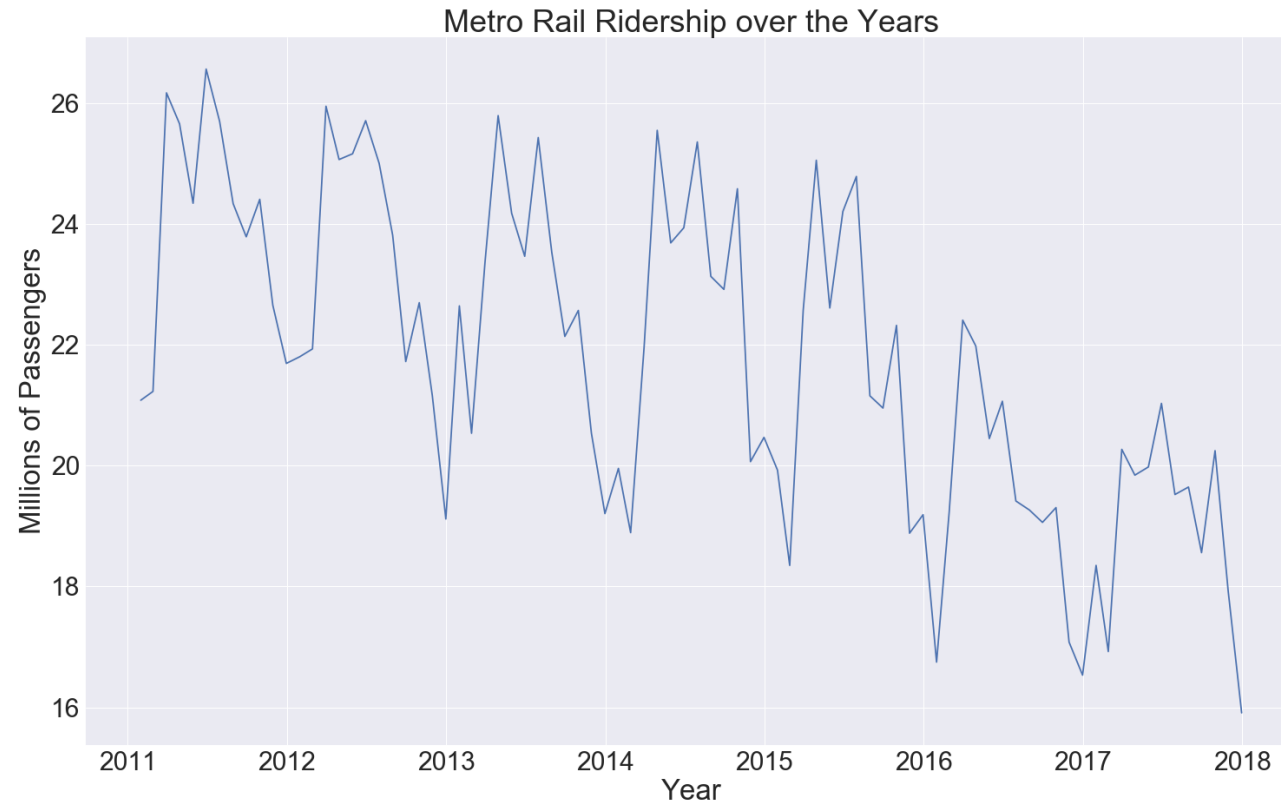


Question: Does time of year impact demand for transportation resources?



The graph of the ridership data is characteristic of a time series.

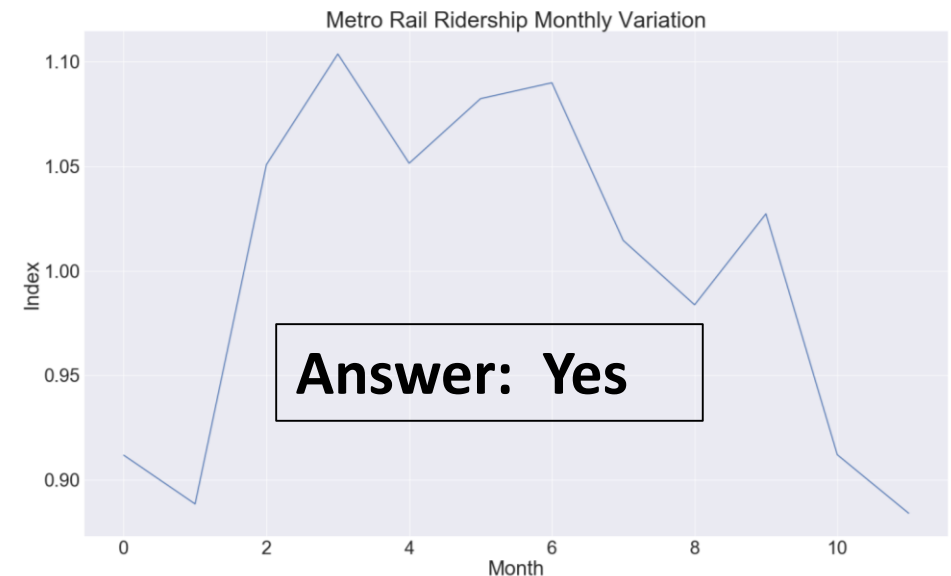
1. Long Term Trend or Movement
2. Seasonal Movement
3. Long-Term Cyclical Movement
4. Irregular Movement:

