Housing Price Indexes in Turkey

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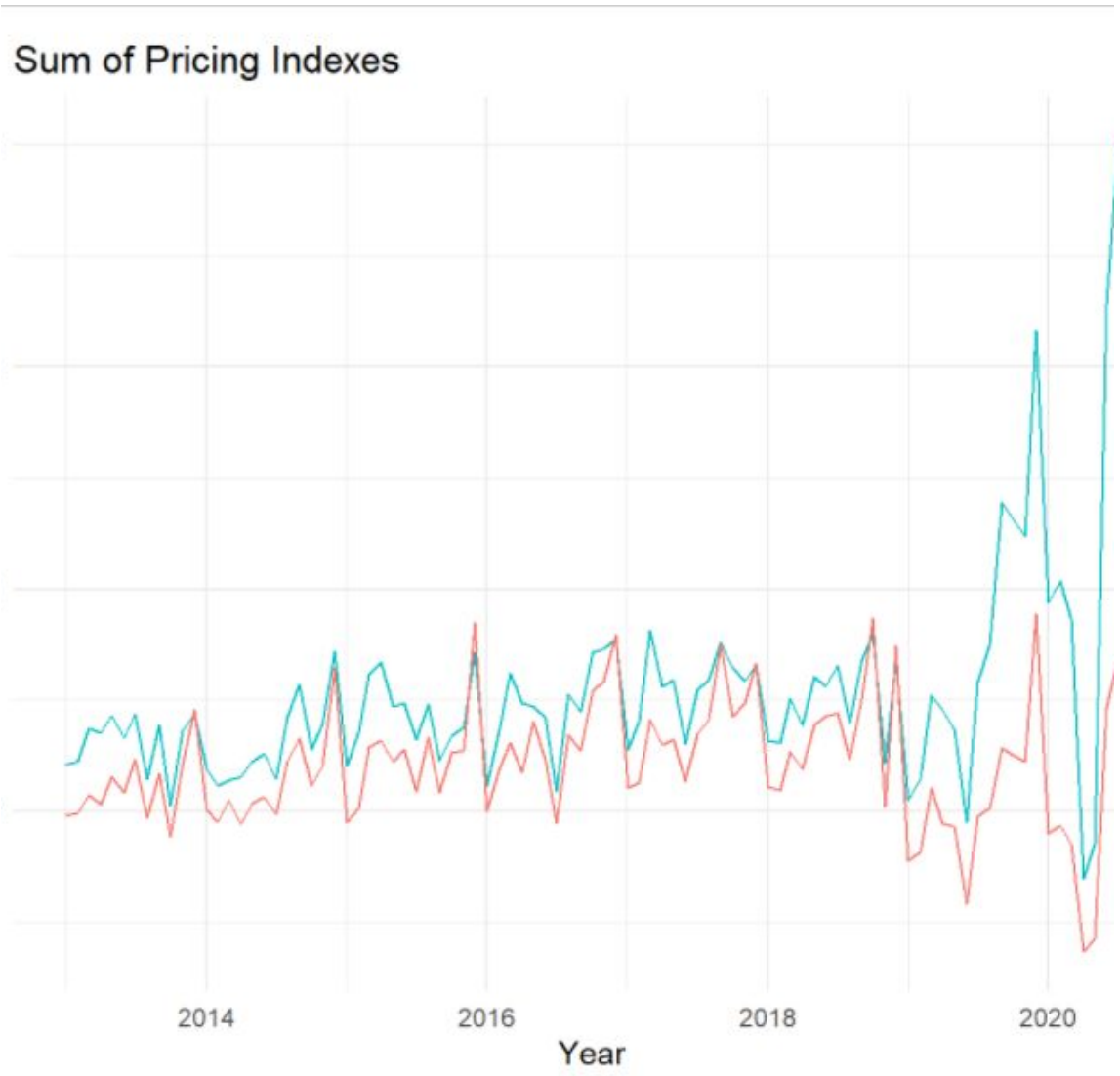
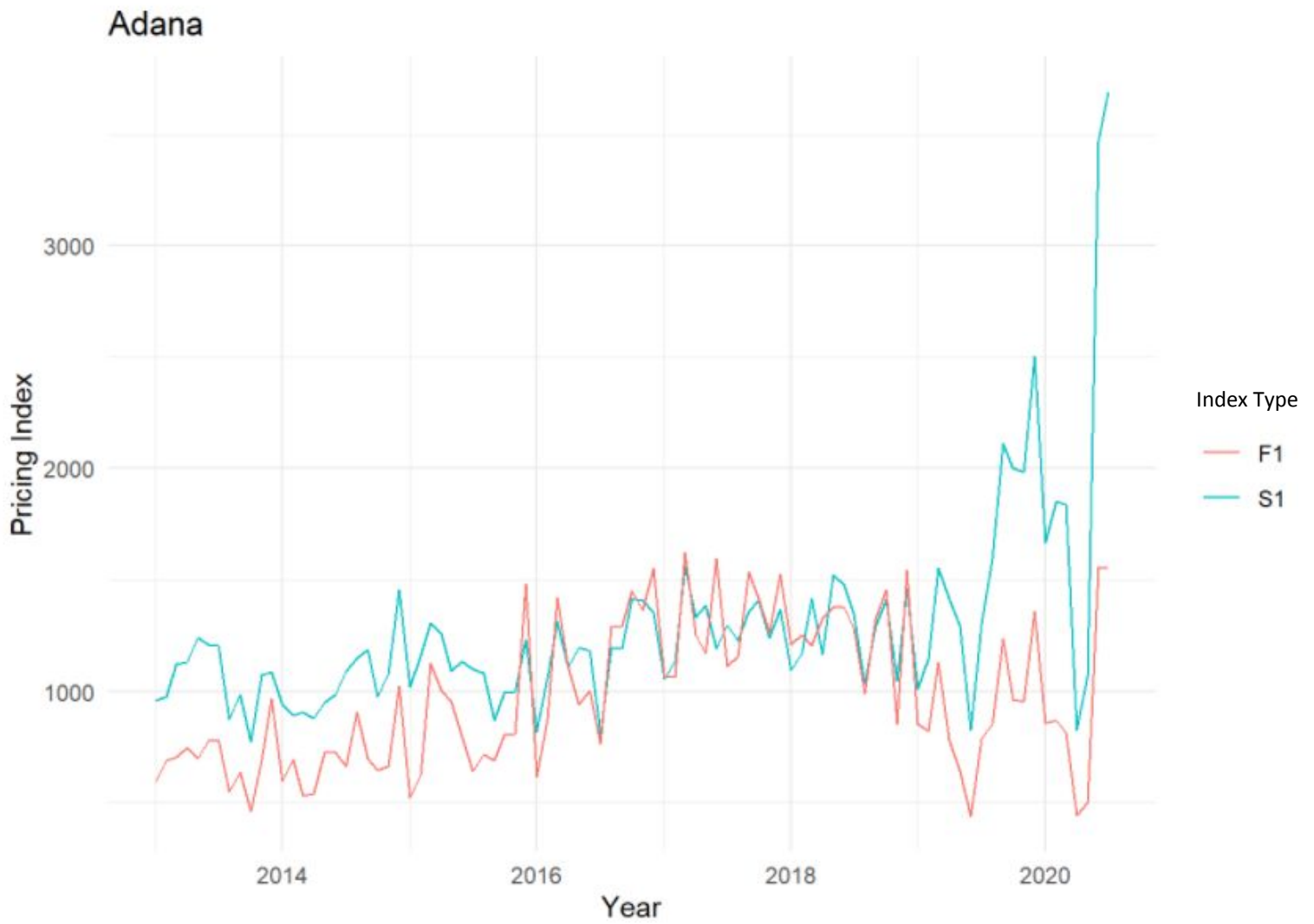
Date	F_Turkey	F_Adana	F_Adiyaman	F_Afyonkarahisar	F_Agri	F_Aksaray	F_Amasya	F_Ankara
2013-01-01	39163	591	109	175	71	158	114	4278
2013-02-01	39521	691	197	163	181	113	174	4292
2013-03-01	43052	705	130	203	64	166	171	4346
2013-04-01	41233	746	115	184	36	170	153	4376
2013-05-01	46049	699	135	251	79	238	212	4614
2013-06-01	43345	777	145	202	61	199	215	4468
2013-07-01	49224	781	182	206	80	247	277	4969
2013-08-01	38817	549	162	209	79	220	181	3773
2013-09-01	46778	637	188	220	81	286	197	5039
2013-10-01	35363	459	140	230	79	148	127	3370
2013-11-01	48255	689	213	190	90	235	216	4796

Data Explanation

The data on which we are working on projects includes housing price indexes. When we look in detail, it consists of monthly data for new and pre-owned houses. The data covers a period from 2013 to the last month. There are 91 rows, 165 columns. The first column shows the date, next 82 column covers data across the new home of the 81 provinces and Turkey. In the remaining 82 columns, it is observed each of the cities and Turkey's overall secondhand houses' price indexes. Migration movements in cities, economic movements throughout the country and some changes in cities (such as opening factories) are some of the factors that affect home sales data. Some packages need to be used to analyze the data.

