTUC  1.741e-01  1.652e-01   1.054  0.29191
## ORIG_RAMP_LOCATIONXAH  4.550e-01  1.878e-01   2.422  0.01542 *
## ORIG_RAMP_LOCATIONXBF  2.768e-01  2.605e-01   1.063  0.28798
## ORIG_RAMP_LOCATIONXBL  7.725e-02  2.330e-01   0.332  0.74021
## ORIG_RAMP_LOCATIONXCB  2.198e-01  1.859e-01   1.182  0.23702
## ORIG_RAMP_LOCATIONXCL  2.444e-01  2.330e-01   1.049  0.29411
## ORIG_RAMP_LOCATIONXCM  2.710e-01  2.330e-01   1.163  0.24478
## ORIG_RAMP_LOCATIONXCN  3.087e-01  2.084e-01   1.481  0.13852
## ORIG_RAMP_LOCATIONXCR  2.550e-01  1.842e-01   1.385  0.16615
## ORIG_RAMP_LOCATIONXCS  9.172e-03  1.969e-01   0.047  0.96285
## ORIG_RAMP_LOCATIONXJX  9.277e-02  2.330e-01   0.398  0.69052
## ORIG_RAMP_LOCATIONXKE  2.584e-01  2.330e-01   1.109  0.26728
## ORIG_RAMP_LOCATIONXMI  7.742e-02  2.179e-01   0.355  0.72239
## ORIG_RAMP_LOCATIONXOR  4.166e-01  3.295e-01   1.265  0.20602
## ORIG_RAMP_LOCATIONXPH  1.498e-01  2.179e-01   0.687  0.49178
## ORIG_RAMP_LOCATIONXPO -2.490e-02  2.018e-01  -0.123  0.90178
## ORIG_RAMP_LOCATIONXSY  4.124e-01  2.330e-01   1.770  0.07675 .
## ORIG_RAMP_LOCATIONXTP  2.096e-01  3.295e-01   0.636  0.52464
## ORIG_RAMP_LOCATIONYDC  1.076e-01  1.652e-01   0.651  0.51496
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.2853 on 70284 degrees of freedom
## Multiple R-squared:  0.3984,Adjusted R-squared:  0.3978
## F-statistic:   665 on 70 and 70284 DF,  p-value: < 2.2e-16
```

```
lm.fit2<-lm(RevMile~od+TOTAL_MILES+BROKER_LOB,DSTrain)
summary(lm.fit2)
```

```
##
## Call:
## lm(formula = RevMile ~ od + TOTAL_MILES + BROKER_LOB, data = DSTrain)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -9.7457 -0.1378 -0.0204  0.1106 19.4769