Seasonal Variation Found by the Average Percentage Method.

1. Each month ridership data expressed as a percentages for the whole year ridership.
2. Percentages from corresponding months of different years are averaged.
3. The resulting twelve percentages are the seasonal index.

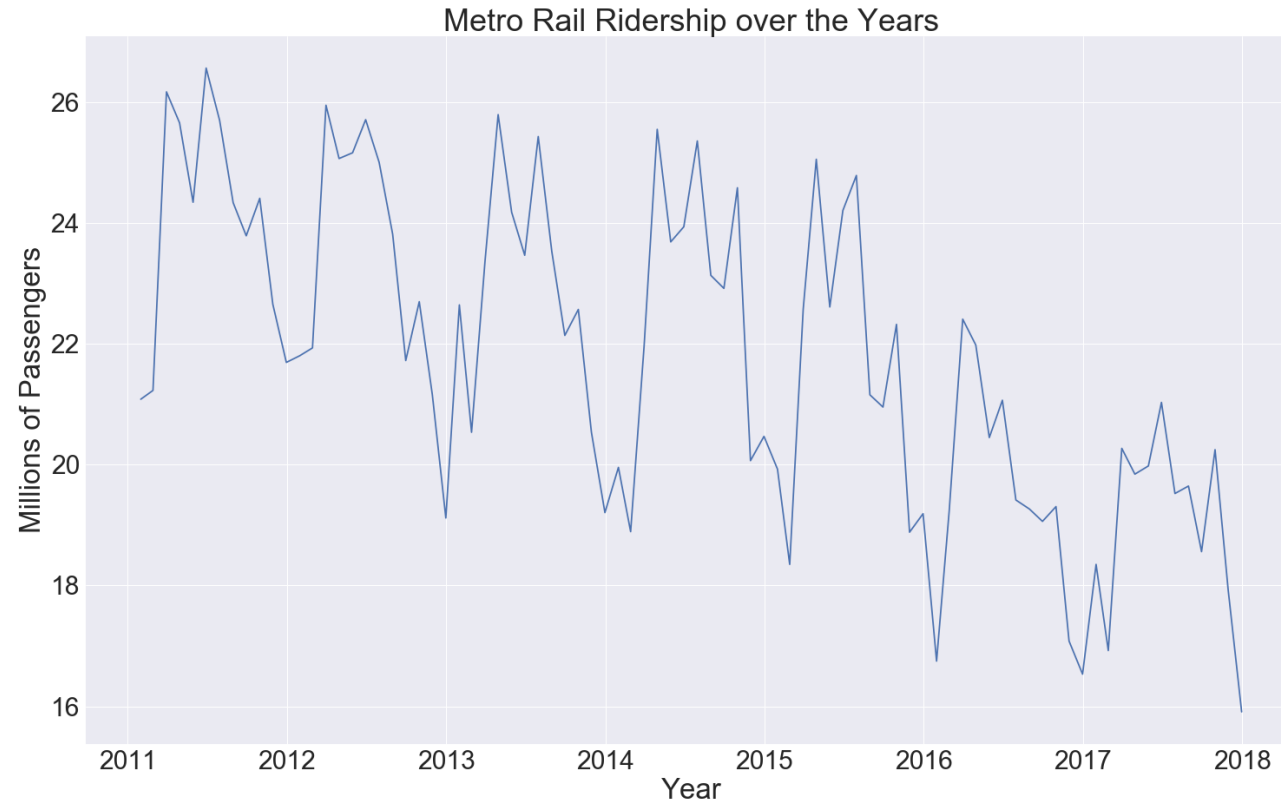
Apr--> 1.10368129252
Jul--> 1.08992193836
Jun--> 1.08230835178
May--> 1.05142726816
Mar--> 1.05080554826
Oct--> 1.02724980163
Aug--> 1.01451853912
Sep--> 0.983724432431
Nov--> 0.912028007182
Jan--> 0.911812450609
Feb--> 0.888482637347
Dec--> 0.884039732595

On average, ridership is the lowest in December and highest in April



Answer: Yes

Question: Is there an overall trend in ridership on metro?