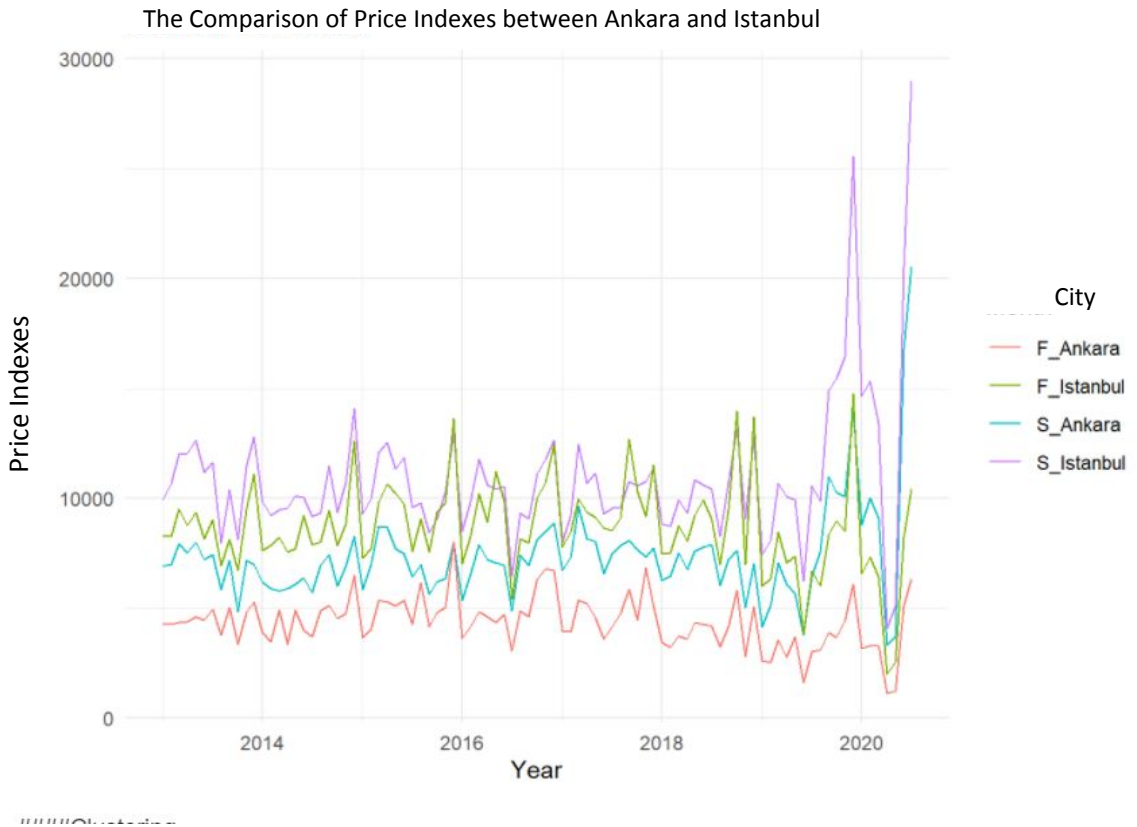
•By analyzing the data, plot line has been drawn to observe the price index movement of the first and secondhand houses by years. As can be seen from the graphic, the amount of house sales increased every year.





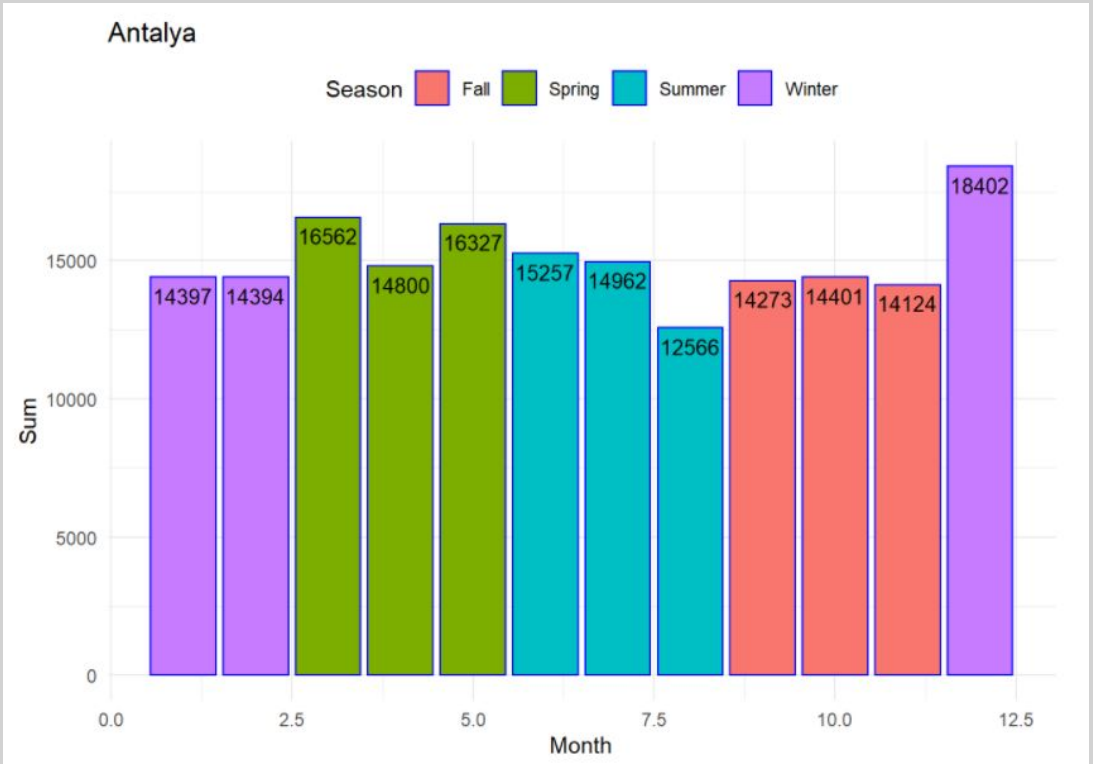
In Turkey ,the behavior of housing prices in general, the city has been interpreted by comparing the behavior of a relationship between them. As can be seen in the graph, the behavior of Adana is similar to the data across the country. We cannot generalize for every city, but we can say that the same criteria are effective across the country.

- The largest cities in Turkey: Ankara and Istanbul. Therefore, the index values of these two cities were examined seperately. When the data of the two cities are analyzed on the graph, Istanbul has higher index values than Ankara. When the sum of the data of all cities is plotted, the total data of Ankara and Istanbul is very high compared to other cities.