##
## Coefficients:
##                 Estimate Std. Error t value Pr(>|t|)
## (Intercept)    3.271e-01  1.915e-01   1.708 0.087601 .
## od1ED-PLR     -2.459e-01  2.691e-01  -0.914 0.360935
## od1TR-ELP      4.016e-01  3.296e-01   1.218 0.223107
## od1TR-TUC     -2.232e-01  3.296e-01  -0.677 0.498367
## od1WN-DAL      1.569e+00  2.457e-01   6.383 1.75e-10 ***
## od1WN-HOU      1.281e+00  3.297e-01   3.886 0.000102 ***
## od2ED-DAL      8.575e-01  2.252e-01   3.808 0.000140 ***
## od2ED-HOU     -3.757e-01  2.457e-01  -1.529 0.126191
## od2MN-BRK      5.346e-01  2.692e-01   1.986 0.047025 *
## od2MN-DAL      1.390e+00  2.333e-01   5.958 2.56e-09 ***
## od2MN-ELA      1.246e-01  2.085e-01   0.598 0.550050
## od2MN-ELP      1.099e+00  3.296e-01   3.333 0.000860 ***
## od2MN-HOU      9.267e-01  3.297e-01   2.810 0.004950 **
## od2MN-LTH      2.195e-01  2.001e-01   1.097 0.272690
## od2MN-PLR      6.862e-01  2.458e-01   2.792 0.005242 **
## od2MN-TAC      5.747e-01  2.457e-01   2.339 0.019344 *
## od2MN-TUC      5.176e-01  3.296e-01   1.570 0.116397
## od2MT-ELA     -4.186e-01  2.253e-01  -1.858 0.063164 .
## od2TR-ELA     -7.016e-01  2.457e-01  -2.855 0.004303 **
## od2TR-HOU      1.059e-01  2.692e-01   0.393 0.694024
## od2TR-PLR     -1.720e-01  2.691e-01  -0.639 0.522886
## od2TR-SLC      1.793e-01  2.691e-01   0.666 0.505369
## odABY-BRK     -7.488e-01  2.199e-01  -3.405 0.000663 ***
## odABY-COI     -4.276e-01  2.086e-01  -2.050 0.040371 *
## odABY-DAL      5.007e-01  2.158e-01   2.320 0.020329 *
## odABY-ELA     -9.753e-01  2.046e-01  -4.767 1.87e-06 ***
## odABY-HOU      2.503e-01  2.158e-01   1.160 0.246183
## odABY-LTH     -9.976e-01  2.028e-01  -4.919 8.74e-07 ***
## odABY-LVG     -3.499e-01  3.296e-01  -1.062 0.288450
## odABY-OAK     -1.003e+00  2.161e-01  -4.643 3.44e-06 ***
## odABY-PLR      2.761e-02  3.296e-01   0.084 0.933236
## odABY-SLC      1.367e-01  3.296e-01   0.415 0.678281
## odABY-SPK     -5.028e-01  2.692e-01  -1.868 0.061782 .
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## odABY-TAC     -7.073e-01  2.130e-01  -3.321 0.000899 ***
## odATL-LTH     -8.005e-01  1.956e-01  -4.093 4.26e-05 ***
## odAUS-BRK     -7.226e-01  1.912e-01  -3.780 0.000157 ***
## odAUS-DVR      1.024e+00  2.331e-01   4.393 1.12e-05 ***
## odAUS-LTC     -4.448e-01  1.906e-01  -2.333 0.019635 *
## odAUS-LTH     -6.737e-01  1.907e-01  -3.533 0.000411 ***
## odAUS-OAK     -5.404e-01  1.920e-01  -2.814 0.004894 **
## odAUS-SLC     -2.339e-02  1.929e-01  -0.121 0.903467
## odAUS-SPK     -4.270e-01  2.035e-01  -2.098 0.035880 *
## odAUS-TAC     -7.462e-01  1.914e-01  -3.899 9.68e-05 ***
## odAUS-TUC      6.403e-01  2.691e-01   2.379 0.017357 *
## odAYR-BRK     -1.064e+00  1.923e-01  -5.533 3.16e-08 ***
## odAYR-COI     -7.234e-01  1.917e-01  -3.773 0.000161 ***
## odAYR-DAL      1.235e-01  1.921e-01   0.643 0.520182
## odAYR-DVR      8.157e-03  2.055e-01   0.040 0.968347
## odAYR-ELA     -1.249e+00  1.911e-01  -6.534 6.45e-11 ***
## odAYR-HOU      3.328e-03  1.920e-01   0.017 0.986170
## odAYR-LTH     -1.084e+00  1.913e-01  -5.665 1.47e-08 ***
## odAYR-LVG     -7.979e-01  2.129e-01  -3.748 0.000178 ***
## odAYR-OAK     -1.198e+00  1.936e-01  -6.188 6.12e-10 ***
## odAYR-PLR     -1.450e-01  1.930e-01  -0.751 0.452389
## odAYR-SLC     -3.905e-01  1.944e-01  -2.009 0.044585 *
## odAYR-SPK     -4.779e-01  2.159e-01  -2.213 0.026897 *
## odAYR-STX     -1.548e-01  2.044e-01  -0.757 0.448986
## odAYR-TAC     -1.000e+00  1.931e-01  -5.177 2.26e-07 ***
## odAYR-TUC     -3.258e-01  2.128e-01  -1.530 0.125905
## odBHM-ICT     -9.371e-02  1.913e-01  -0.490 0.624276
## odBRK-BTH     -9.360e-01  2.036e-01  -4.598 4.28e-06 ***
## odBRK-BUF     -7.140e-01  1.934e-01  -3.692 0.000222 ***
## odBRK-CHR     -8.154e-01  1.921e-01  -4.245 2.19e-05 ***
## odBRK-DAL     -1.542e-01  1.907e-01  -0.808 0.418906
## odBRK-DPO     -2.451e-01  1.908e-01  -1.285 0.198835
## odBRK-ERL     -9.528e-01  1.913e-01  -4.981 6.34e-07 ***
## odBRK-GB2     -4.503e-01  1.905e-01  -2.364 0.018072 *
## odBRK-GB3     -2.969e-01  1.913e-01  -1.552 0.120603
## odBRK-HAR     -8.192e-01  1.915e-01  -4.277 1.90e-05 ***
## odBRK-HOU     -3.434e-01  1.908e-01  -1.800 0.071895 .
## odBRK-HUN     -5.479e-01  3.297e-01  -1.662 0.096528 .
## odBRK-JAX     -9.889e-01  1.957e-01  -5.053 4.36e-07 ***
## odBRK-KAN     -7.210e-03  1.908e-01  -0.038 0.969854
## odBRK-LTC      8.253e-01  1.909e-01   4.324 1.54e-05 ***
## odBRK-LTH      1.695e+00  1.924e-01   8.811  < 2e-16 ***
## odBRK-MIA     -1.182e+00  1.922e-01  -6.152 7.71e-10 ***
## odBRK-MRN     -6.026e-01  1.907e-01  -3.159 0.001581 **
## odBRK-MRV     -9.332e-01  1.918e-01  -4.866 1.14e-06 ***
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## odBRK-NFK     -8.432e-01  1.983e-01  -4.252 2.12e-05 ***