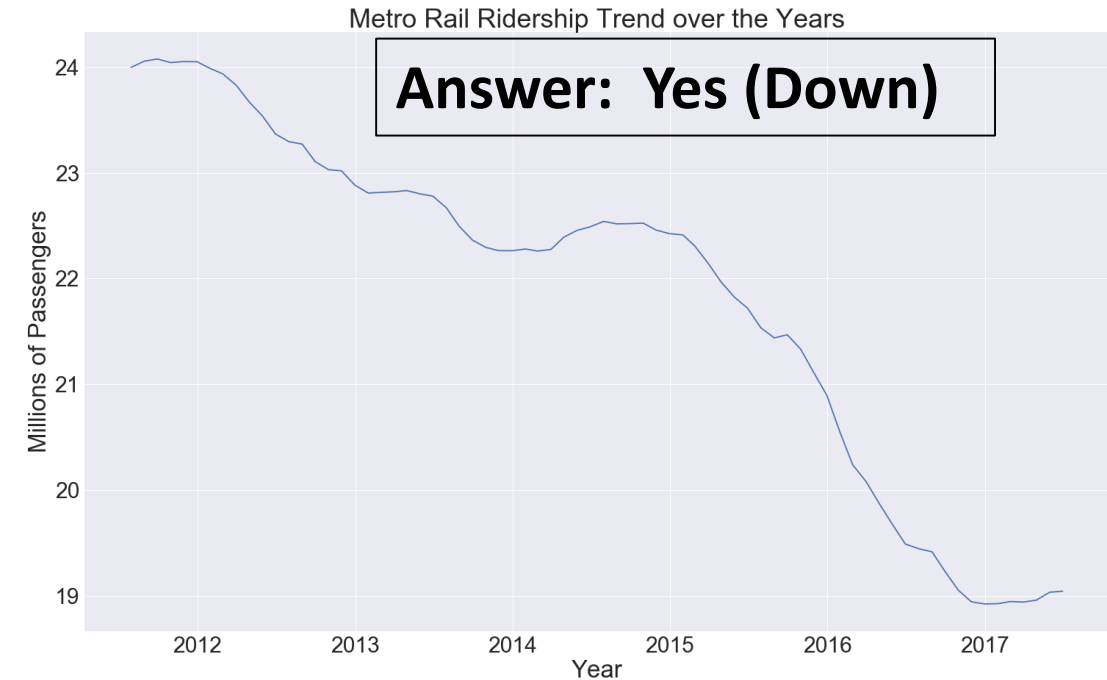
The graph of the ridership data is characteristic of a time series.

