Hypothesis: Identifying and analyzing key performance indicators of a vehicle which are essential in a sale/purchase deal in order to **find out factors responsible for Carvana's downfall in revenue** and make recommendations based on my analysis **to stabilize and boost comapany's revenue**.

Data Source: Carvana's Official Dataset, representing the characteristic of bought/sold vehicles.

Analytics-
Using visual analytics identifying some leading indicators of a bad buy.

Carvana Dataset consists of the following variables which are directly/indirectly supposed to impact the 'IsBadBuy' factor:

Continuous Numerical Columns:
['VehOdo', 'MMRAcquisitionAuctionAveragePrice', 'MMRAcquisitionAuctionCleanPrice', 'MMRAcquisitionRetailAveragePrice', 'MMRAcquisitonRetailCleanPrice', 'MMRCurrentAuctionAveragePrice', 'MMRCurrentAuctionCleanPrice', 'MMRCurrentRetailAveragePrice', 'MMRCurrentRetailCleanPrice', 'BYRNO', 'VNZIP1', 'VehBCost', 'WarrantyCost']

Low Cardinality Numerical Columns:
['VehYear', 'VehicleAge', 'WheelTypeID', 'IsOnlineSale']
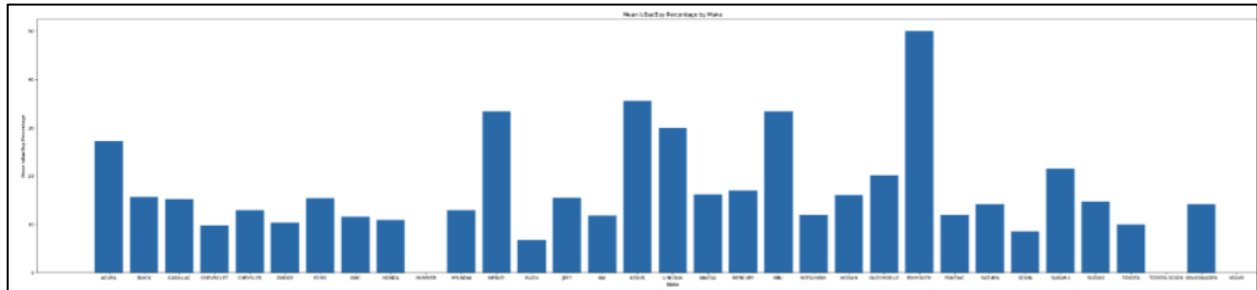
Low Cardinality Categorical Columns:
['Auction', 'Transmission', 'WheelType', 'Nationality', 'TopThreeAmericanName']

High Cardinality Categorical Columns:
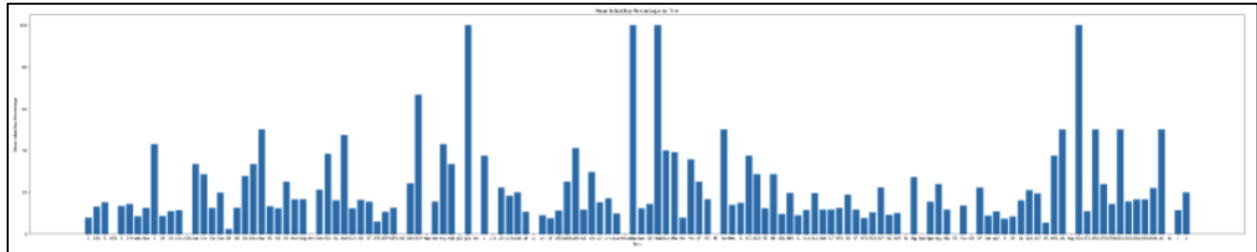['Make', 'Model', 'Trim', 'SubModel', 'Color', 'Size', 'VNST']

Leading Indicators:

1. Make - Vehicle Manufacturer

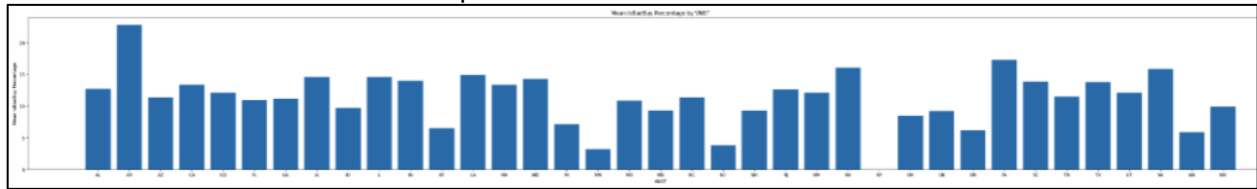Major Manufacturers which contribute to 'IsBadBuy' are:
Plymouth, Lexus, Infiniti, Mini, Lincoln, Acura
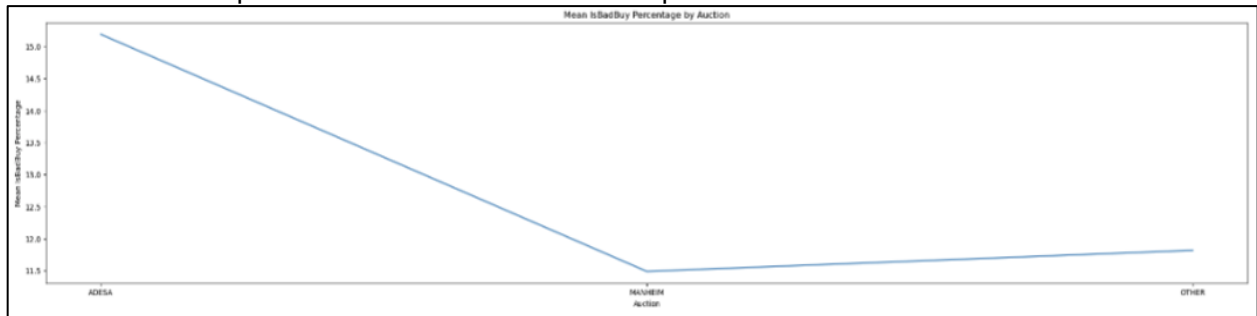
2. **Trim** - Vehicle Trim Level

Major Trim levels which contribute to 'IsBadBuy' are: **JLX, Maz, Out, Z24, GXP**

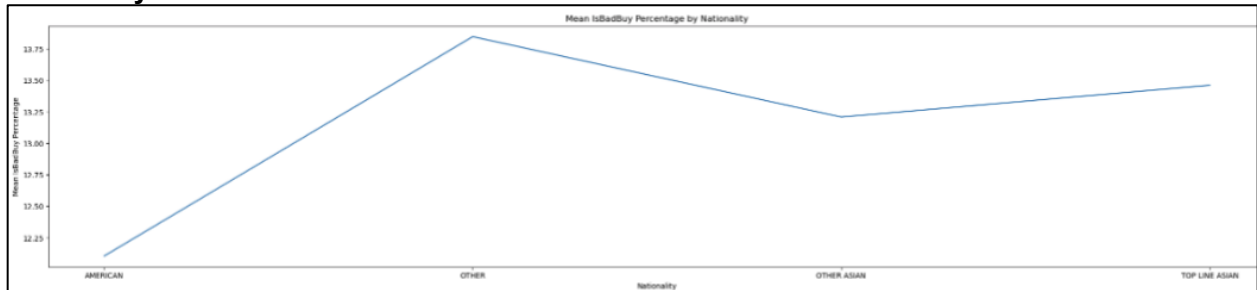3. **VNST** - State where the the car was purchased