## odBRK-PIT     -6.297e-01  1.941e-01  -3.243 0.001182 **
## odBRK-PLR     -2.258e-01  2.457e-01  -0.919 0.357993
## odBRK-TAY     -9.185e-01  1.974e-01  -4.654 3.26e-06 ***
## odBRK-TOL     -4.405e-01  1.928e-01  -2.285 0.022313 *
## odBRK-TTS     -1.056e+00  1.977e-01  -5.338 9.44e-08 ***
## odBRK-XAH     -7.114e-01  2.198e-01  -3.236 0.001213 **
## odBRK-XBF     -4.609e-01  2.458e-01  -1.875 0.060780 .
## odBRK-XBL     -5.923e-01  3.297e-01  -1.796 0.072427 .
## odBRK-XCB     -6.493e-01  2.158e-01  -3.009 0.002626 **
## odBRK-XCL     -6.322e-01  1.948e-01  -3.245 0.001175 **
## odBRK-XCM     -5.798e-01  3.297e-01  -1.758 0.078671 .
## odBRK-XCN     -5.796e-01  2.692e-01  -2.153 0.031302 *
## odBRK-XCS     -8.879e-01  2.693e-01  -3.298 0.000976 ***
## odBRK-XJX     -8.861e-01  2.458e-01  -3.604 0.000313 ***
## odBRK-XKE     -8.089e-01  2.036e-01  -3.972 7.12e-05 ***
## odBRK-XOR     -8.253e-01  3.298e-01  -2.503 0.012325 *
## odBRK-XPH     -7.168e-01  2.199e-01  -3.260 0.001116 **
## odBRK-XPO     -5.734e-01  3.297e-01  -1.739 0.082021 .
## odBRK-XSY     -6.542e-01  3.297e-01  -1.984 0.047227 *
## odBRK-XTP     -8.762e-01  2.333e-01  -3.756 0.000173 ***
## odBTH-COI     -5.500e-01  1.911e-01  -2.877 0.004012 **
## odBTH-DAL      1.841e-01  1.944e-01   0.947 0.343695
## odBTH-DVR      4.374e-01  2.457e-01   1.780 0.075024 .
## odBTH-ELA     -9.773e-01  1.919e-01  -5.093 3.53e-07 ***
## odBTH-HOU      1.565e-01  1.971e-01   0.794 0.427151
## odBTH-LTH     -1.107e+00  1.914e-01  -5.786 7.26e-09 ***
## odBTH-LVG     -5.824e-01  2.457e-01  -2.370 0.017780 *
## odBTH-OAK     -1.144e+00  1.982e-01  -5.770 7.94e-09 ***
## odBTH-PLR     -3.683e-02  1.938e-01  -0.190 0.849300
## odBTH-SLC     -2.220e-01  1.975e-01  -1.124 0.260891
## odBTH-SPK     -5.824e-01  3.297e-01  -1.767 0.077280 .
## odBTH-TAC     -8.671e-01  1.979e-01  -4.382 1.18e-05 ***
## odBTH-TUC     -2.979e-01  2.006e-01  -1.485 0.137560
## odBUF-COI     -4.058e-01  1.912e-01  -2.122 0.033846 *
## odBUF-DAL      4.633e-01  1.921e-01   2.412 0.015869 *
## odBUF-DVR      6.661e-01  2.252e-01   2.957 0.003104 **
## odBUF-ELA     -7.704e-01  1.911e-01  -4.032 5.53e-05 ***
## odBUF-HOU      4.027e-01  1.950e-01   2.065 0.038900 *
## odBUF-LTH     -6.975e-01  1.913e-01  -3.646 0.000266 ***
## odBUF-LVG     -3.939e-01  1.992e-01  -1.977 0.048003 *
## odBUF-OAK     -8.523e-01  1.921e-01  -4.437 9.12e-06 ***
## odBUF-PLR      5.163e-02  2.198e-01   0.235 0.814249
## odBUF-SLC     -5.187e-02  1.933e-01  -0.268 0.788473
## odBUF-SPK     -3.096e-01  2.252e-01  -1.375 0.169177
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## odBUF-TAC     -6.504e-01  1.928e-01  -3.374 0.000741 ***
## odBUF-TUC     -2.606e-01  1.984e-01  -1.314 0.189005
## odCBF-ICT      1.265e-01  1.907e-01   0.663 0.507242
## odCBF-LTH      2.086e-01  1.940e-01   1.075 0.282243
## odCBF-OAK      9.407e-02  1.920e-01   0.490 0.624125
## odCBF-SEA      6.884e-02  1.917e-01   0.359 0.719474
## odCHR-DVR      9.001e-01  2.457e-01   3.663 0.000250 ***
## odCHR-LTC     -5.405e-01  1.907e-01  -2.834 0.004593 **
## odCHR-LTH     -8.111e-01  1.921e-01  -4.223 2.42e-05 ***
## odCHR-OAK     -6.500e-01  2.105e-01  -3.088 0.002019 **
## odCHR-SLC     -1.973e-01  1.929e-01  -1.023 0.306376
## odCHR-SPK     -5.373e-01  2.252e-01  -2.386 0.017046 *
## odCHR-TAC     -8.169e-01  1.921e-01  -4.251 2.13e-05 ***
## odCIN-ELA     -3.618e-01  3.296e-01  -1.098 0.272398
## odCOI-ELP      1.280e+00  1.920e-01   6.670 2.58e-11 ***
## odCOI-GB1     -4.882e-01  1.903e-01  -2.565 0.010317 *
## odCOI-GB4     -5.612e-01  1.904e-01  -2.947 0.003209 **
## odCOI-NFK     -5.158e-01  1.926e-01  -2.678 0.007400 **
## odCOI-TAY     -5.402e-01  1.935e-01  -2.791 0.005256 **
## odCOI-TOL     -4.312e-01  1.924e-01  -2.241 0.025012 *
## odCOI-XBF     -3.795e-01  2.252e-01  -1.685 0.092006 .
## odCOI-XCL     -3.774e-01  1.913e-01  -1.973 0.048523 *
## odCOI-XCM     -5.443e-01  1.913e-01  -2.846 0.004433 **
## odCOI-XKE     -6.942e-01  1.908e-01  -3.637 0.000276 ***
## odCOI-XMR     -3.043e-01  3.296e-01  -0.923 0.355865
## odCOI-XPH     -5.591e-01  1.925e-01  -2.904 0.003681 **
## odCOI-XSY     -4.421e-01  1.976e-01  -2.238 0.025248 *
## odCOL-ELA     -4.930e-01  1.911e-01  -2.580 0.009891 **
## odCRX-ELA     -6.516e-01  1.907e-01  -3.416 0.000635 ***
## odCRX-LTH     -8.096e-01  1.907e-01  -4.245 2.18e-05 ***
## odDAL-DPO      1.863e+00  1.943e-01   9.588  < 2e-16 ***
## odDAL-ELA     -5.429e-02  1.905e-01  -0.285 0.775580
## odDAL-ERL      1.272e-01  1.910e-01   0.666 0.505498
## odDAL-GB4      3.896e-01  1.907e-01   2.043 0.041066 *
## odDAL-HAR      3.389e-01  1.924e-01   1.762 0.078132 .
## odDAL-LTH     -1.961e-01  1.904e-01  -1.030 0.303151
## odDAL-MRN      2.078e+00  2.201e-01   9.441  < 2e-16 ***
## odDAL-MRV      1.925e-01  1.923e-01   1.001 0.316719
## odDAL-NFK      6.328e-01  2.105e-01   3.007 0.002642 **
## odDAL-PIT      6.557e-01  1.955e-01   3.353 0.000799 ***
## odDAL-SEA     -2.278e-01  1.907e-01  -1.195 0.232079
## odDAL-TAY      3.564e-01  1.971e-01   1.808 0.070551 .
## odDAL-TOL      9.131e-01  2.459e-01   3.714 0.000204 ***
## odDAL-XBF      6.350e-01  3.297e-01   1.926 0.054070 .
## odDAL-XBL      7.557e-01  2.332e-01   3.241 0.001191 **
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## odDAL-XCL      6.179e-01  2.129e-01   2.902 0.003711 **