Antalya

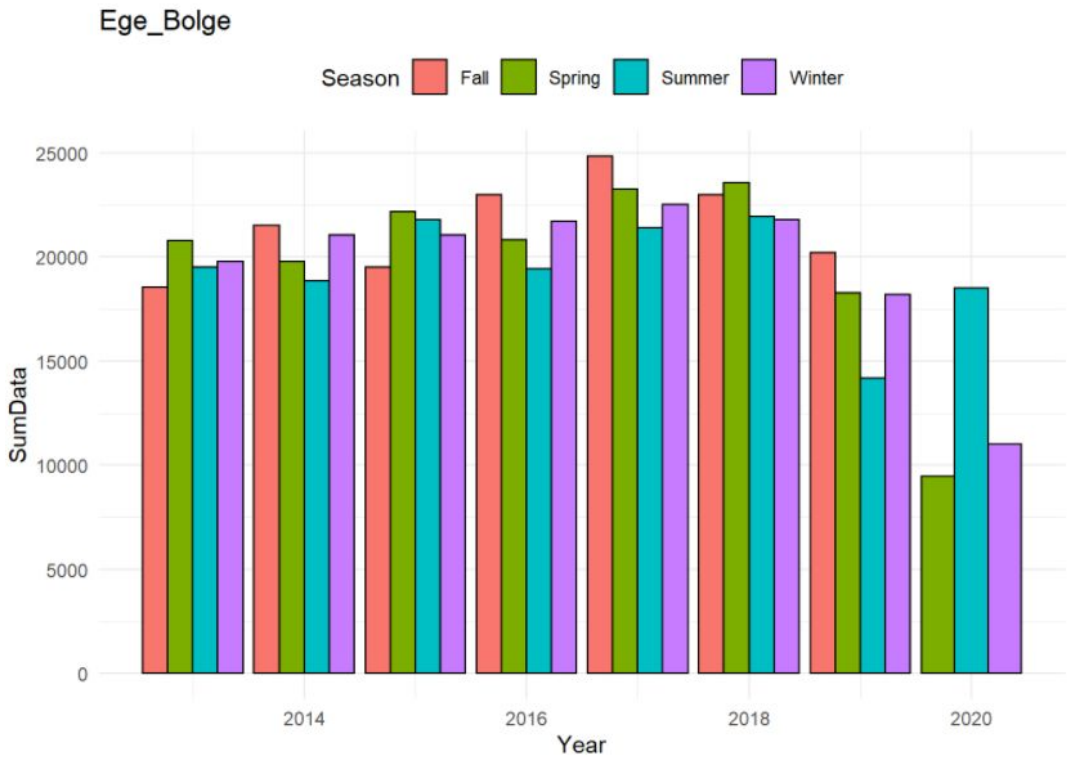
- In order to examine the house data of the Aegean ve Akdeniz region, whose population has increased considerably during the summer season, some of the cities in the Aegean and Akdeniz Region were selected from all data. (Antalya, Balıkesir, İzmir, Aydın)
- Between 2013-2020, a bar plot was drawn for Antalya's data by months. By observing the month-by-month price index movement, it can be said that the indexes have increased each year, and the are also increasing every year in the summer months.



Balikesir

- Between 2013-2020, a line plot was drawn for Balıkesir’s index valuesby months. By observing the month-by-month index movement, it can be said that the sales have increased end of the year.

Eagean Region Analysis for New Houses

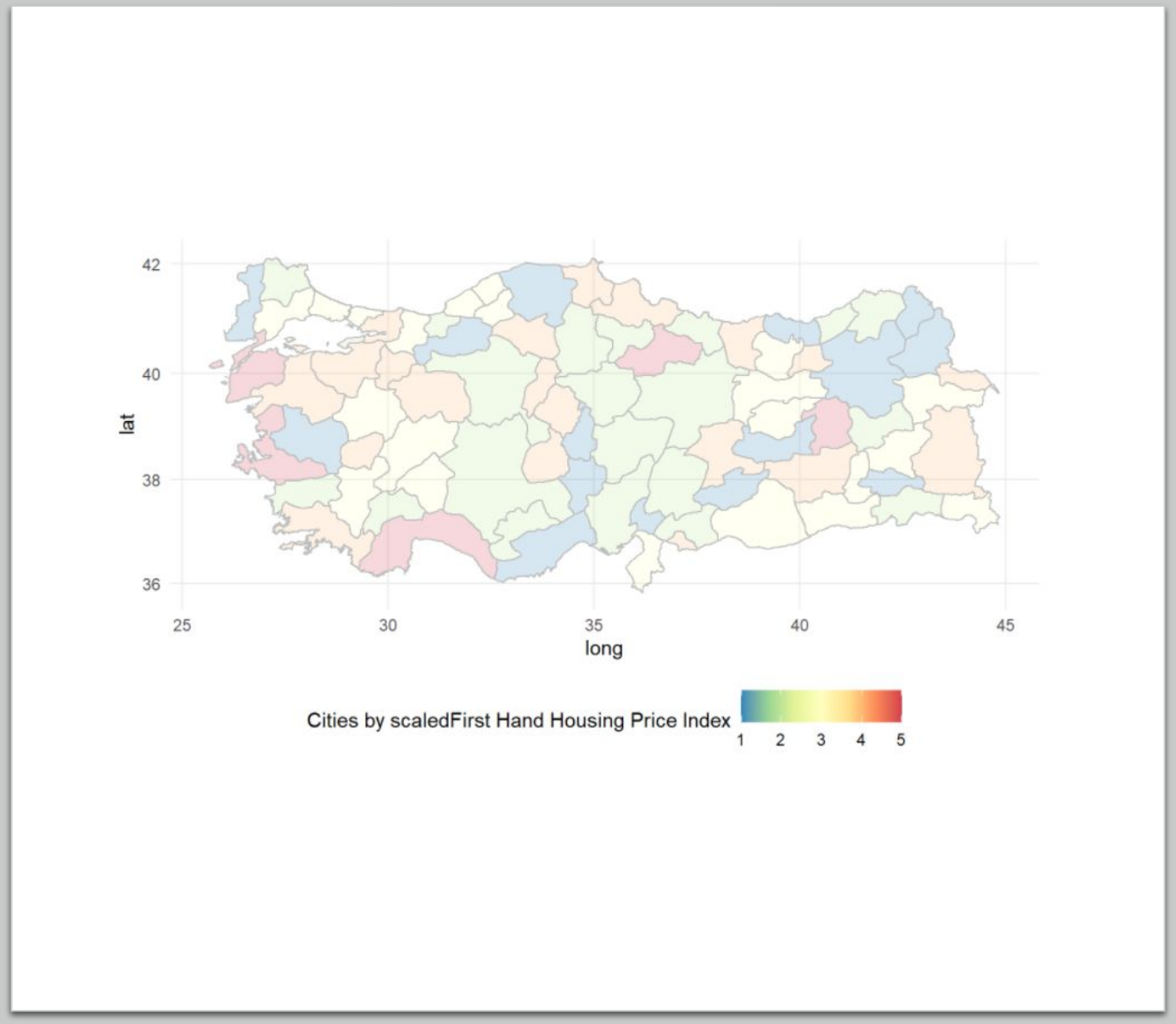


- There seems to be a consistent trend over the years. Although , there is a positive growth trend for Fall season in first years (2013-1017), last years , it can be easily seen that values are decreasing year by year.

