**Data Analysis: Passenger Vehicle Supply & Demand Analysis**

***Background:*** The urbanization of rural towns and small cities have made it almost impossible to travel anywhere other than by personal vehicle or public transit. Today, you can find at least one vehicle per household to be used to get to work, school, extracurricular activities, and leisure travel. The consumer demand for the freedom to travel and convenience and flexibility that passenger vehicles provide has changed the automobile manufacture landscape. This study is aimed at analyzing vehicle supply and consumer demand for passenger vehicles in the U.S. between January 2000 and January 2024, to explore the following questions of interest:

* Are there specific characteristics of the time series representing vehicle usage that contribute most to the predictability of the time series?
* Is there any relationship between the trends of vehicle supply & consumer demand?
* Are there any external or exogenous factors that help in predicting vehicle sales?

The data was acquired from U.S. Bureau of Economic Analysis, U.S. Census Bureau, and U.S. Bureau of Transportation Statistics and contains roughly 292 records of monthly data for vehicle data and public ridership. The dataset variables are below. The dataset of interest is in the following: VehicleData.csv. Note that you can use any of the following variables too. You are not limited to use VehicleData.csv only.

|  |  |
| --- | --- |
| Auto Inventory/Sales Ratio  <https://fred.stlouisfed.org/series/AISRSA> | Ratio, Seasonally Adjusted |
| Manufacturers' New Orders: Motor Vehicles and Parts  <https://fred.stlouisfed.org/series/AMVPNO> | Millions of Dollars, Seasonally Adjusted |
| Motor Vehicle Retail Sales: Foreign Autos  <https://fred.stlouisfed.org/series/FAUTOSA> | Thousands of Units, Seasonally Adjusted  Autos defined as all passenger cars, including station wagons. Foreign sales are all U.S. sales of vehicles not produced in the U.S., Canada, or Mexico. |
| Motor Vehicle Retail Sales: Domestic Autos  <https://fred.stlouisfed.org/series/DAUTOSAAR> | Millions of Units, Seasonally Adjusted Annual Rate  Autos are all passenger cars, including station wagons. Domestic sales are all United States (U.S.) sales of vehicles assembled in the U.S., Canada, and Mexico. |
| Domestic Auto Production  <https://fred.stlouisfed.org/series/DAUPSA> | Thousands of Units, Seasonally Adjusted Domestic auto production is defined as all autos assembled in the U.S. |
| Vehicle Miles Traveled  <https://fred.stlouisfed.org/series/VMT> | Millions, Not Seasonally Adjusted |
| Auto Exports  <https://fred.stlouisfed.org/series/AUENSA> | Thousands of Units, Not Seasonally Adjusted |
| Natural Gas Consumption  <https://fred.stlouisfed.org/series/NATURALGASD11> | Billion Cubic Feet, Seasonally Adjusted  This data is collected by the U.S. Department of Transportation, Bureau of Transportation Statistics (BTS) calculation from data collected by U.S. Energy Information Administration (EIA) |
| Public Transit Ridership  <https://fred.stlouisfed.org/series/TRANSIT> | Thousands of Unlinked Trips, Not Seasonally Adjusted |
| US Regular Conventional Gas Price  <https://fred.stlouisfed.org/series/GASREGCOVM> | Dollars per Gallon, Not Seasonally Adjusted |