## odDAL-XCM      7.554e-01  2.332e-01   3.240 0.001195 **
## odDAL-XKE      4.577e-01  1.988e-01   2.302 0.021332 *
## odDAL-XNS      1.377e+00  2.695e-01   5.111 3.22e-07 ***
## odDAL-XPH      6.049e-01  3.296e-01   1.835 0.066490 .
## odDAL-XSY      4.693e-01  2.085e-01   2.251 0.024401 *
## odDAL-XWR      5.042e-01  3.296e-01   1.530 0.126135
## odDPO-ELA     -2.658e-01  1.904e-01  -1.396 0.162744
## odDPO-HOU      1.584e+00  1.925e-01   8.226  < 2e-16 ***
## odDPO-LTH     -3.523e-01  1.906e-01  -1.848 0.064555 .
## odDPO-OAK     -3.894e-01  1.929e-01  -2.018 0.043558 *
## odDPO-PLR      7.167e-01  1.934e-01   3.705 0.000211 ***
## odDPO-SEA     -1.546e-01  1.909e-01  -0.810 0.418010
## odDPO-SLC      4.542e-01  1.915e-01   2.372 0.017712 *
## odDVR-ELA      9.979e-01  1.909e-01   5.226 1.74e-07 ***
## odDVR-ERL      3.501e-01  1.970e-01   1.777 0.075555 .
## odDVR-GB2      1.294e+00  1.930e-01   6.704 2.04e-11 ***
## odDVR-HAR      5.541e-01  2.056e-01   2.695 0.007035 **
## odDVR-HOU      7.909e-01  2.003e-01   3.948 7.89e-05 ***
## odDVR-JAX      2.996e-01  2.045e-01   1.465 0.142857
## odDVR-MIA      1.851e-01  2.331e-01   0.794 0.426999
## odDVR-MRV      4.404e-01  2.056e-01   2.143 0.032157 *
## odDVR-NFK      5.686e-01  2.331e-01   2.439 0.014714 *
## odDVR-OAK      7.673e-01  1.938e-01   3.959 7.55e-05 ***
## odDVR-PIT      9.699e-01  2.086e-01   4.650 3.32e-06 ***
## odDVR-TAY      4.637e-01  2.331e-01   1.989 0.046672 *
## odDVR-XAH      5.964e-01  2.331e-01   2.558 0.010533 *
## odDVR-XBF      1.867e-01  3.297e-01   0.566 0.571220
## odDVR-XBL      1.888e-01  3.296e-01   0.573 0.566888
## odDVR-XCL      4.578e-01  2.332e-01   1.964 0.049586 *
## odDVR-XCM      4.792e-01  3.296e-01   1.454 0.145999
## odDVR-XJX      3.251e-01  2.692e-01   1.208 0.227071
## odDVR-XKE      2.143e-01  1.996e-01   1.073 0.283090
## odDVR-XMI      2.613e-01  2.158e-01   1.211 0.225853
## odDVR-XPH      3.390e-01  2.692e-01   1.260 0.207819
## odDVR-XPO      3.898e-03  2.158e-01   0.018 0.985588
## odDVR-XSY      1.419e-01  2.457e-01   0.578 0.563441
## odDVR-XTP      2.612e-01  2.692e-01   0.970 0.331814
## odEDM-PLR     -1.897e-01  3.296e-01  -0.575 0.565042
## odELA-ERL     -1.211e+00  1.907e-01  -6.352 2.14e-10 ***
## odELA-GB1     -5.327e-01  1.904e-01  -2.798 0.005143 **
## odELA-GB3     -2.703e-01  1.907e-01  -1.417 0.156394
## odELA-HAR     -8.042e-01  1.907e-01  -4.218 2.47e-05 ***
## odELA-HOU      4.645e-02  1.905e-01   0.244 0.807337
## odELA-KAN      2.504e-02  1.905e-01   0.131 0.895416
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## odELA-LVG      2.816e+00  2.464e-01  11.432  < 2e-16 ***