1. Long Term Trend or Movement
2. Seasonal Movement
3. Long-Term Cyclical Movement
4. Irregular Movement:

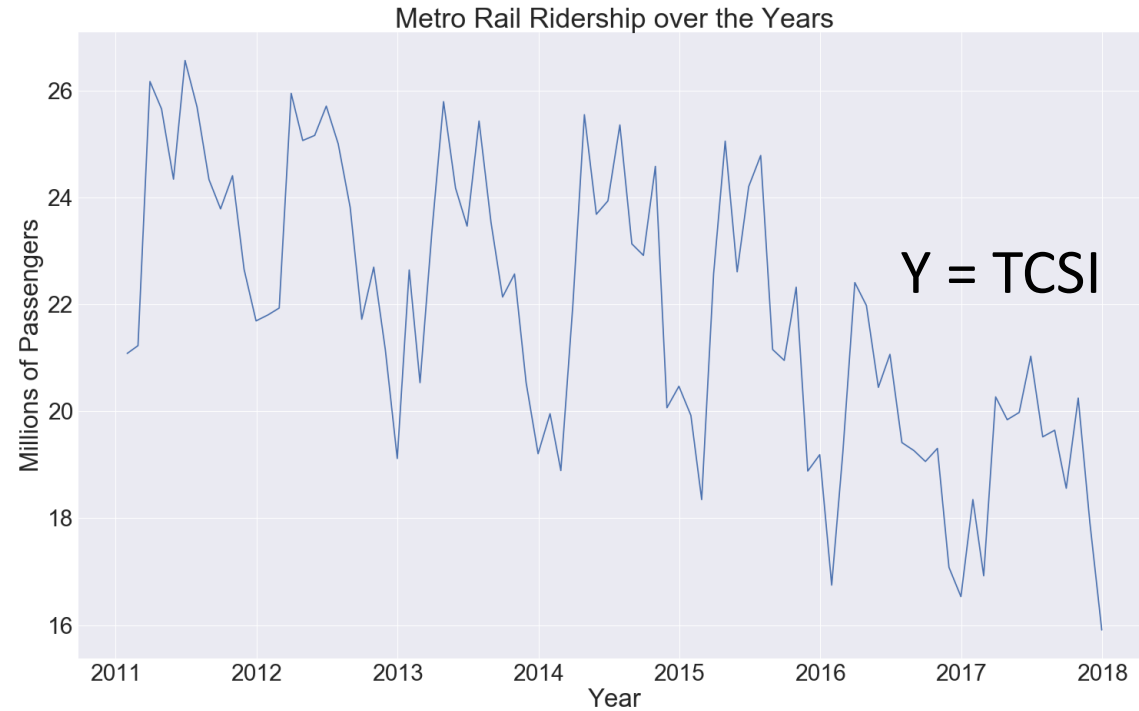
Time series variable: Y describes the observations.

$$Y = T \times C \times S \times I = TCSI$$

T : Trend
C : Cyclical Movement
S : Seasonal Variation
I : Irregular Movement



Ridership Data is characteristic of a time series.



$$Y = TCSI$$

Y : Observation (Number of Passengers)

