THE COST OF POPULARITY: ANALYZING TOURISM'S EFFECT ON MEDELLIN'S HOUSING MARKET (2011-2021)

METHODS OF ADVANCED DATA ENGINEERING (MADE) WS 24/25
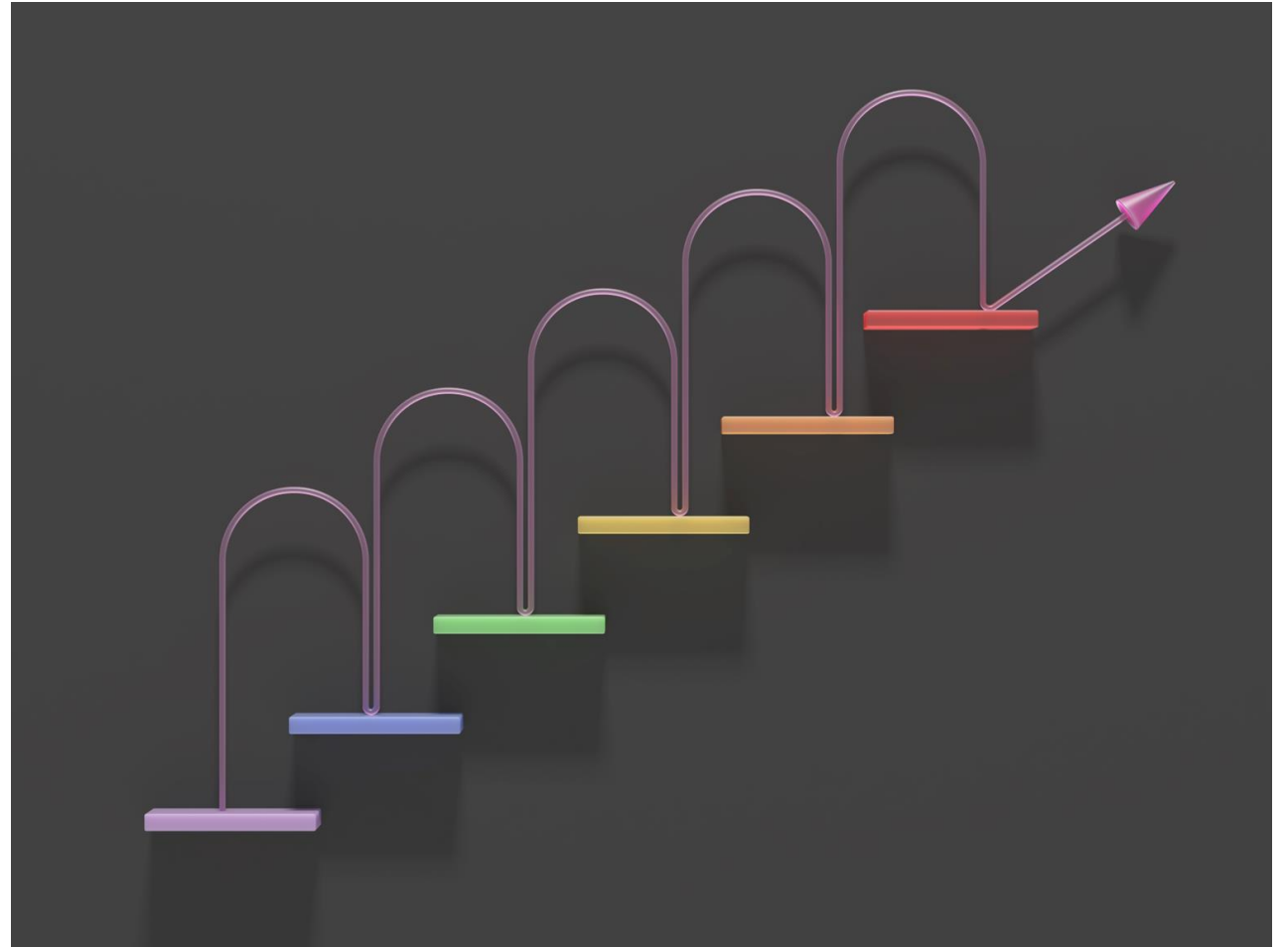
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22.01.2025