Major states which contribute to 'IsBadBuy' are: **AR, PA, NV, VA**

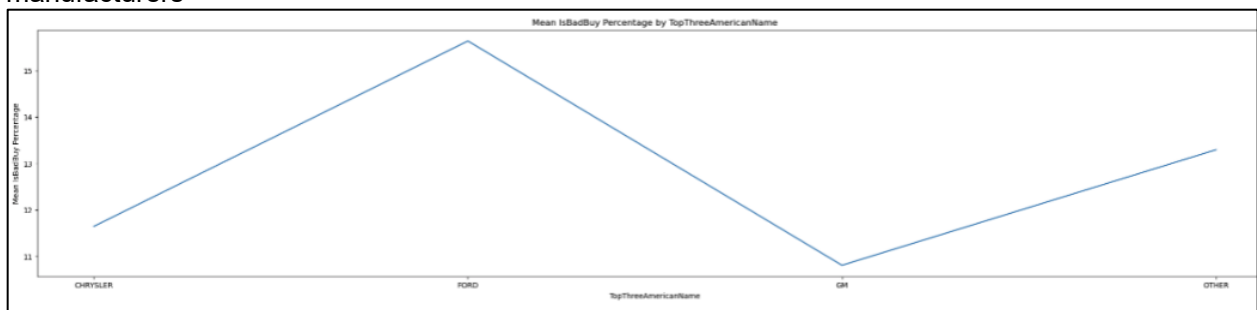4. **Auction** - Auction provider at which the vehicle was purchase

Major Contributing Auction to 'IsBadBuy: **ADESA**
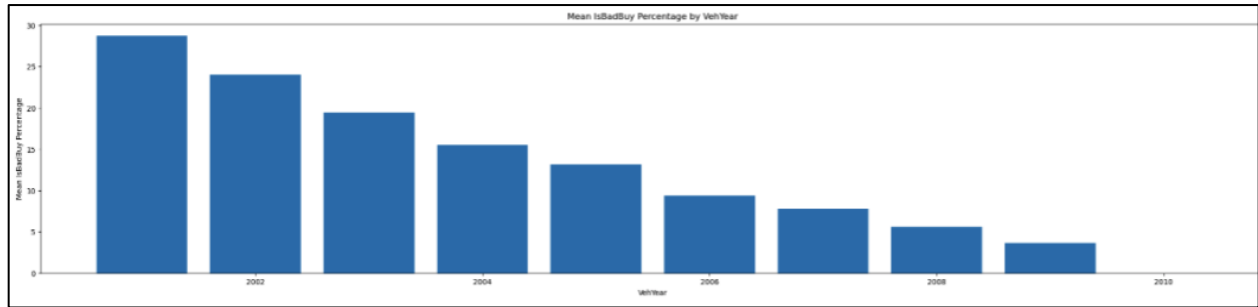
5. **Nationality**

Major Nationalities which contribute to 'IsBadBuy' are: Other, Other Asian, Top Line Asian

6. **TopThreeAmericanName** - Identifies if the manufacturer is one of the top three American manufacturers
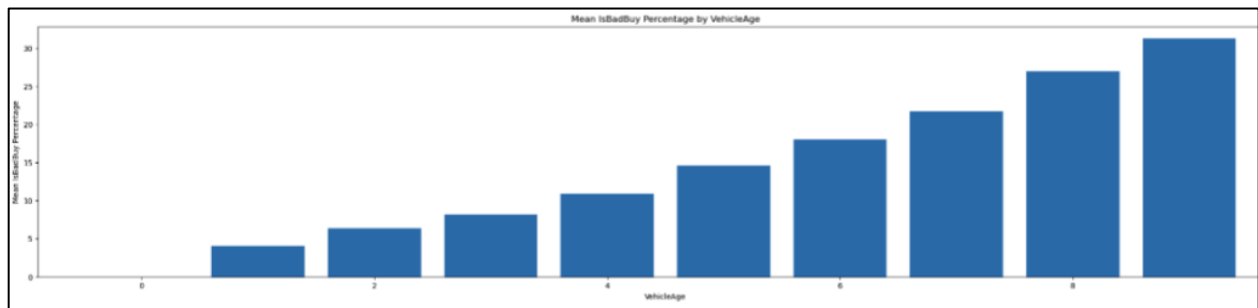

Out of three major American Manufacturers: Ford is contributing to 'IsBadBuy' the most