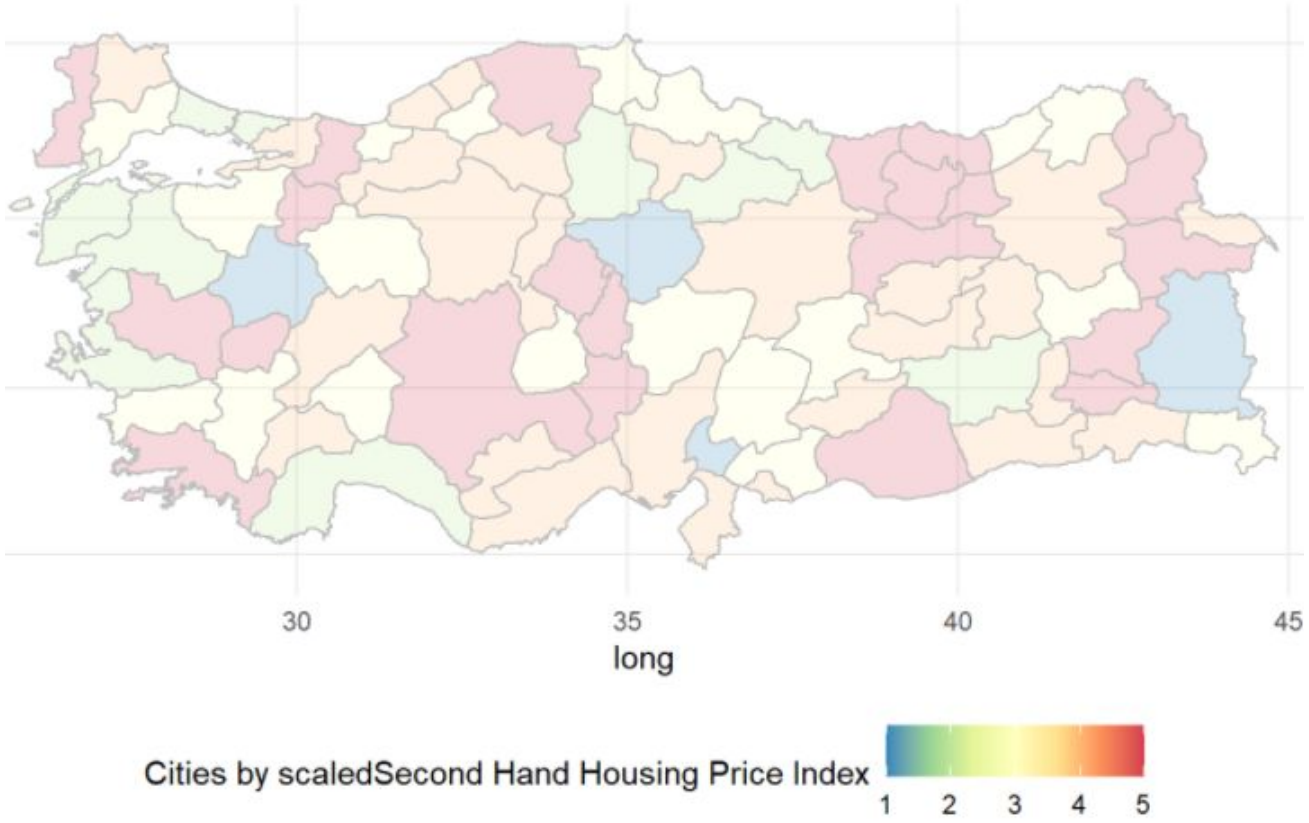
Clustering

- In this section, we tried to group cities according to how similar they are to each other and find similarity within a cluster using the k-means algorithm.

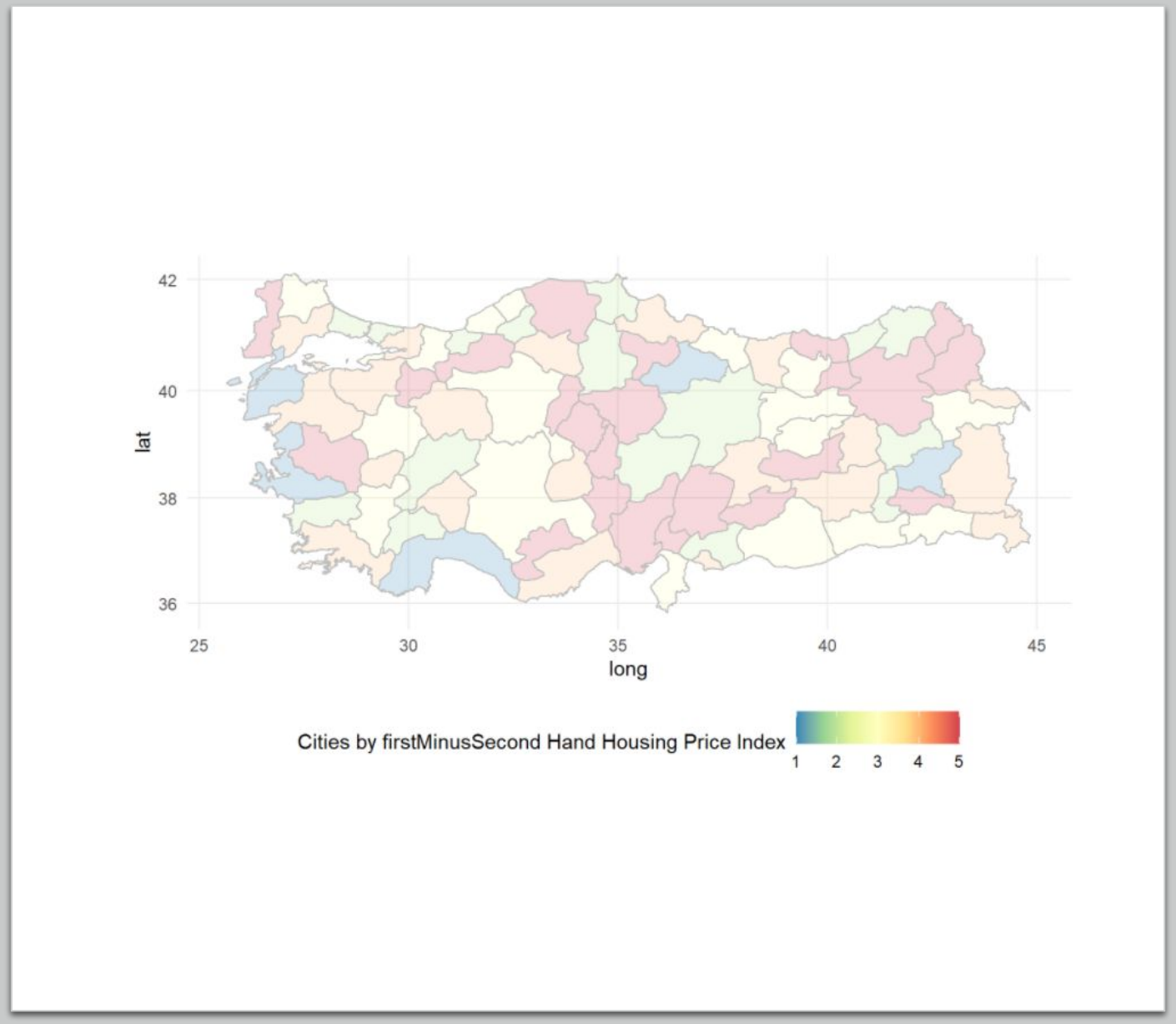
- In the first form of clustering, it is desired to analyze the sales behavior more logically by classifying data of the cities according to the similarities of the index movement. Therefore, all columns are scaled.



In the second form of clustering, it is desired to analyze the sales behavior by classifying data of the cities according to the index level. This time it is not scaled. Thus, it is aimed to cluster the cities with similar index levels.



- In the last form, cities are clustered according to the index difference between first hand and second hand. Thus, cities with similar index differences were found and analyzed.