## odELA-MRN     -2.324e-01  1.904e-01  -1.221 0.222228
## odELA-MRV     -9.938e-01  1.907e-01  -5.211 1.89e-07 ***
## odELA-NFK     -6.438e-01  1.951e-01  -3.300 0.000969 ***
## odELA-PIT     -5.995e-01  1.909e-01  -3.140 0.001691 **
## odELA-PLR      5.264e-01  1.909e-01   2.757 0.005841 **
## odELA-SLC      1.206e+00  1.921e-01   6.275 3.51e-10 ***
## odELA-STX      5.699e-01  1.910e-01   2.984 0.002848 **
## odELA-TAY     -1.048e+00  1.920e-01  -5.458 4.84e-08 ***
## odELA-TOL     -5.779e-01  2.019e-01  -2.863 0.004196 **
## odELA-XBL     -3.349e-01  2.331e-01  -1.437 0.150816
## odELA-XJX     -1.183e-01  2.331e-01  -0.508 0.611771
## odELA-XMI     -1.527e-01  2.086e-01  -0.732 0.464125
## odELA-XNS      2.017e-01  2.252e-01   0.896 0.370307
## odELA-XOR     -5.560e-02  2.691e-01  -0.207 0.836334
## odELA-XPO     -4.599e-01  2.253e-01  -2.042 0.041186 *
## odELA-XSV     -2.672e-01  2.691e-01  -0.993 0.320788
## odELP-ERL      1.980e-01  2.034e-01   0.973 0.330406
## odELP-GB4     -1.484e-02  1.908e-01  -0.078 0.937980
## odELP-HAR      5.498e-01  2.252e-01   2.442 0.014627 *
## odELP-HOU      1.531e+00  2.458e-01   6.229 4.73e-10 ***
## odELP-MRV      4.259e-01  3.296e-01   1.292 0.196281
## odELP-XAH      7.752e-01  3.297e-01   2.351 0.018704 *
## odELP-XBL      3.447e-01  3.296e-01   1.046 0.295679
## odELP-XCB      4.900e-01  3.297e-01   1.486 0.137152
## odELP-XCL      3.279e-01  3.296e-01   0.995 0.319876
## odELP-XCM      5.482e-01  2.104e-01   2.606 0.009174 **
## odELP-XCN      5.818e-01  3.297e-01   1.765 0.077630 .
## odELP-XCR      3.774e-01  3.296e-01   1.145 0.252266
## odELP-XJX      8.159e-01  2.691e-01   3.031 0.002435 **
## odELP-XKE      4.647e-01  2.457e-01   1.891 0.058569 .
## odELP-XMI      6.183e-01  3.296e-01   1.876 0.060678 .
## odELP-XOR      7.581e-01  2.691e-01   2.817 0.004852 **
## odELP-XPH      2.084e-01  2.197e-01   0.948 0.342900
## odELP-XPO      9.454e-02  2.691e-01   0.351 0.725379
## odELP-XSY      1.960e-01  3.296e-01   0.595 0.552057
## odELP-XTP      8.679e-01  3.296e-01   2.633 0.008464 **
## odELP-XWR      1.270e-01  2.198e-01   0.578 0.563403
## odERL-HOU      1.325e-01  1.911e-01   0.694 0.487825
## odERL-LTH     -1.266e+00  1.912e-01  -6.624 3.52e-11 ***
## odERL-LVG     -6.213e-01  2.045e-01  -3.039 0.002375 **
## odERL-OAK     -1.037e+00  1.913e-01  -5.424 5.84e-08 ***
## odERL-PLR     -8.520e-04  1.948e-01  -0.004 0.996510
## odERL-SLC     -2.993e-01  1.915e-01  -1.562 0.118184
## odERL-SPK     -6.225e-01  1.997e-01  -3.118 0.001824 **
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## odERL-STX      3.995e-01  3.296e-01   1.212 0.225559
## odERL-TAC     -9.146e-01  1.915e-01  -4.776 1.79e-06 ***
## odERL-TUC     -3.021e-01  1.953e-01  -1.547 0.121832
## odGB1-LVG      3.572e-01  1.996e-01   1.790 0.073509 .
## odGB1-SLC     -5.307e-03  1.906e-01  -0.028 0.977783
## odGB2-LTH     -4.991e-01  1.904e-01  -2.622 0.008746 **
## odGB2-OAK     -5.298e-01  1.906e-01  -2.779 0.005456 **
## odGB2-SPK     -6.043e-02  1.912e-01  -0.316 0.752004
## odGB2-TAC     -4.873e-01  1.904e-01  -2.559 0.010495 *
## odGB3-ICT     -5.244e-01  1.906e-01  -2.752 0.005930 **
## odGB3-LTH     -4.158e-01  1.907e-01  -2.180 0.029231 *
## odGB4-HOU      4.802e-01  1.907e-01   2.519 0.011783 *
## odGB4-TUC     -1.503e-02  1.906e-01  -0.079 0.937142
## odGPA-ICT     -3.393e-01  1.936e-01  -1.752 0.079696 .
## odHAR-HOU      1.804e-01  1.915e-01   0.942 0.346049
## odHAR-LTH     -8.577e-01  1.908e-01  -4.494 7.00e-06 ***
## odHAR-LVG     -4.298e-01  2.158e-01  -1.992 0.046405 *
## odHAR-OAK     -1.013e+00  1.921e-01  -5.274 1.34e-07 ***
## odHAR-PLR      1.067e-01  1.964e-01   0.543 0.586805
## odHAR-SLC     -1.588e-01  1.924e-01  -0.825 0.409198
## odHAR-SPK     -5.914e-01  2.085e-01  -2.836 0.004566 **
## odHAR-STX      2.716e-01  2.026e-01   1.341 0.180020
## odHAR-TAC     -8.125e-01  1.913e-01  -4.248 2.16e-05 ***
## odHAR-TUC     -2.107e-01  1.988e-01  -1.060 0.289141
## odHOU-LTH     -1.687e-01  1.906e-01  -0.885 0.376270
## odHOU-MRN      1.976e+00  3.298e-01   5.993 2.07e-09 ***
## odHOU-MRV      2.589e-01  1.918e-01   1.350 0.176941
## odHOU-NFK      5.747e-01  2.045e-01   2.810 0.004952 **
## odHOU-PIT      5.419e-01  1.932e-01   2.805 0.005028 **
## odHOU-PLR      2.712e+00  2.462e-01  11.017  < 2e-16 ***
## odHOU-SEA     -4.513e-01  1.906e-01  -2.368 0.017898 *
## odHOU-TAY      3.904e-01  1.997e-01   1.956 0.050521 .
## odHOU-TOL      7.022e-01  1.989e-01   3.530 0.000416 ***
## odHOU-XBF      5.570e-01  1.992e-01   2.796 0.005179 **
## odHOU-XBL      9.136e-01  2.457e-01   3.718 0.000201 ***
## odHOU-XCB      8.068e-01  2.693e-01   2.996 0.002735 **
## odHOU-XCL      5.318e-01  2.020e-01   2.632 0.008478 **
## odHOU-XCM      8.915e-01  2.692e-01   3.312 0.000928 ***
## odHOU-XKE      5.967e-01  2.198e-01   2.715 0.006629 **
## odHOU-XWR      3.793e-01  2.457e-01   1.544 0.122663
## odJAX-LTC     -5.838e-01  1.919e-01  -3.043 0.002343 **
## odJAX-LTH     -7.444e-01  1.926e-01  -3.866 0.000111 ***
## odJAX-OAK     -6.287e-01  2.045e-01  -3.074 0.002115 **
## odJAX-SLC     -2.619e-01  1.919e-01  -1.364 0.172448
## odJAX-SPK     -4.068e-01  3.297e-01  -1.234 0.217171
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## odJAX-TAC     -1.039e+00  1.968e-01  -5.279 1.30e-07 ***