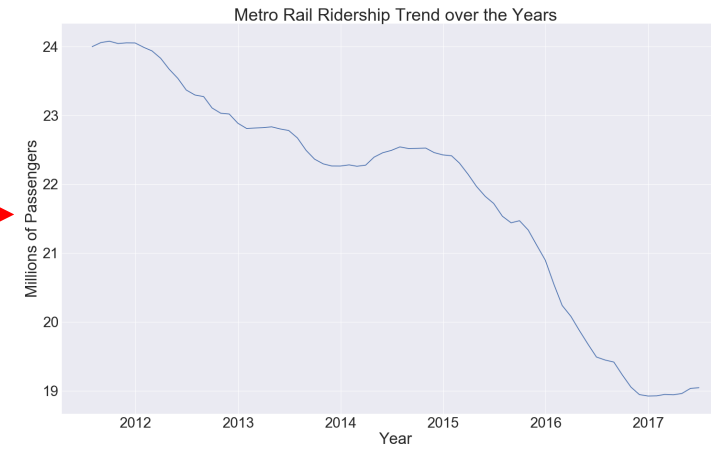
T : Trend

C : Cyclical Movement

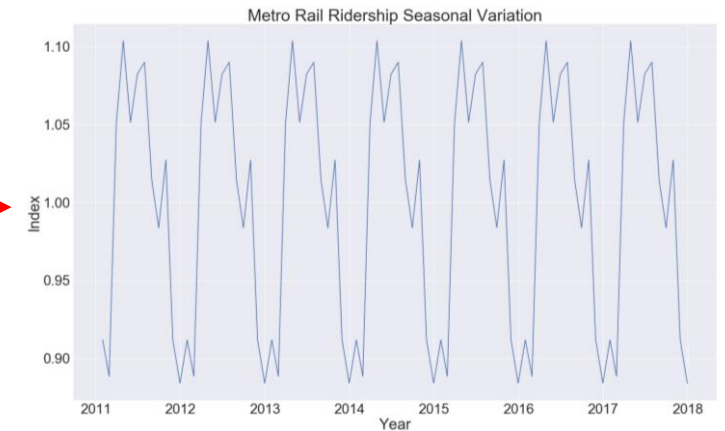
S : Seasonal Variation

I : Irregular Movement

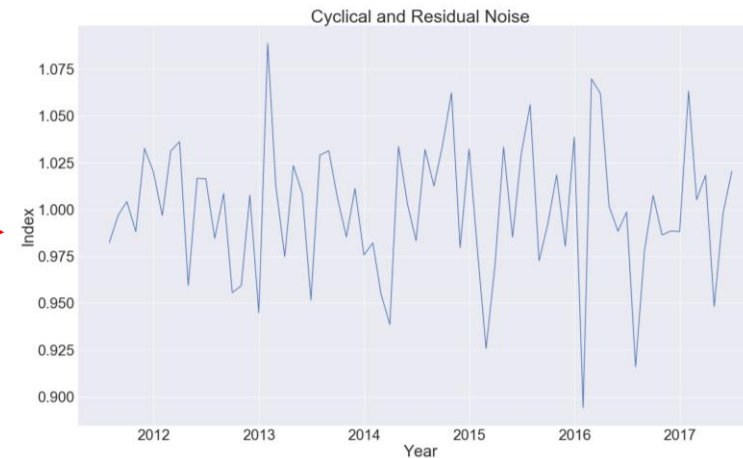
T →



S →

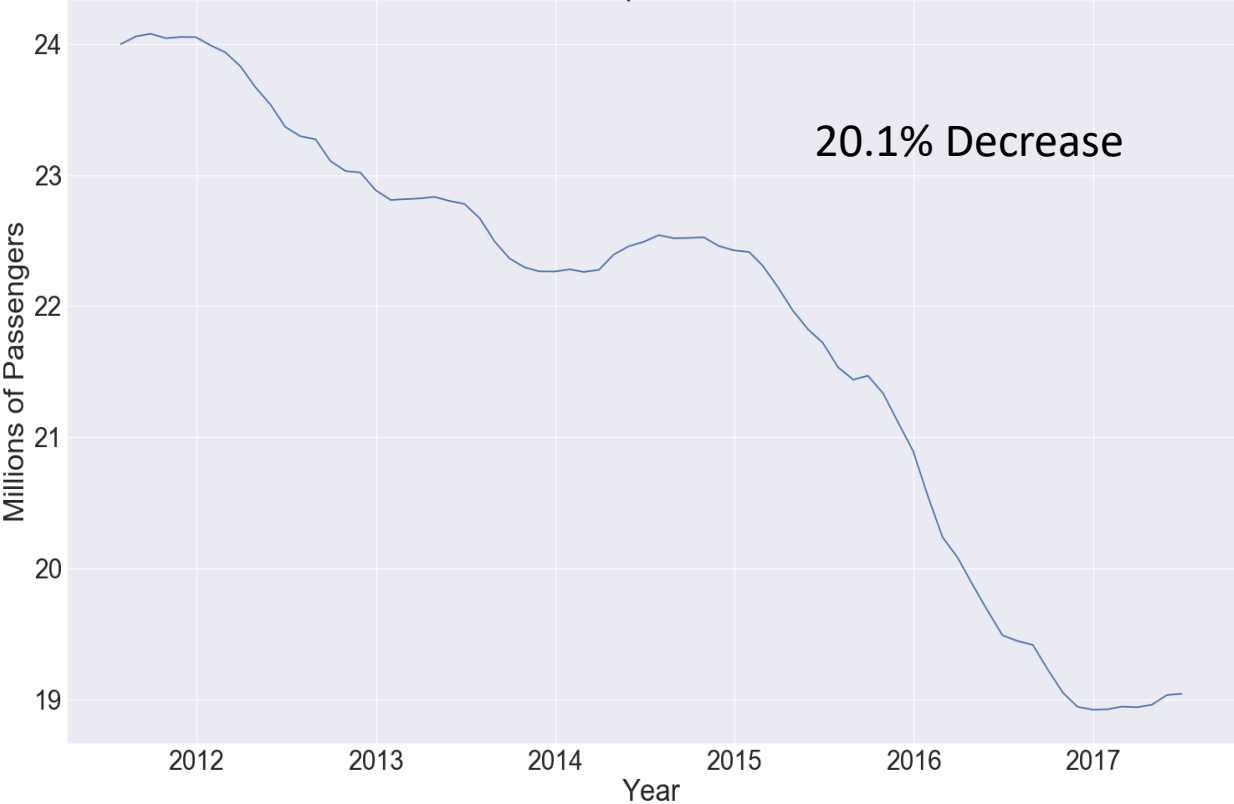


CI →



Could External Factors Impact Ridership?