OUTLINE

FAU

CONTEXT

Medellín has seen a significant rise in both international and domestic tourism over the past decade.
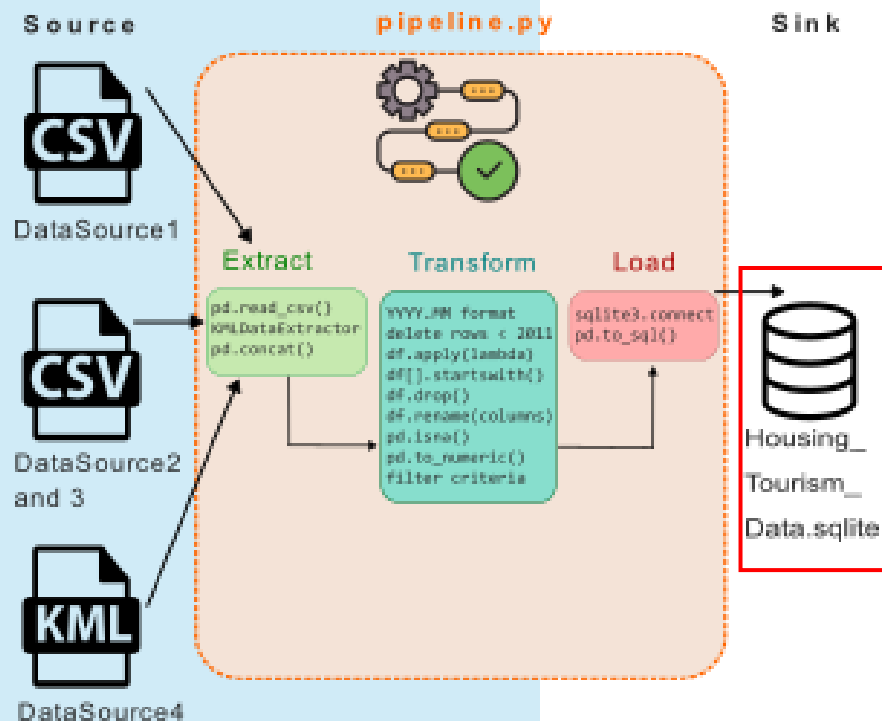
Anecdotal evidence suggests tourism might influence housing prices.

MAIN QUESTIONS

To what extent do domestic and inbound (foreign) tourism trends correlate with fluctuations in housing market prices in Medellín?

What is the impact of domestic and inbound tourism on housing sales and rental prices?

DATA OVERVIEW

ETL Pipeline

Source

pipeline.py

Sink

Extract
```
pd.read_csv()
KMLDataExtractor
pd.concat()
```

Transform
```
YYYY.MM format
delete rows < 2011
df.apply(lambda)
df[].startswith()
df.drop()
df.rename(columns)
pd.isna()
pd.to_numeric()
filter criteria
```

Load
```
sqlite3.connect
pd.to_sql()
```

DataSource1

DataSource2 and 3

DataSource4

Housing_
Tourism_
Data.sqlite

Description of database tables

| Table Name	Description
sales rents 2011 2021 66563 entries	Contains data on property sales and rental offers from 2011 to 2021. Includes details such as property type (e.g., apartment), condition (new or used), price (total and per square meter), neighborhood, area (private and lot), and geospatial information (longitude and latitude).
monthly entry colombians foreigners 292 entries	Records the monthly number of passengers entering Medellín through its airport, categorized by nationality (Colombians and foreigners).
monthly passengers origin 16886 entries	Provides information on the origins of passengers (both domestic cities and international countries) arriving in Medellín. The data is segmented by period, origin, and nationality.