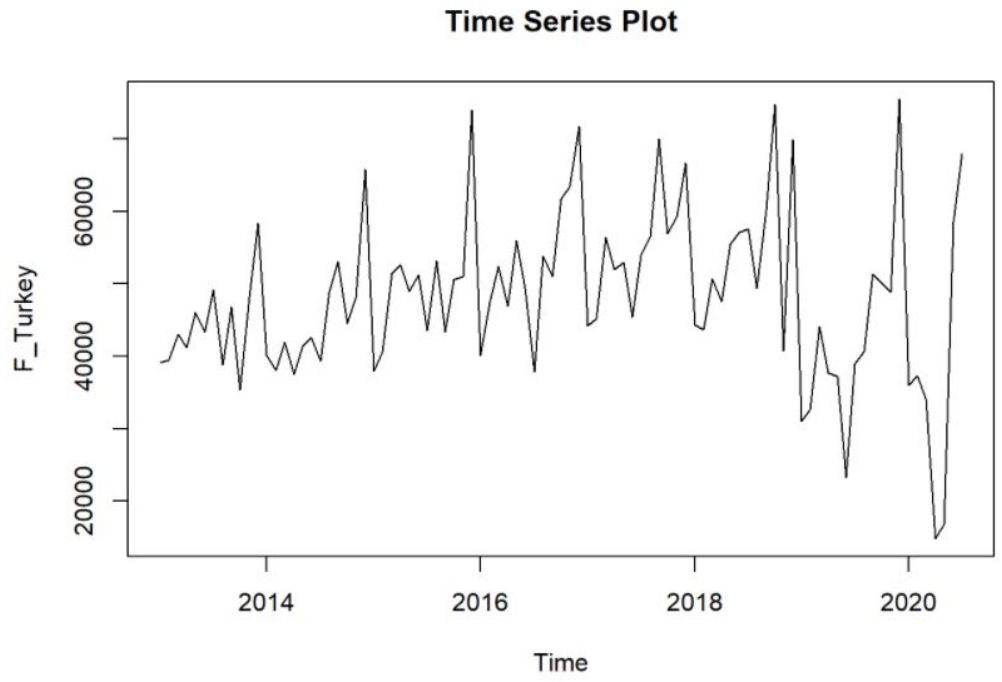


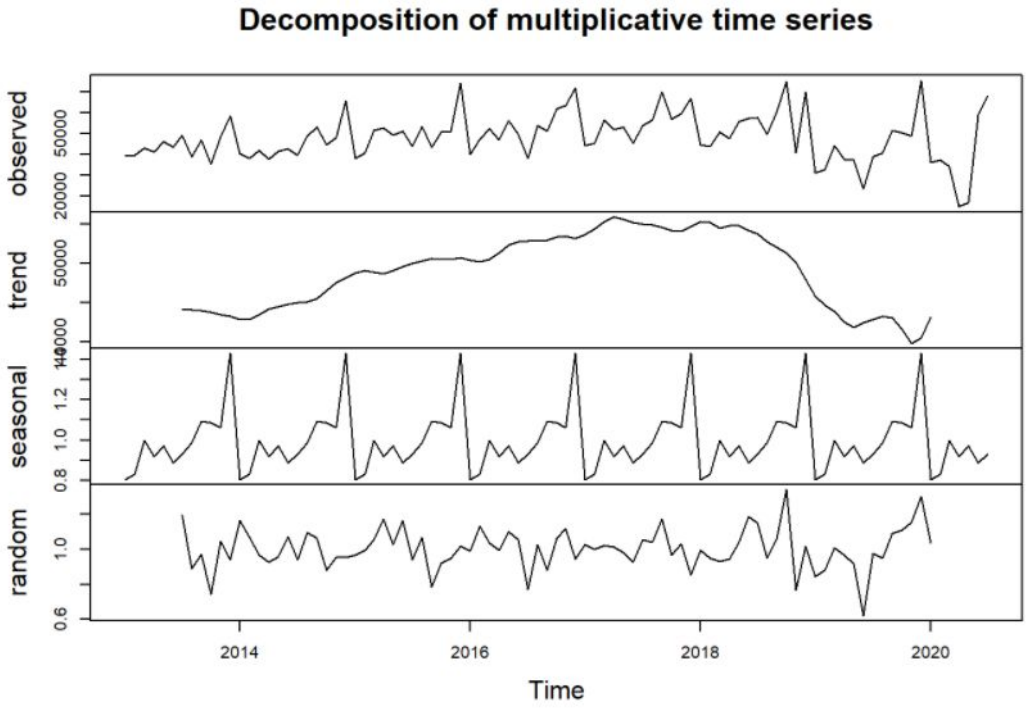
The Comparison between firsthand and secondhand Prices in some of the Largest Cities

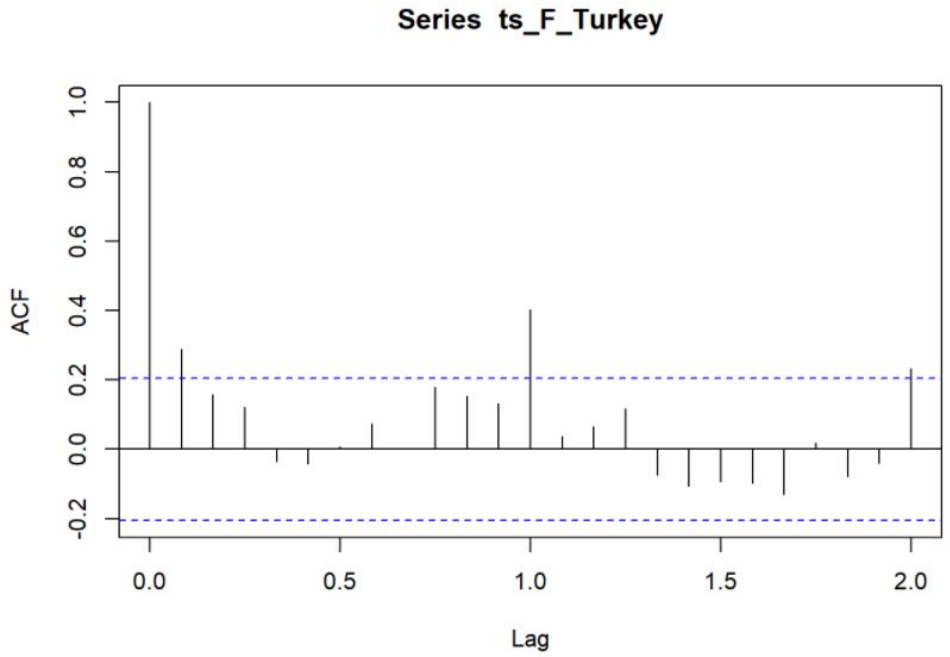
- İstanbul, Ankara, Adana, Kayseri, Antalya, Bursa, Eskişehir, Mersin, Van are among the largest 30 cities in Turkey. To see the difference between first-hand and second-hand prices, the means of their respective price index are calculated. As a common fact, first-hand prices are higher than the second-hand prices. However, Van shows an exceptional result as its second-hand price is higher. The plot is generated to show how large the difference is among these cities. Ankara and İstanbul are the leading cities in terms of the price gap, with Ankara on top and İstanbul the runner-up.

Time Series Analysis

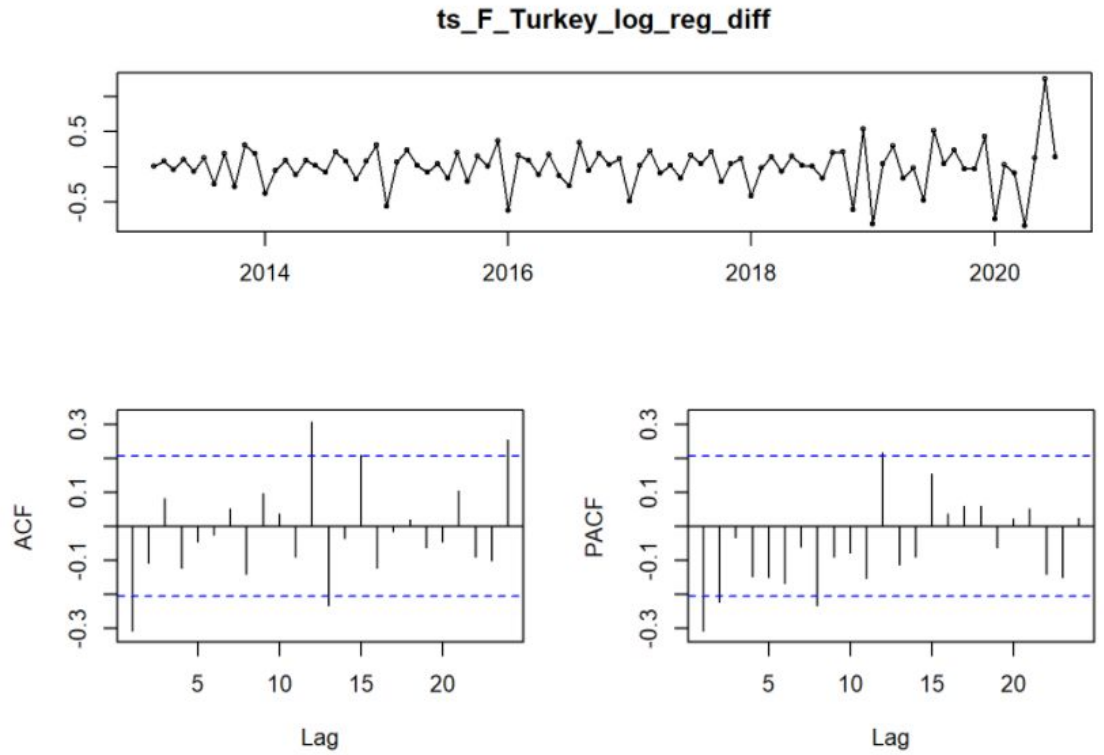
In order to do Time Series Analysis, the data should be converted to time series in format. Then we see that variance is increasing over time so that it's multiplicative. Also, it may include seasonality and it can be understood better from the decomposition. Decomposed time series is plotted below.