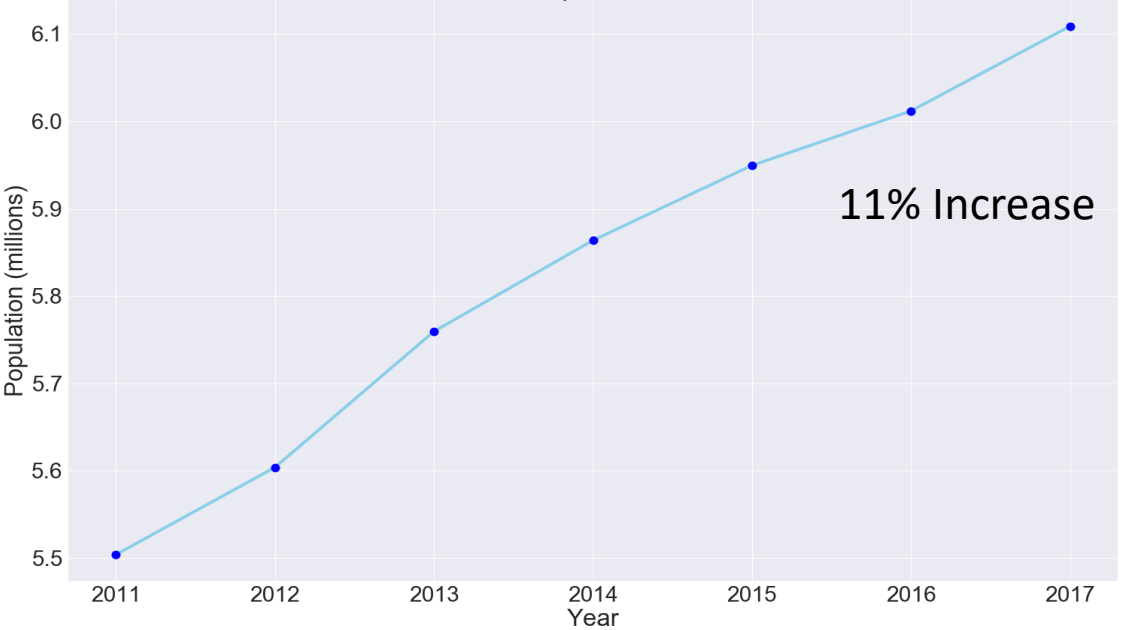
Metro Rail Ridership Trend over the Years



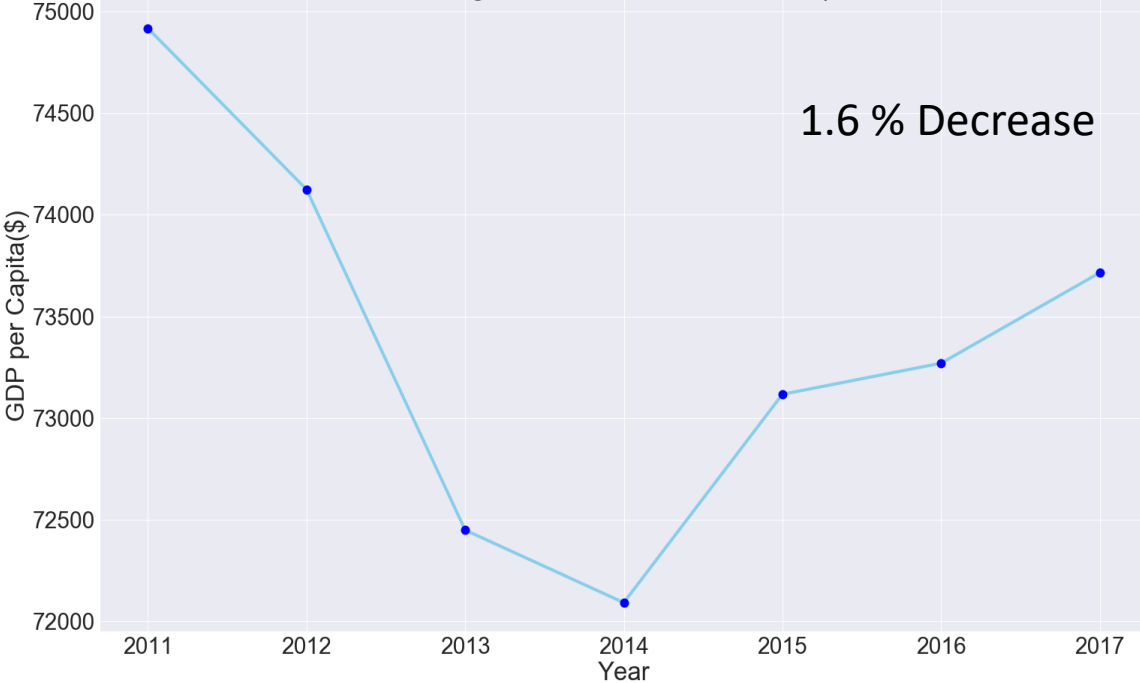
Population Increased during the interval ridership declined.
Population is ruled out.