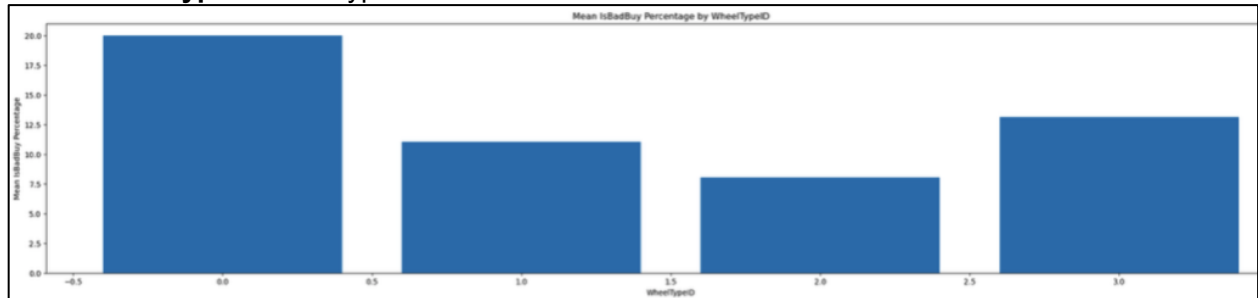7. **VehYear** - The manufacturer's year of the vehicle

Mean IsBadBuy Percentage by VehYear

With the increase in year the 'IsBadBuy' decreases, Inversely related

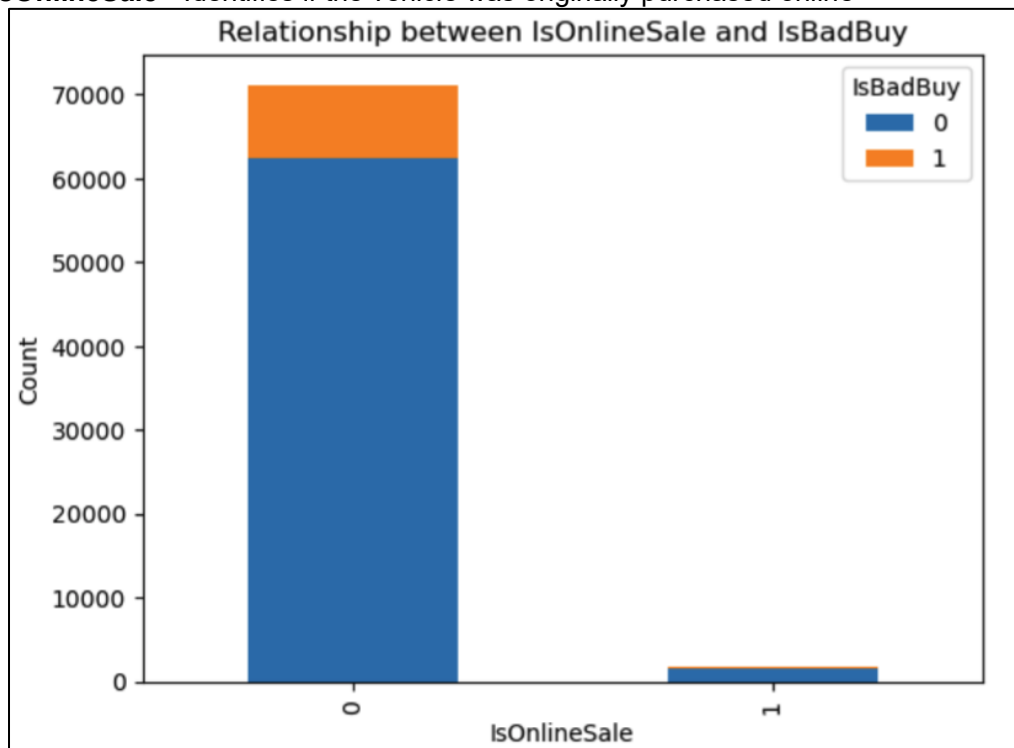8. **VehicleAge** - The Years elapsed since the manufacturer's year