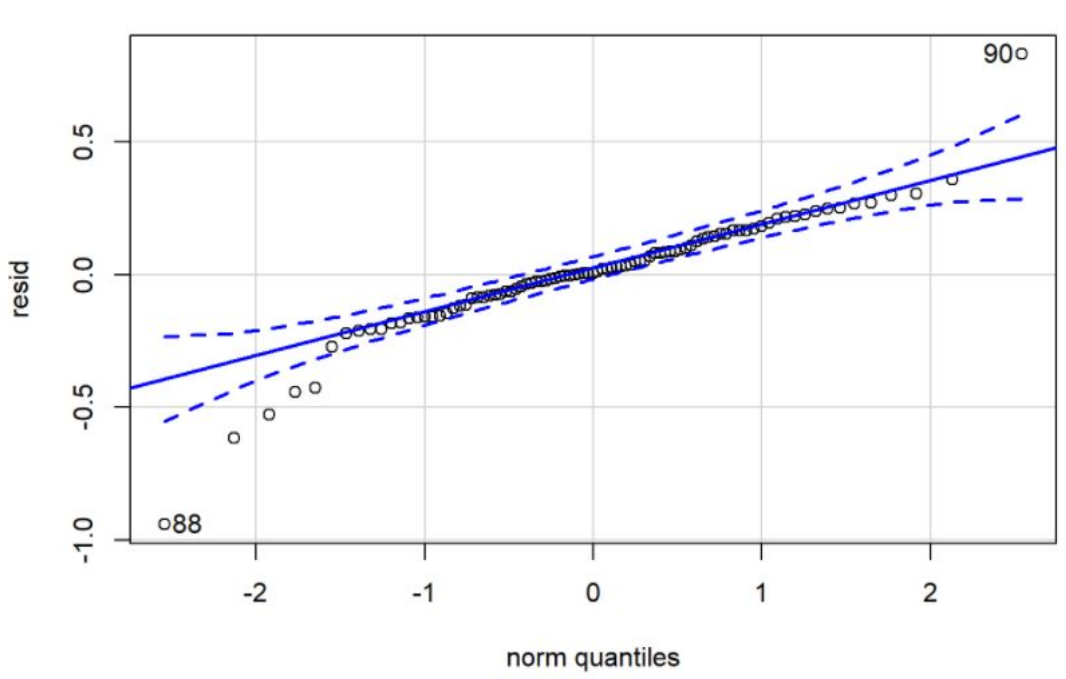


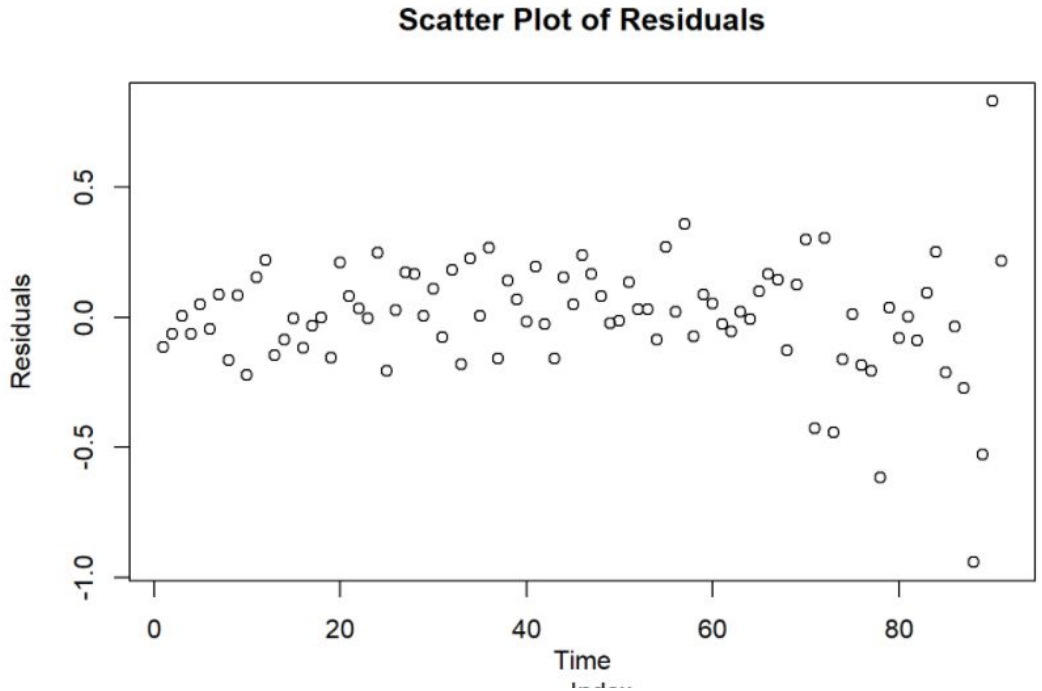


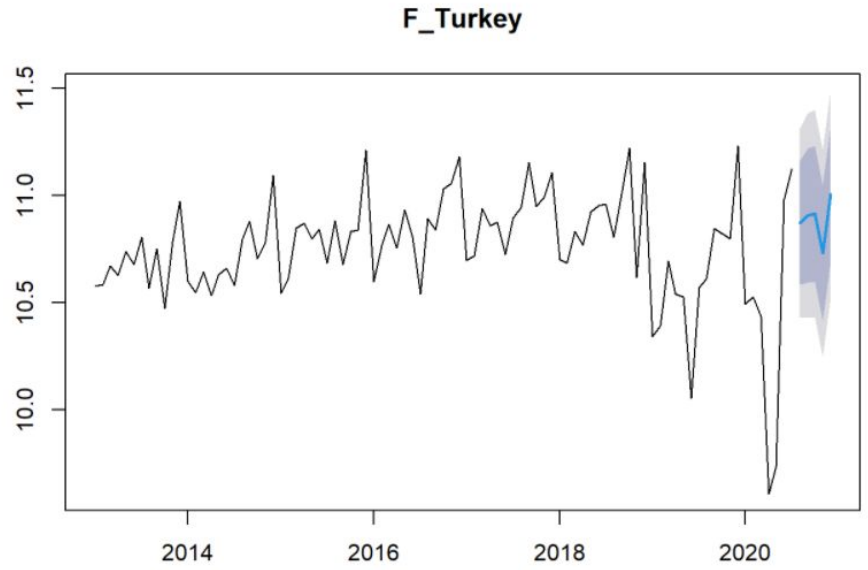
- After the times series visualization and analysis, the autocorrelation function of the time series is plotted. The autocorrelation values peak at lag 12 and at lag 24. It means that there is a monthly seasonality factor.

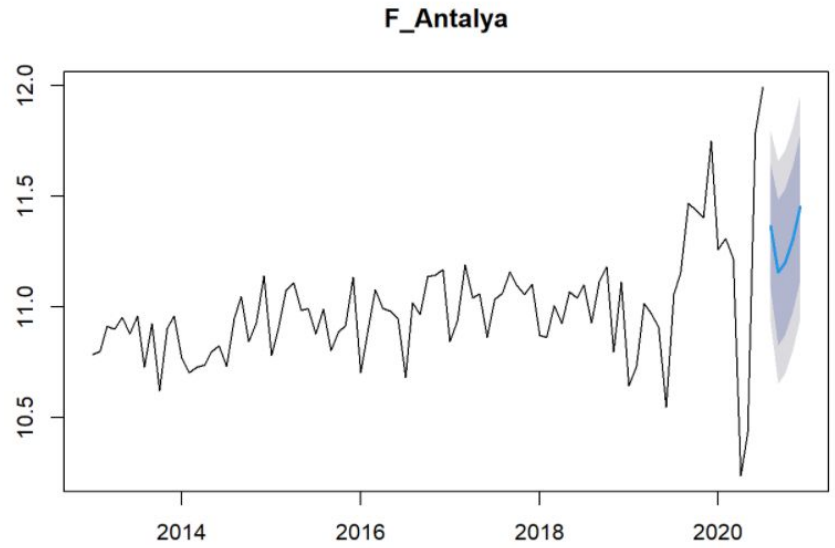


The Q-Q plot suggests that the residuals are distributed normally but at the extreme sides there are flaws. We tried to explain all the months but it could not be explained fully. Secondly, the scatter plot examined, we want then to be random. As can be seen the residuals almost random except just left hand side.