Economic conditions in terms of GDP per Capita declined during the interval ridership declined. However, GDP per Capita increased from 2014 to 2017 by 2.25% while ridership experienced its greatest decline (15.5%) during this same time period.
Economic Conditions ruled out.

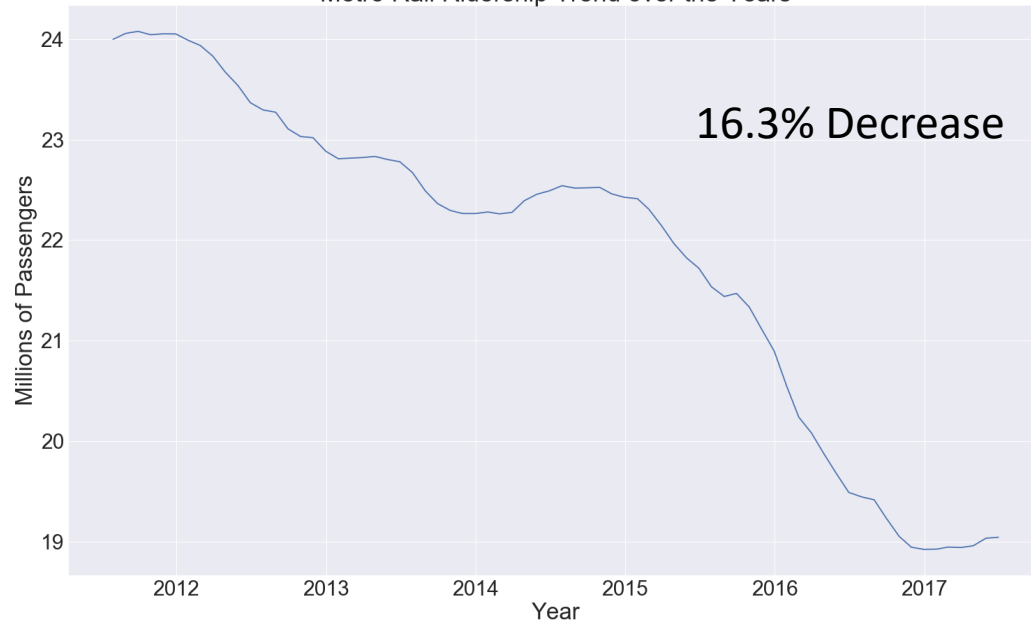
Population