Mean IsBadBuy Percentage by VehicleAge

With the increase in car's age the 'IsBadBuy' increases, Directly Related

9. **WheelTypeID** - The type id of the vehicle wheel

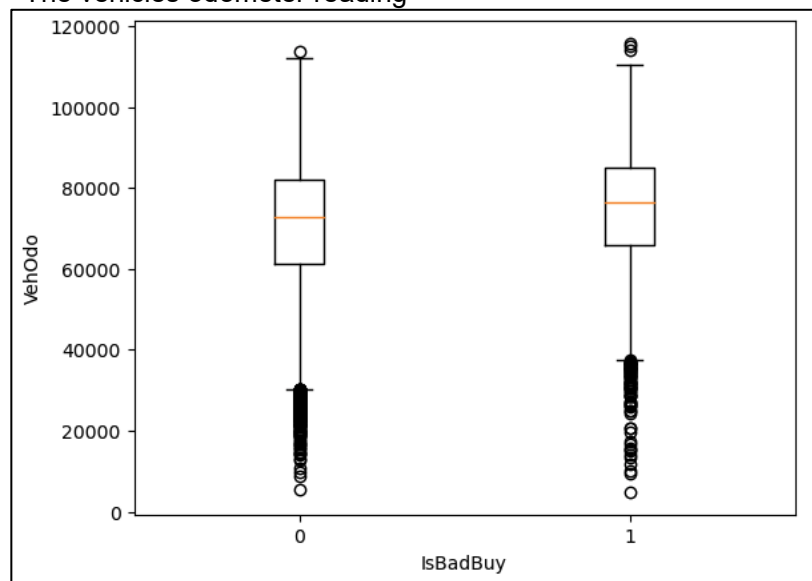Mean IsBadBuy Percentage by WheelTypeID

As shown in the figure above, the wheelTypeID 0.0 is contributing maximum to the 'IsBadBuy'

10. **IsOnlineSale** - Identifies if the vehicle was originally purchased online
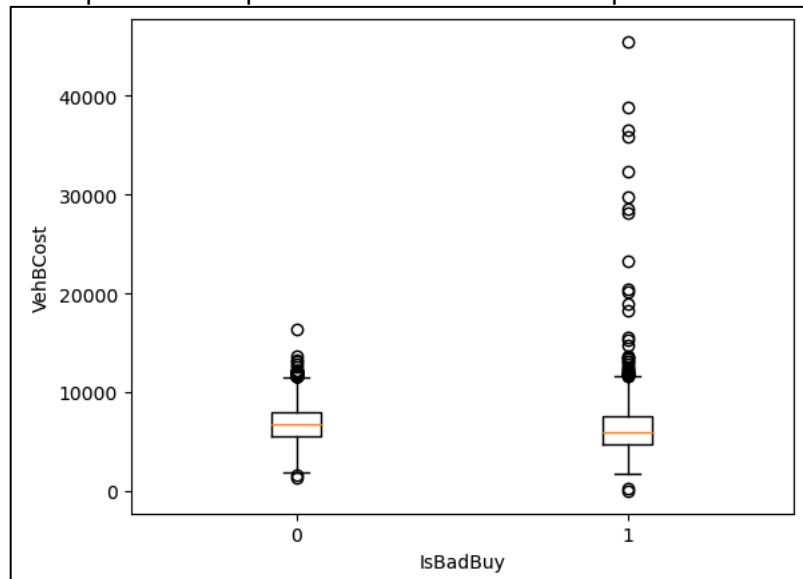

As shown in the figure, Online Sales is not affecting much to the 'IsBadBuy'