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DATA OVERVIEW

Table: sales_rents_2011_2021

Filter in any column

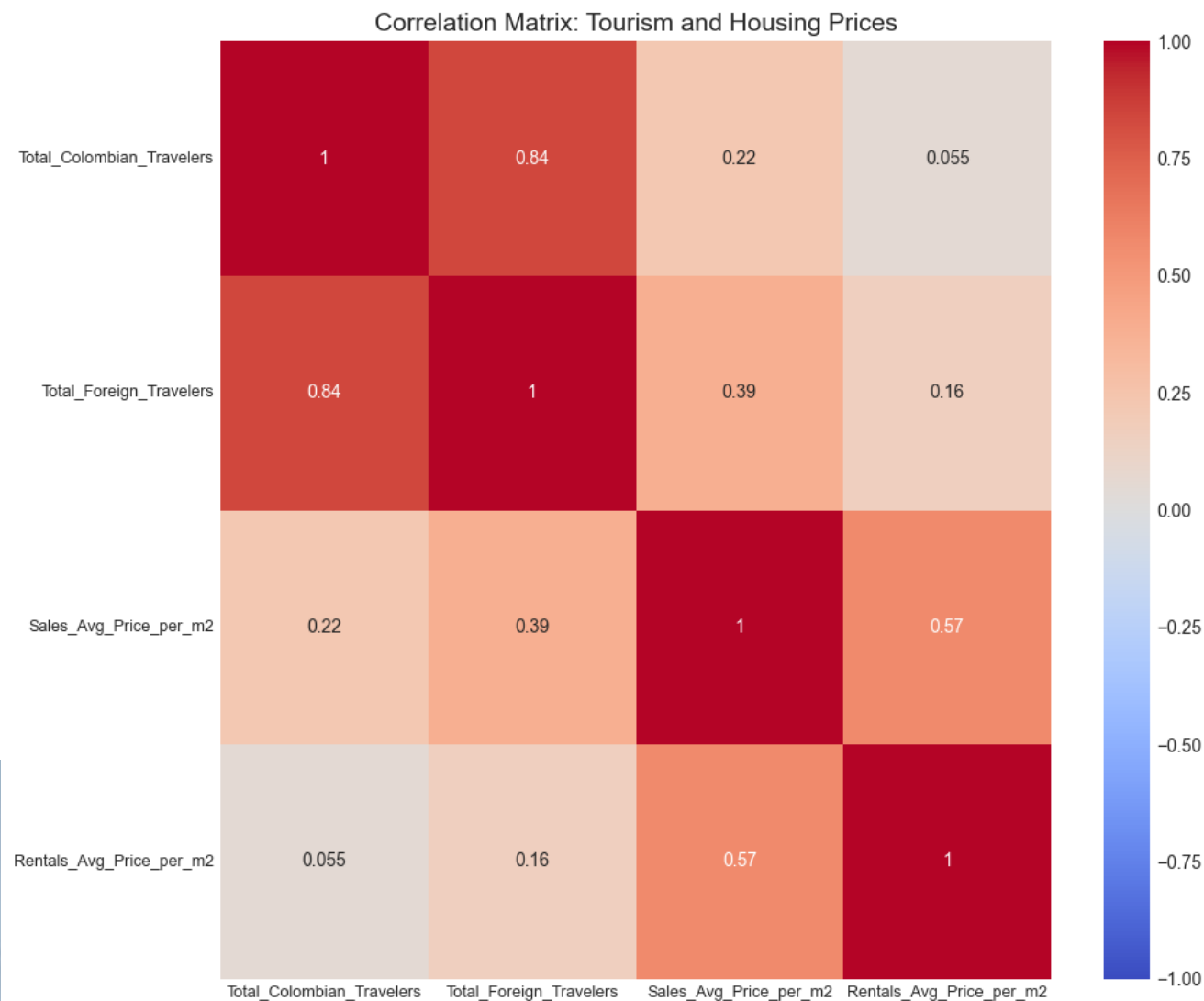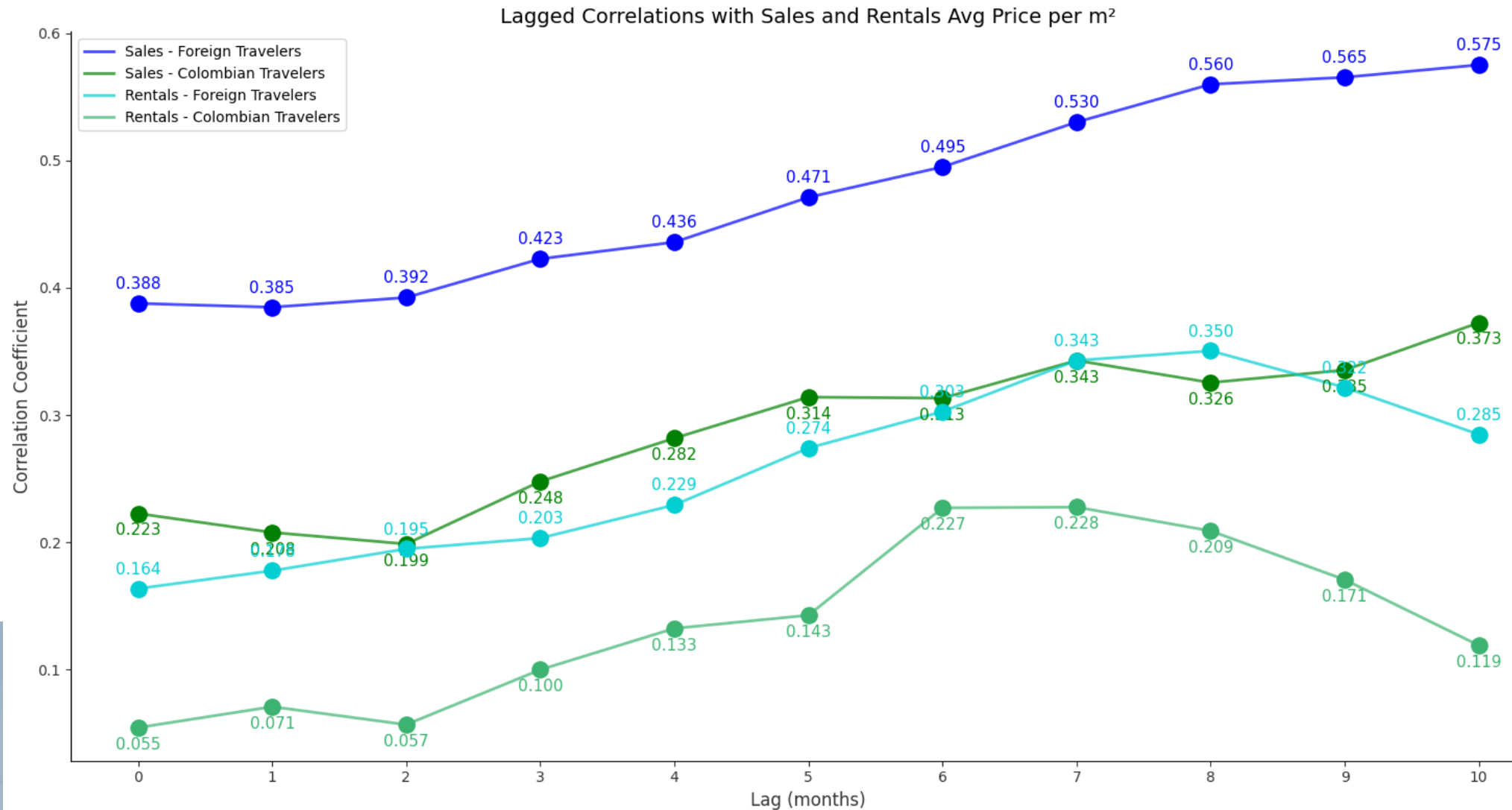|	Period	Research	Property	Condition ▲	Neighborhood	Stratum	Private_Area_m2	Lot_Area_m2	Commercial_Price_COP	Price_per_m2_COP	Longitude	Latitude
	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter
11414	2016.06	ARRENDAMIENTO	APARTAMENTO	NUEVO	ZONA EXPANSION ...	3	56	36	700000	12500	6.27049951	−75.60341992
11415	2016.06	ARRENDAMIENTO	APARTAMENTO	NUEVO	LOS BALSOS # 2	6	73	23	1750000	23973	6.19605729	−75.57025639
11416	2016.06	ARRENDAMIENTO	APARTAMENTO	NUEVO	ZONA EXPANSION ...	3	55	36	700000	12727	6.27049951	−75.60341992