## odKAN-LTH     -1.594e-01  1.905e-01  -0.837 0.402819
## odKAN-OAK     -1.945e-01  1.923e-01  -1.011 0.311827
## odKAN-SEA     -1.089e-02  1.909e-01  -0.057 0.954509
## odKAN-SLC      3.168e-01  1.916e-01   1.654 0.098221 .
## odLTC-LTH      3.176e+00  2.019e-01  15.733  < 2e-16 ***
## odLTC-MIA     -4.014e-01  1.907e-01  -2.104 0.035354 *
## odLTC-TAC      6.966e-01  1.906e-01   3.654 0.000258 ***
## odLTC-TTS     -3.876e-01  1.912e-01  -2.027 0.042662 *
## odLTH-MIA     -8.604e-01  1.920e-01  -4.481 7.44e-06 ***
## odLTH-MRN     -4.449e-01  1.906e-01  -2.334 0.019623 *
## odLTH-MRV     -1.046e+00  1.914e-01  -5.466 4.62e-08 ***
## odLTH-NFK     -8.063e-01  1.947e-01  -4.141 3.46e-05 ***
## odLTH-PIT     -6.675e-01  1.921e-01  -3.474 0.000513 ***
## odLTH-TAC      1.594e+00  1.924e-01   8.286  < 2e-16 ***
## odLTH-TAY     -1.047e+00  1.954e-01  -5.359 8.40e-08 ***
## odLTH-TOL     -6.038e-01  1.972e-01  -3.061 0.002205 **
## odLTH-TTS     -7.906e-01  1.929e-01  -4.098 4.18e-05 ***
## odLTH-XBF     -4.229e-01  2.129e-01  -1.987 0.046981 *
## odLTH-XBL     -4.571e-01  2.692e-01  -1.698 0.089522 .
## odLTH-XCB     -3.504e-01  3.296e-01  -1.063 0.287726
## odLTH-XCL     -4.473e-01  1.957e-01  -2.285 0.022304 *
## odLTH-XCM     -6.963e-01  1.929e-01  -3.609 0.000308 ***
## odLTH-XCN     -2.757e-01  3.296e-01  -0.836 0.403026
## odLTH-XCR     -5.140e-01  2.056e-01  -2.499 0.012440 *
## odLTH-XCS     -4.306e-01  3.297e-01  -1.306 0.191524
## odLTH-XJX     -4.105e-01  2.253e-01  -1.823 0.068366 .
## odLTH-XKE     -7.523e-01  2.036e-01  -3.695 0.000220 ***
## odLTH-XMI     -5.309e-01  2.459e-01  -2.159 0.030839 *
## odLTH-XNS     -2.136e-01  3.296e-01  -0.648 0.516973
## odLTH-XOR     -4.019e-01  2.253e-01  -1.784 0.074475 .
## odLTH-XPH     -6.575e-01  3.297e-01  -1.994 0.046120 *
## odLTH-XPO     -6.068e-01  2.693e-01  -2.253 0.024240 *
## odLTH-XSV     -6.568e-01  2.692e-01  -2.440 0.014696 *
## odLTH-XSY     -6.546e-01  2.692e-01  -2.431 0.015052 *
## odLTH-XTP     -4.848e-01  1.961e-01  -2.472 0.013421 *
## odLVG-MRV     -6.055e-01  1.970e-01  -3.073 0.002117 **
## odLVG-PIT     -2.072e-01  2.197e-01  -0.943 0.345658
## odLVG-TAY     -5.712e-01  2.691e-01  -2.122 0.033831 *
## odMIA-OAK     -7.779e-01  1.922e-01  -4.048 5.16e-05 ***
## odMIA-SLC     -4.465e-01  1.922e-01  -2.324 0.020143 *
## odMIA-SPK     -5.816e-01  2.087e-01  -2.787 0.005318 **
## odMIA-TAC     -1.125e+00  2.107e-01  -5.338 9.43e-08 ***
## odMRN-OAK     -4.974e-01  1.923e-01  -2.587 0.009695 **
## odMRN-PLR      7.128e-01  2.037e-01   3.499 0.000467 ***
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## odMRN-SEA     -5.038e-01  1.912e-01  -2.635 0.008418 **