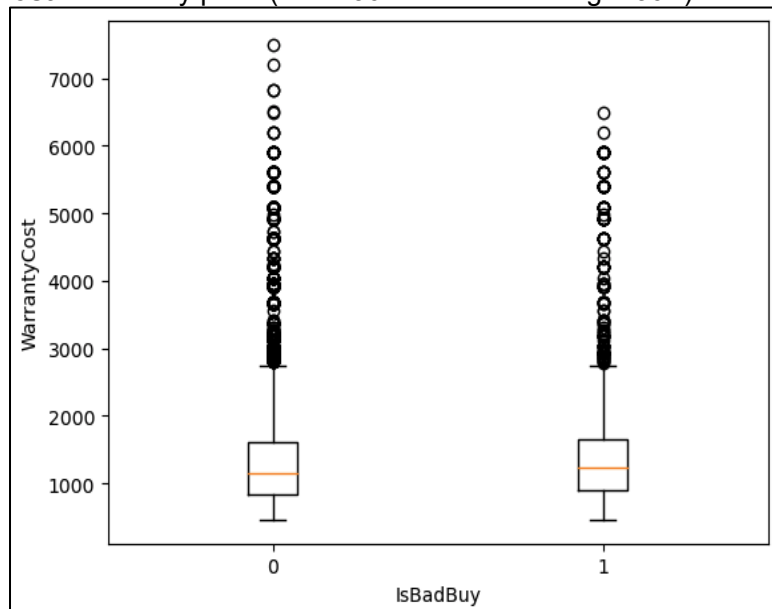11. **VehOdo** - The vehicles odometer reading

Median Odometer Reading of 'IsBadBuy' vehicles are higher

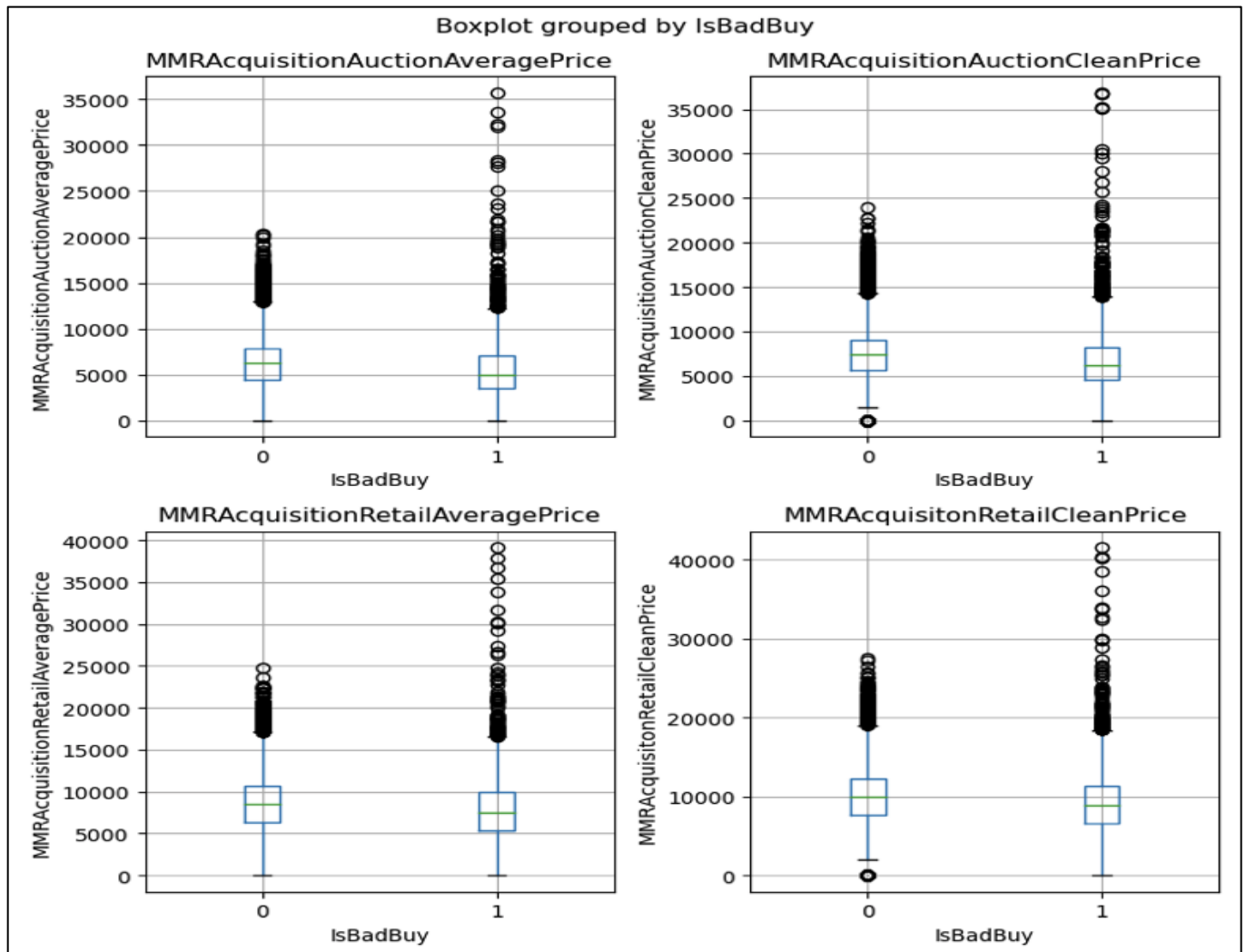12. **VehBCost** - Acquisition cost paid for the vehicle at time of purchase