11417	2016.06	ARRENDAMIENTO	APARTAMENTO	NUEVO	LAS LOMAS # 2	6	128	94	2800000	21875	6.21171022	−75.55761278
11418	2016.06	ARRENDAMIENTO	APARTAMENTO	NUEVO	LA HONDONADA	4	60	19	750000	12500	6.20239441	−75.60191528
11419	2016.06	ARRENDAMIENTO	APARTAMENTO	NUEVO	ZONA DE ...	5	45	16	900000	20000	6.21669398	−75.60516884
11420	2016.06	ARRENDAMIENTO	APARTAMENTO	NUEVO	ZONA DE ...	5	45	16	900000	20000	6.21669398	−75.60516884
11421	2016.06	ARRENDAMIENTO	APARTAMENTO	NUEVO	SAN MIGUEL	3	30	7	520000	17333	6.25455976	−75.55421753
11422	2016.06	ARRENDAMIENTO	APARTAMENTO	NUEVO	BOSTON	4	60	8	770000	12833	6.24578023	−75.56123486
11423	2016.06	ARRENDAMIENTO	APARTAMENTO	NUEVO	ZONA DE ...	5	73	27	1200000	16438	6.21710477	−75.60565092
11424	2016.06	ARRENDAMIENTO	APARTAMENTO	NUEVO	ZONA DE ...	5	45	16	880000	19556	6.21669398	−75.60516884
11425	2016.06	ARRENDAMIENTO	APARTAMENTO	NUEVO	ZONA DE ...	5	45	16	900000	20000	6.21669398	−75.60516884
11426	2016.06	ARRENDAMIENTO	APARTAMENTO	NUEVO	ZONA EXPANSION ...	3	55	36	750000	13636	6.27049951	−75.60341992
11427	2016.06	ARRENDAMIENTO	APARTAMENTO	NUEVO	VILLA CARLOTA	6	66	11	1450000	21970	6.22233481	−75.57392735
11428	2016.06	ARRENDAMIENTO	APARTAMENTO	NUEVO	BOLIVARIANA	5	40	24	680000	17000	6.24487848	−75.59157658
11429	2016.06	ARRENDAMIENTO	APARTAMENTO	NUEVO	EL CHAGUALO	3	37	5	620000	16757	6.26078686	−75.5710812
11430	2016.06	ARRENDAMIENTO	APARTAMENTO	NUEVO	EL CHAGUALO	3	36	5	620000	17222	6.26078686	−75.5710812
11431	2016.06	ARRENDAMIENTO	APARTAMENTO	NUEVO	EL CHAGUALO	3	37	5	650000	17568	6.26078686	−75.5710812