## odMRN-SLC      6.951e-02  1.915e-01   0.363 0.716594
## odMRV-OAK     -1.060e+00  1.940e-01  -5.466 4.63e-08 ***
## odMRV-PLR     -6.714e-02  1.928e-01  -0.348 0.727613
## odMRV-SLC     -2.300e-01  1.945e-01  -1.182 0.237072
## odMRV-SPK     -6.910e-01  2.128e-01  -3.247 0.001168 **
## odMRV-STX      2.019e-01  2.331e-01   0.866 0.386418
## odMRV-TAC     -9.444e-01  1.918e-01  -4.923 8.54e-07 ***
## odMRV-TUC     -3.246e-01  2.006e-01  -1.618 0.105667
## odNFK-OAK     -9.421e-01  2.160e-01  -4.363 1.29e-05 ***
## odNFK-PLR      9.832e-01  3.296e-01   2.983 0.002856 **
## odNFK-SLC     -2.797e-01  2.012e-01  -1.390 0.164487
## odNFK-TAC     -8.308e-01  1.972e-01  -4.214 2.52e-05 ***
## odOAK-PIT     -6.275e-01  1.966e-01  -3.191 0.001416 **
## odOAK-PLR      9.184e-02  1.948e-01   0.471 0.637319
## odOAK-SLC      1.173e+00  1.974e-01   5.942 2.83e-09 ***
## odOAK-STX      3.419e-02  1.962e-01   0.174 0.861651
## odOAK-TAY     -1.095e+00  2.199e-01  -4.979 6.41e-07 ***
## odOAK-TOL     -5.863e-01  2.006e-01  -2.923 0.003472 **
## odOAK-XAH     -3.819e-01  2.252e-01  -1.696 0.089934 .
## odOAK-XBF     -3.810e-01  2.332e-01  -1.634 0.102257
## odOAK-XBL     -5.628e-01  2.458e-01  -2.290 0.022028 *
## odOAK-XCL     -5.034e-01  2.019e-01  -2.494 0.012646 *
## odOAK-XCM     -6.528e-01  2.045e-01  -3.191 0.001416 **
## odOAK-XCR     -6.026e-01  2.253e-01  -2.675 0.007485 **
## odOAK-XKE     -7.353e-01  2.028e-01  -3.626 0.000288 ***
## odOAK-XOR     -5.686e-01  3.297e-01  -1.724 0.084628 .
## odOAK-XPH     -6.592e-01  2.692e-01  -2.448 0.014350 *
## odOAK-XPO     -6.924e-01  2.332e-01  -2.969 0.002993 **
## odOAK-XSY     -6.266e-01  2.253e-01  -2.781 0.005415 **
## odOAK-XTP     -4.319e-01  3.297e-01  -1.310 0.190203
## odOAK-XWR     -6.379e-01  3.298e-01  -1.934 0.053088 .
## odPIT-PLR      3.249e-01  2.056e-01   1.580 0.114023
## odPIT-SLC      8.246e-02  1.996e-01   0.413 0.679505
## odPIT-SPK     -3.108e-01  2.198e-01  -1.414 0.157348
## odPIT-STX      6.694e-01  3.297e-01   2.030 0.042311 *
## odPIT-TAC     -6.069e-01  1.946e-01  -3.118 0.001821 **
## odPLR-TAY     -6.750e-02  3.296e-01  -0.205 0.837737
## odPLR-TOL      3.702e-01  2.457e-01   1.507 0.131906
## odPLR-XAH      8.418e-01  2.130e-01   3.953 7.73e-05 ***
## odPLR-XBL      1.233e-01  2.457e-01   0.502 0.615902
## odPLR-XCB      4.288e-01  1.973e-01   2.173 0.029772 *
## odPLR-XCL      2.166e-01  2.457e-01   0.881 0.378070
## odPLR-XCM      2.009e-01  3.296e-01   0.609 0.542292
## odPLR-XCN      5.052e-01  2.692e-01   1.876 0.060618 .
```

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## odPLR-XCR      4.627e-01  2.129e-01   2.173 0.029759 *
## odPLR-XCS      3.031e-01  2.199e-01   1.379 0.167965
## odPLR-XJX      6.574e-01  2.130e-01   3.087 0.002021 **
## odPLR-XKE      2.259e-01  1.929e-01   1.171 0.241478
## odPLR-XMI      2.941e-01  2.331e-01   1.262 0.207080
## odPLR-XOR      8.269e-01  2.199e-01   3.761 0.000170 ***
## odPLR-XPH      2.757e-01  2.035e-01   1.355 0.175384
## odPLR-XPO      9.409e-02  2.158e-01   0.436 0.662863
## odPLR-XSY      2.865e-01  2.034e-01   1.409 0.158986
## odPLR-XTP      5.235e-01  3.297e-01   1.588 0.112336
## odPLR-XWR      1.205e-01  2.691e-01   0.448 0.654323
## odPLR-YDC      3.062e-01  1.907e-01   1.606 0.108280
## odSLC-TAY     -1.544e-01  2.018e-01  -0.765 0.444176
## odSLC-TOL      2.864e-01  2.069e-01   1.384 0.166290
## odSLC-TTS     -3.424e-01  1.992e-01  -1.719 0.085610 .
## odSLC-XAH      1.957e-01  2.457e-01   0.797 0.425597
## odSLC-XBF     -7.743e-03  3.296e-01  -0.023 0.981258
## odSLC-XBL     -8.933e-02  2.001e-01  -0.447 0.655229
## odSLC-XCB      9.721e-03  3.296e-01   0.029 0.976473
## odSLC-XCL     -3.464e-02  2.056e-01  -0.169 0.866183
## odSLC-XCM     -9.028e-02  2.104e-01  -0.429 0.667851
## odSLC-XCR     -1.325e-01  2.026e-01  -0.654 0.513005
## odSLC-XCS     -2.451e-01  2.457e-01  -0.998 0.318357
## odSLC-XJX     -1.667e-01  3.296e-01  -0.506 0.613114
## odSLC-XKE     -2.727e-01  2.018e-01  -1.351 0.176642
## odSLC-XMI     -3.196e-01  2.331e-01  -1.371 0.170355
## odSLC-XNS      1.387e-01  3.296e-01   0.421 0.673963
## odSLC-XOR     -1.969e-01  2.692e-01  -0.731 0.464482
## odSLC-XPH     -1.800e-01  2.069e-01  -0.870 0.384182
## odSLC-XPO     -2.677e-01  2.019e-01  -1.326 0.184814
## odSLC-XSY     -1.259e-01  2.056e-01  -0.613 0.540204
## odSLC-XTP     -2.330e-01  2.069e-01  -1.126 0.260214
## odSLC-XWR     -2.552e-01  2.128e-01  -1.199 0.230375
## odSPK-TAY     -3.925e-01  2.128e-01  -1.844 0.065153 .
## odSPK-XAH     -3.604e-01  2.006e-01  -1.797 0.072386 .
## odSPK-XBL     -4.273e-01  2.056e-01  -2.078 0.037678 *
## odSPK-XCB     -1.383e-01  2.158e-01  -0.641 0.521458
## odSPK-XCL     -1.865e-01  2.056e-01  -0.907 0.364340
## odSPK-XCM     -3.353e-01  2.252e-01  -1.489 0.136553
## odSPK-XCR     -4.339e-01  2.331e-01  -1.862 0.062671 .
## odSPK-XCS     -5.870e-01  2.692e-01  -2.181 0.029207 *
## odSPK-XJX     -3.978e-01  2.692e-01  -1.478 0.139471
## odSPK-XKE     -4.462e-01  2.086e-01  -2.139 0.032413 *
## odSPK-XNS     -3.004e-01  2.691e-01  -1.116 0.264388
## odSPK-XOR     -4.378e-01  2.159e-01  -2.028 0.042566 *
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## odSPK-XPH     -4.299e-01  2.198e-01  -1.956 0.050503 .