Higher Acquisition cost of majority of 'IsBadBuy' labeled vehicles

13. **WarrantyCost** - Warranty price (term=36month and millage=36K)

14. MMRAcquisitionAuctionAveragePrice - Acquisition price for this vehicle in average condition at time of purchase

MMRAcquisitionAuctionCleanPrice - Acquisition price for this vehicle in the above Average condition at time of purchase

MMRAcquisitionRetailAveragePrice - Acquisition price for this vehicle in the retail market in average condition at time of purchase

MMRAcquisitonRetailCleanPrice - Acquisition price for this vehicle in the retail market in above average condition at time of purchase
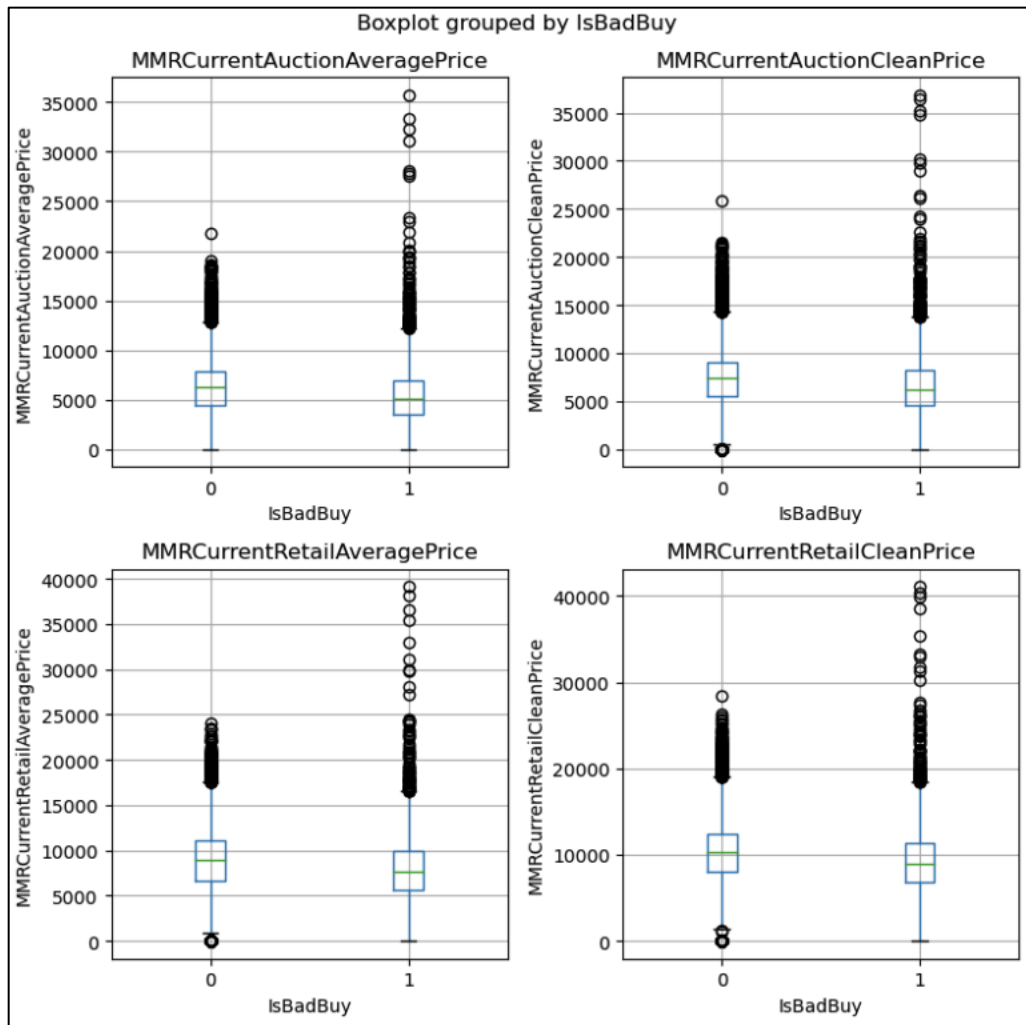