Exploratory Analysis
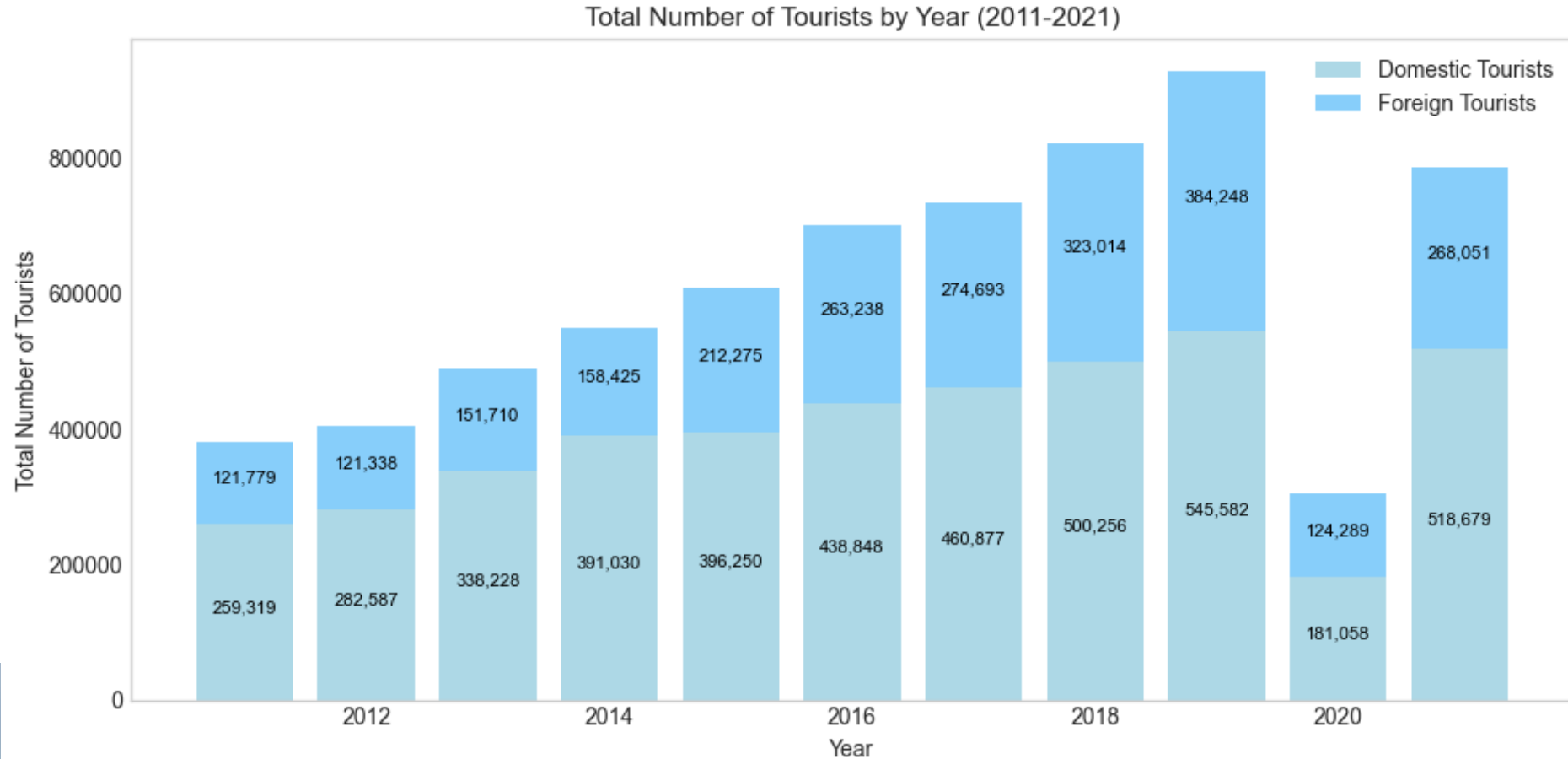
Total Number of Tourists by Year (2011-2021)