F_Turkey
11.5
11.0
10.5
10.0
2014
2016
2018
2020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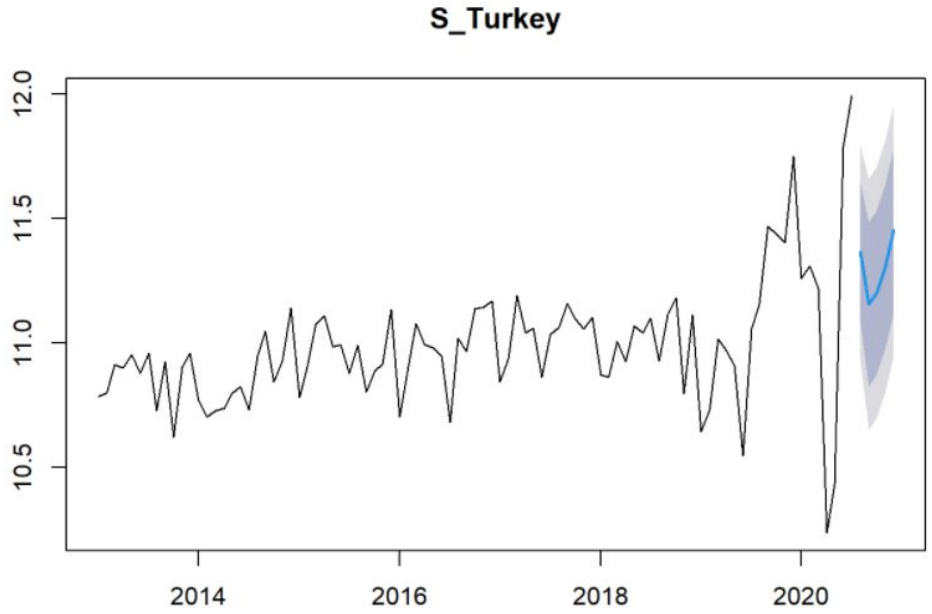
10.5
2014
2016
2018
2020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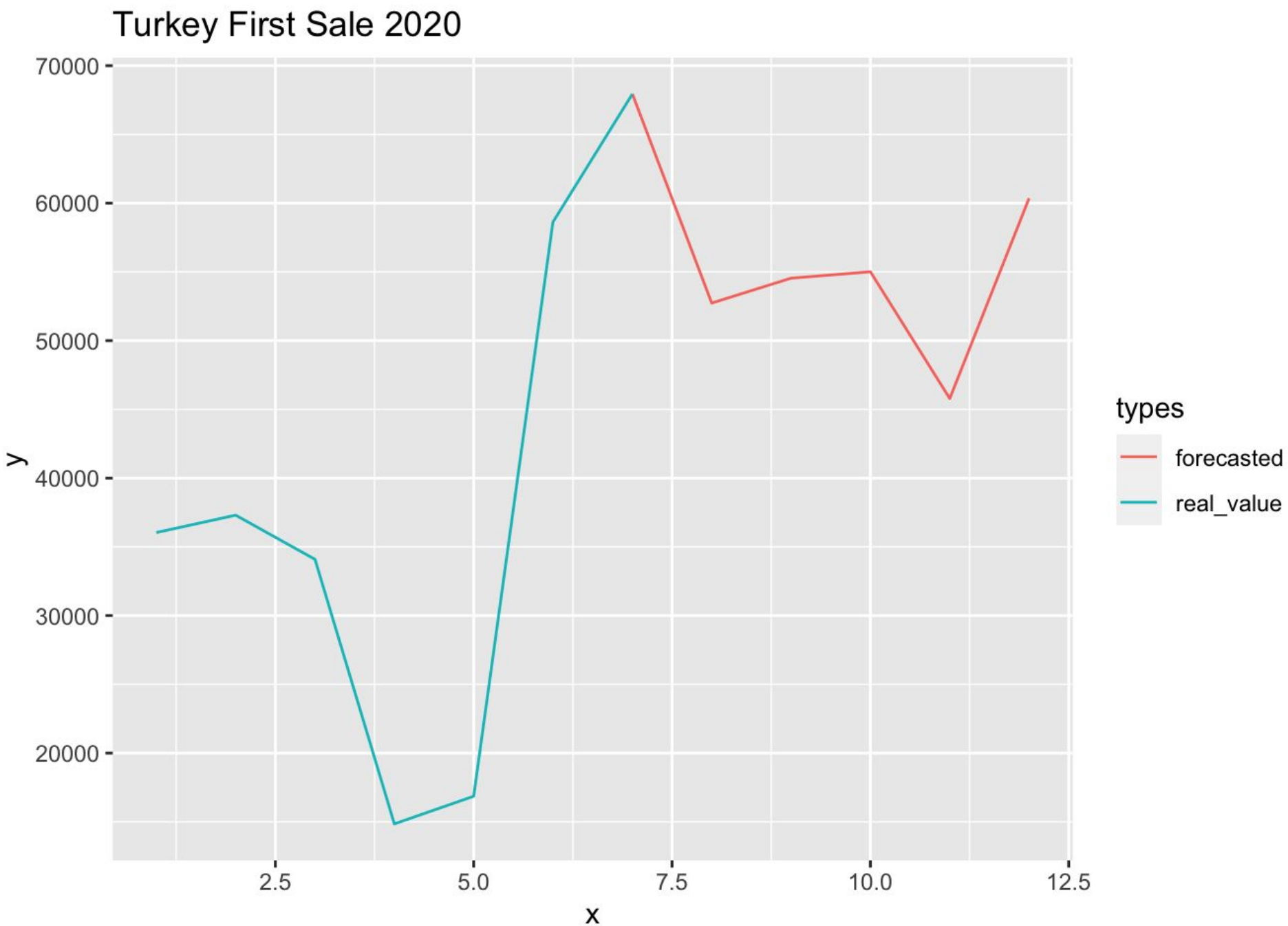
11.0
10.5
2014
2016
2018
2020


Turkey First Sale 2020
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60000
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y
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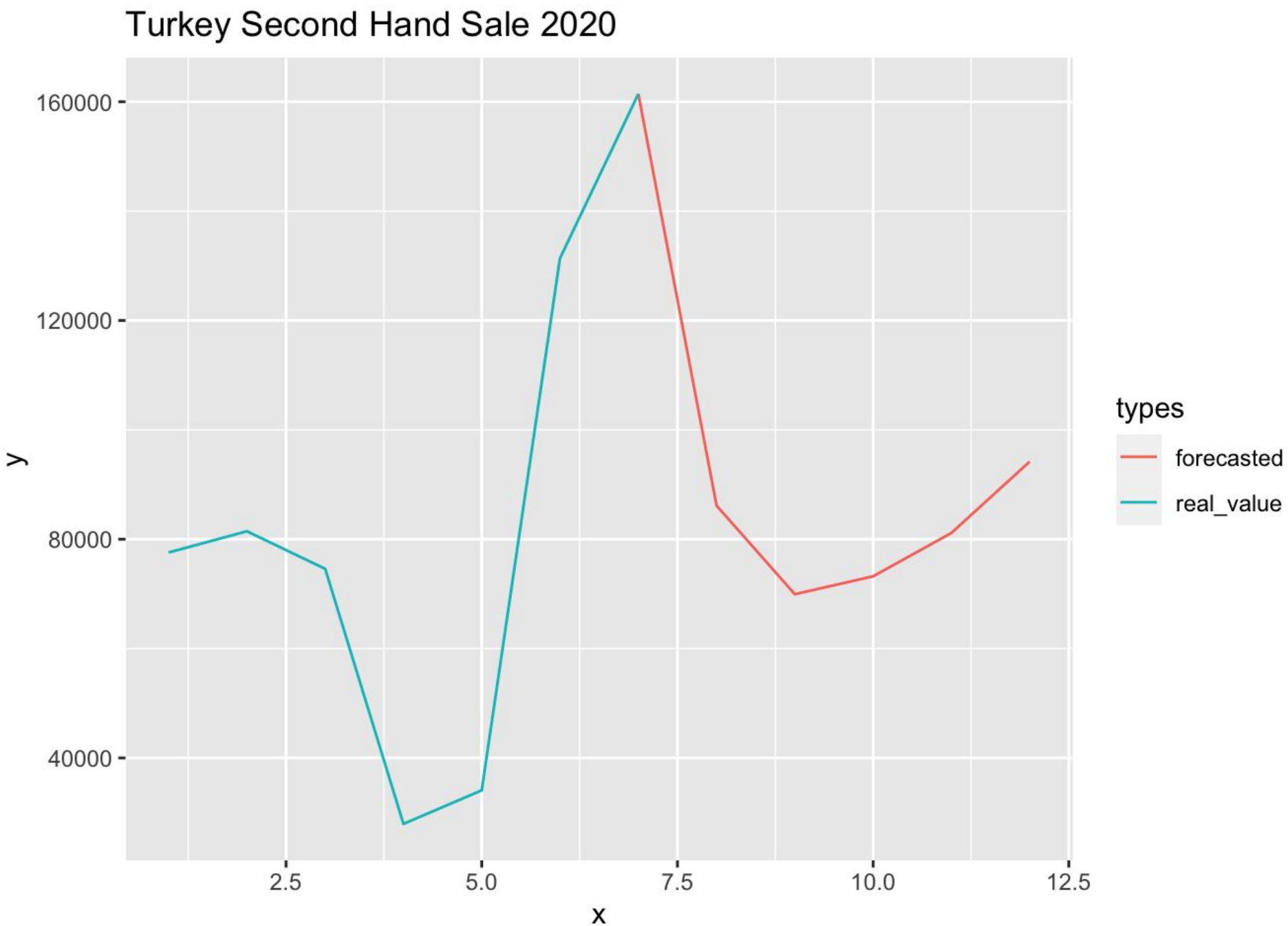
7.5
10.0
12.5
x
types
forecasted
real_value