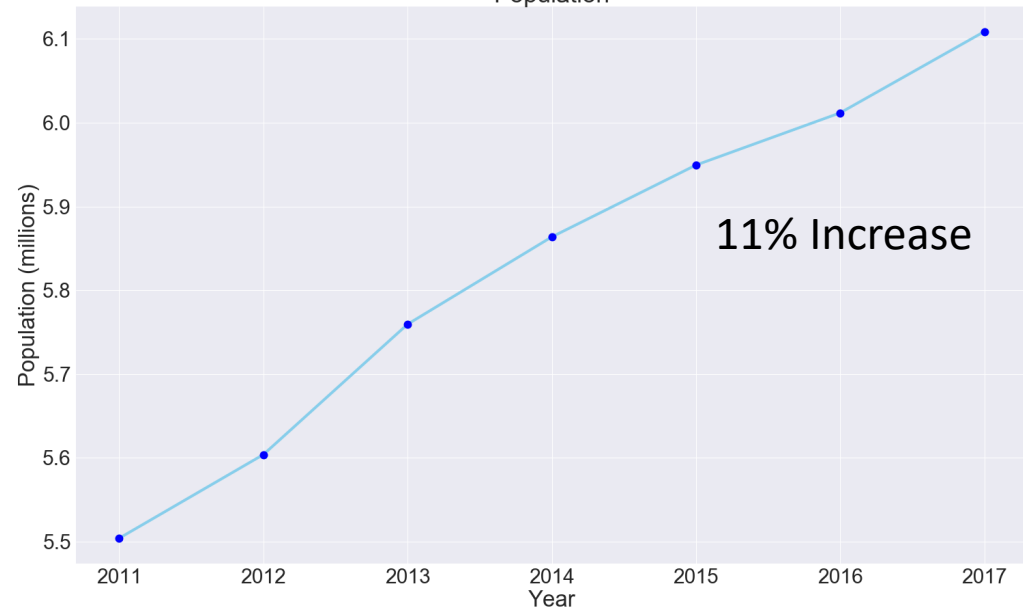
Washington Metro Area GDP Per Capita



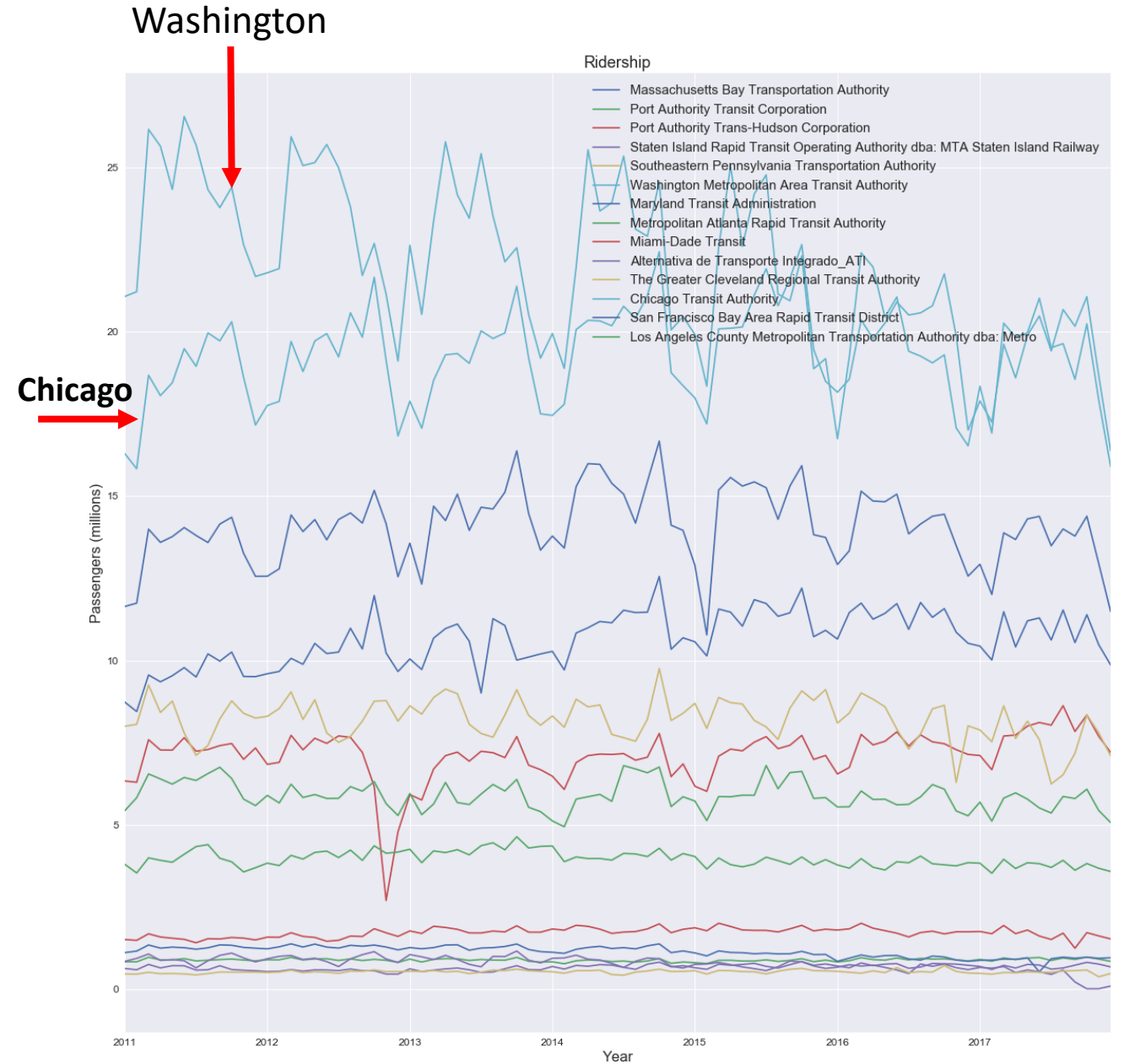
Metro Rail Ridership Trend over the Years



Population



Comparison with Other Metro Transit Authorities



Closer look comparing Chicago with Washington Metro



What is causing Washington Metro ridership to decline?