Boxplot grouped by IsBadBuy

15.

MMRCurrentAuctionAveragePrice - Acquisition price for this vehicle in average condition as of current day

MMRCurrentAuctionCleanPrice - Acquisition price for this vehicle in the above condition as of current day

MMRCurrentRetailAveragePrice - Acquisition price for this vehicle in the retail market in average condition as of current day

MMRCurrentRetailCleanPrice - Acquisition price for this vehicle in the retail market in above average condition as of current day
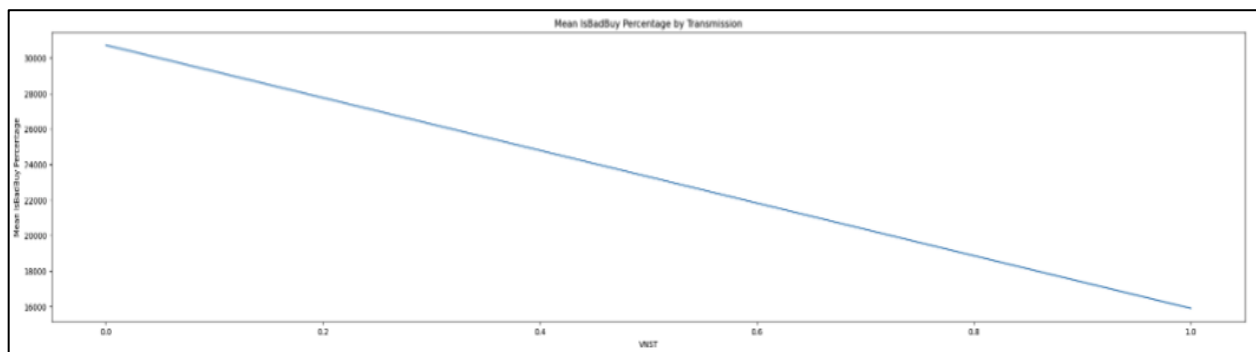
Recommendations for Carvana-

Based on the visual Analytics Report Above, I have the following recommendations for carvana:

1. Avoid the following car makers: **Plymouth, Lexus, Infiniti, Mini, Lincoln, Acura**
2. Avoid vehicles with Trim levels: **JLX, Maz, Out, Z24, GXP**
3. States to avoid: **AR, PA, NV, VA**
4. Prefer Auction 'Manheim' over '**Adesa**'
5. **Avoid vehicles with 'Special' Wheeltype**
6. '**American**' cars are the performing best in terms of 'IsBadBuy'
7. Among the top Three American Names, **buying 'Ford' cars are leading to higher 'IsBadBuy' values**
8. Cars with **higher vehicle year** should be preferred
9. Cars with **lower Vehicle age** should be preferred
10. **WheelType 0.0 should be avoided**
11. **Lower Odometer Reading** should be preferred
12. **Lower Acquisition Costing** vehicles can give more profits, lower 'IsBadBuy' value,
13. 'IsBadBuy' values are highly getting Influeced by MMR Prices, **higher MMR prices are being shown by 'IsBadBuy' labeled vehicles.**

I propose Carvana to follow the above Practices while buying and selling cars, to stabilize the revenue trend of the company and avoid losses caused by 'IsBadBuy' categorized vehicles.

Profit/Loss Vs 'IsBadBuy'