Turkey Second Hand Sale 2020
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12.5
x
types
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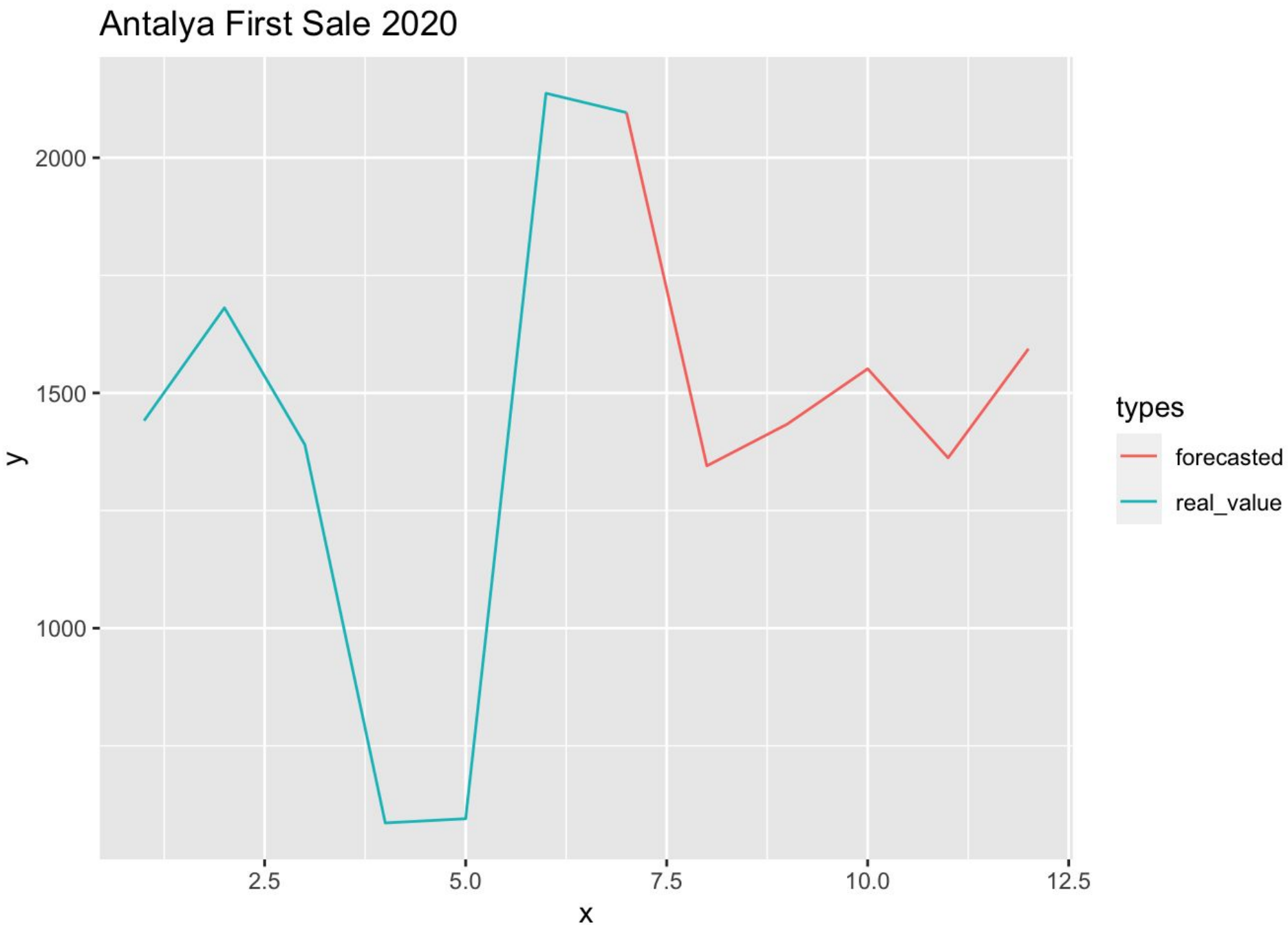
real_value


Antalya First Sale 2020
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1500
1000
y
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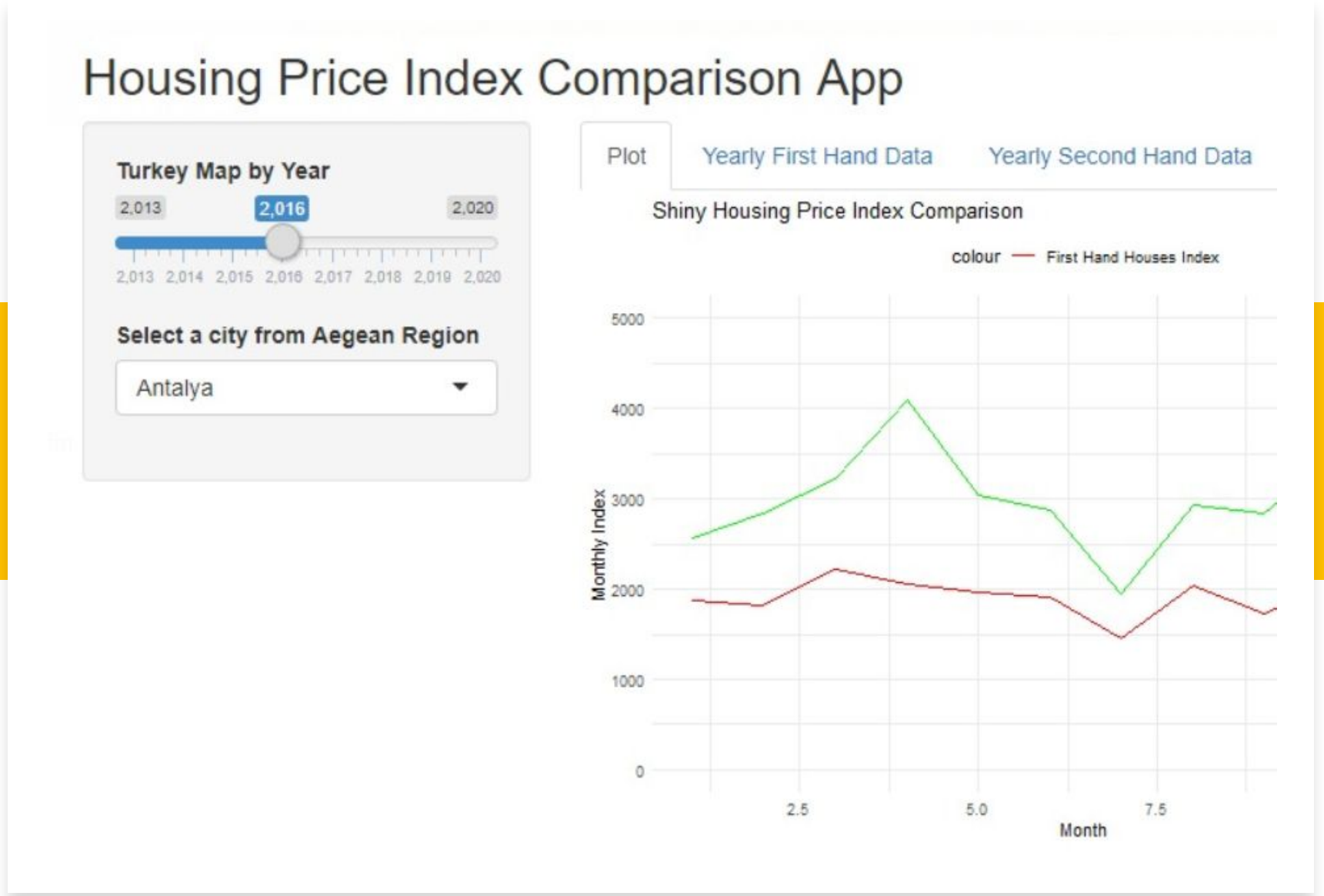
5.0
7.5
10.0
12.5
x
types
forecasted
real_value



Shiny App

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