## odSPK-XPO     -6.177e-01  2.692e-01  -2.294 0.021773 *
## odSPK-XSV     -3.538e-01  2.198e-01  -1.609 0.107582
## odSPK-XSY     -4.192e-01  2.692e-01  -1.557 0.119431
## odSPK-XTP     -4.326e-01  2.253e-01  -1.920 0.054831 .
## odSTX-XAH      7.765e-01  2.693e-01   2.883 0.003937 **
## odSTX-XBF      4.957e-01  2.457e-01   2.018 0.043622 *
## odSTX-XCB      4.814e-01  2.252e-01   2.137 0.032578 *
## odSTX-XCL      1.728e-01  2.457e-01   0.703 0.481937
## odSTX-XJX      6.494e-01  2.332e-01   2.784 0.005363 **
## odSTX-XKE      3.619e-01  2.457e-01   1.473 0.140757
## odSTX-XMI      6.753e-01  2.252e-01   2.998 0.002719 **
## odSTX-XMR      3.578e-01  2.458e-01   1.456 0.145461
## odSTX-XPH      2.879e-01  2.056e-01   1.400 0.161384
## odSTX-XPO      2.183e-01  2.457e-01   0.888 0.374416
## odSTX-XTP      8.351e-01  2.332e-01   3.582 0.000342 ***
## odSTX-YDC      5.468e-01  1.930e-01   2.833 0.004612 **
## odTAC-TAY     -8.565e-01  2.086e-01  -4.107 4.02e-05 ***
## odTAC-TOL     -3.633e-01  1.988e-01  -1.828 0.067578 .
## odTAC-TTS     -1.038e+00  1.967e-01  -5.279 1.31e-07 ***
## odTAC-XBF     -5.435e-01  3.296e-01  -1.649 0.099181 .
## odTAC-XBL     -6.739e-01  2.129e-01  -3.166 0.001546 **
## odTAC-XCL     -5.151e-01  2.069e-01  -2.489 0.012803 *
## odTAC-XCM     -6.389e-01  2.057e-01  -3.106 0.001894 **
## odTAC-XCR     -9.503e-01  3.298e-01  -2.881 0.003962 **
## odTAC-XCS     -9.307e-01  2.693e-01  -3.456 0.000549 ***
## odTAC-XJX     -9.388e-01  2.160e-01  -4.346 1.39e-05 ***
## odTAC-XKE     -7.924e-01  3.297e-01  -2.404 0.016239 *
## odTAC-XMI     -1.012e+00  2.131e-01  -4.747 2.07e-06 ***
## odTAC-XOR     -9.212e-01  2.200e-01  -4.186 2.84e-05 ***
## odTAC-XPH     -7.899e-01  2.027e-01  -3.896 9.79e-05 ***
## odTAC-XPO     -7.850e-01  2.159e-01  -3.635 0.000278 ***
## odTAC-XSY     -6.166e-01  2.046e-01  -3.014 0.002579 **
## odTAC-XTP     -9.017e-01  2.254e-01  -4.000 6.35e-05 ***
## odTAY-TUC     -2.554e-01  3.296e-01  -0.775 0.438484
## odTOR-TUC      9.583e+00  2.457e-01  38.996  < 2e-16 ***
## odTTS-TUC      3.182e-01  3.296e-01   0.965 0.334447
## odTUC-XAH      5.992e-01  2.069e-01   2.896 0.003776 **
## odTUC-XBF     -3.431e-02  2.252e-01  -0.152 0.878885
## odTUC-XBL     -8.393e-02  2.691e-01  -0.312 0.755155
## odTUC-XBM      5.648e-01  3.296e-01   1.713 0.086626 .
## odTUC-XCB      2.234e-01  2.457e-01   0.909 0.363130
## odTUC-XCL     -6.273e-03  2.069e-01  -0.030 0.975808
## odTUC-XCM     -1.696e-01  2.691e-01  -0.630 0.528659
## odTUC-XCN      3.062e-01  2.457e-01   1.247 0.212584
```

```
## odTUC-XCR      1.684e-01  2.158e-01   0.781 0.435063
## odTUC-XCS     -1.374e-01  3.296e-01  -0.417 0.676824
## odTUC-XJX      5.033e-01  3.296e-01   1.527 0.126761
## odTUC-XKE     -1.556e-01  2.012e-01  -0.773 0.439363
## odTUC-XMI      2.040e-01  2.158e-01   0.945 0.344504
## odTUC-XNS      5.313e-01  3.296e-01   1.612 0.106988
## odTUC-XOR      9.300e-02  3.296e-01   0.282 0.777842
## odTUC-XPH     -1.938e-01  2.198e-01  -0.882 0.377987
## odTUC-XPO     -1.520e-01  2.158e-01  -0.704 0.481270
## odTUC-XSY     -1.965e-01  2.331e-01  -0.843 0.399284
## odTUC-XTP      4.674e-01  2.691e-01   1.737 0.082453 .
## TOTAL_MILES    5.709e-04  1.014e-05  56.295  < 2e-16 ***
## BROKER_LOBIMC  1.425e-02  2.467e-03   5.776 7.69e-09 ***
## BROKER_LOBMTR  7.016e-03  3.314e-03   2.117 0.034255 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.2691 on 69858 degrees of freedom
## Multiple R-squared:  0.468,Adjusted R-squared:  0.4643
## F-statistic: 123.9 on 496 and 69858 DF,  p-value: < 2.2e-16

lm.fit3<-lm(RevMile~TOTAL_MILES+BROKER_LOB,DSTrain)
summary(lm.fit3)

##
## Call:
## lm(formula = RevMile ~ TOTAL_MILES + BROKER_LOB, data = DSTrain)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -0.7902 -0.2233 -0.0241  0.1986 27.7407
##
## Coefficients:
##                 Estimate Std. Error  t value Pr(>|t|)
## (Intercept)    1.738e+00  5.176e-03  335.699  < 2e-16 ***
## TOTAL_MILES   -2.397e-04  2.379e-06 -100.738  < 2e-16 ***
## BROKER_LOBIMC  3.035e-02  3.091e-03    9.821  < 2e-16 ***
## BROKER_LOBMTR  1.377e-02  4.150e-03    3.317  0.00091 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.3436 on 70351 degrees of freedom
## Multiple R-squared:  0.1268,Adjusted R-squared:  0.1268
## F-statistic:  3406 on 3 and 70351 DF,  p-value: < 2.2e-16

predtest<-predict(lm.fit,DSTest,interval="confidence",level=0.95,se.fit=T)
```

```
## Error in model.frame.default(Terms, newdata, na.action = na.action,
xlev = object$xlevels):  factor ORIG_RAMP_LOCATION has new levels CIN
```

Loyal Customers
High Demand Routes
Loyal Customers on High Demand Routes
Different Months?

4 Results

5 Conclusion