Exploratory Analysis
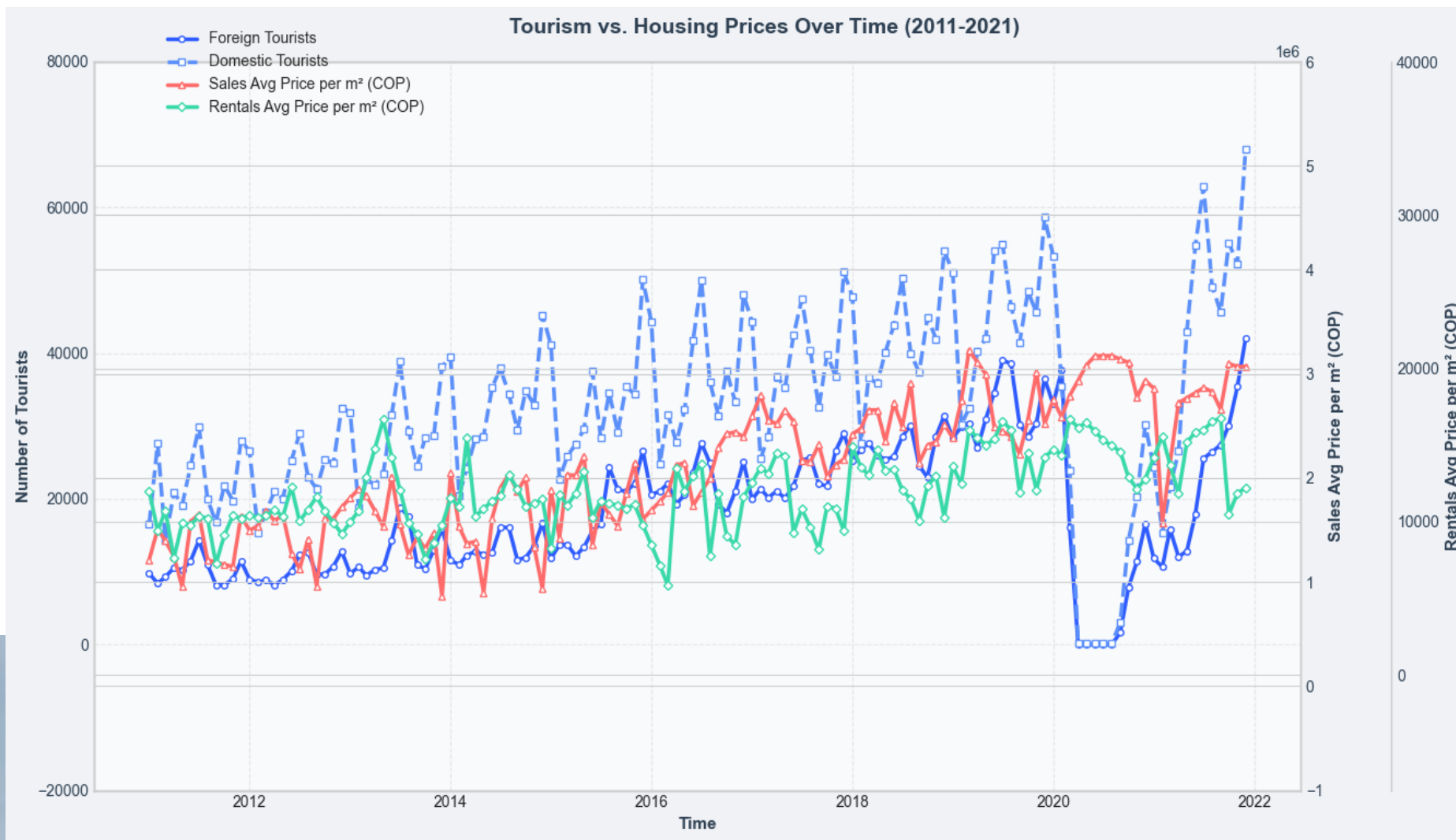
Correlation Analysis / Lagged Correlations

Correlation Matrix: Tourism and Housing Prices

Correlation Analysis / Lagged Correlations

Lagged Correlations with Sales and Rentals Avg Price per m²

Scatter plots / Granger Causality Tests

Scatter plots / Granger Causality Tests
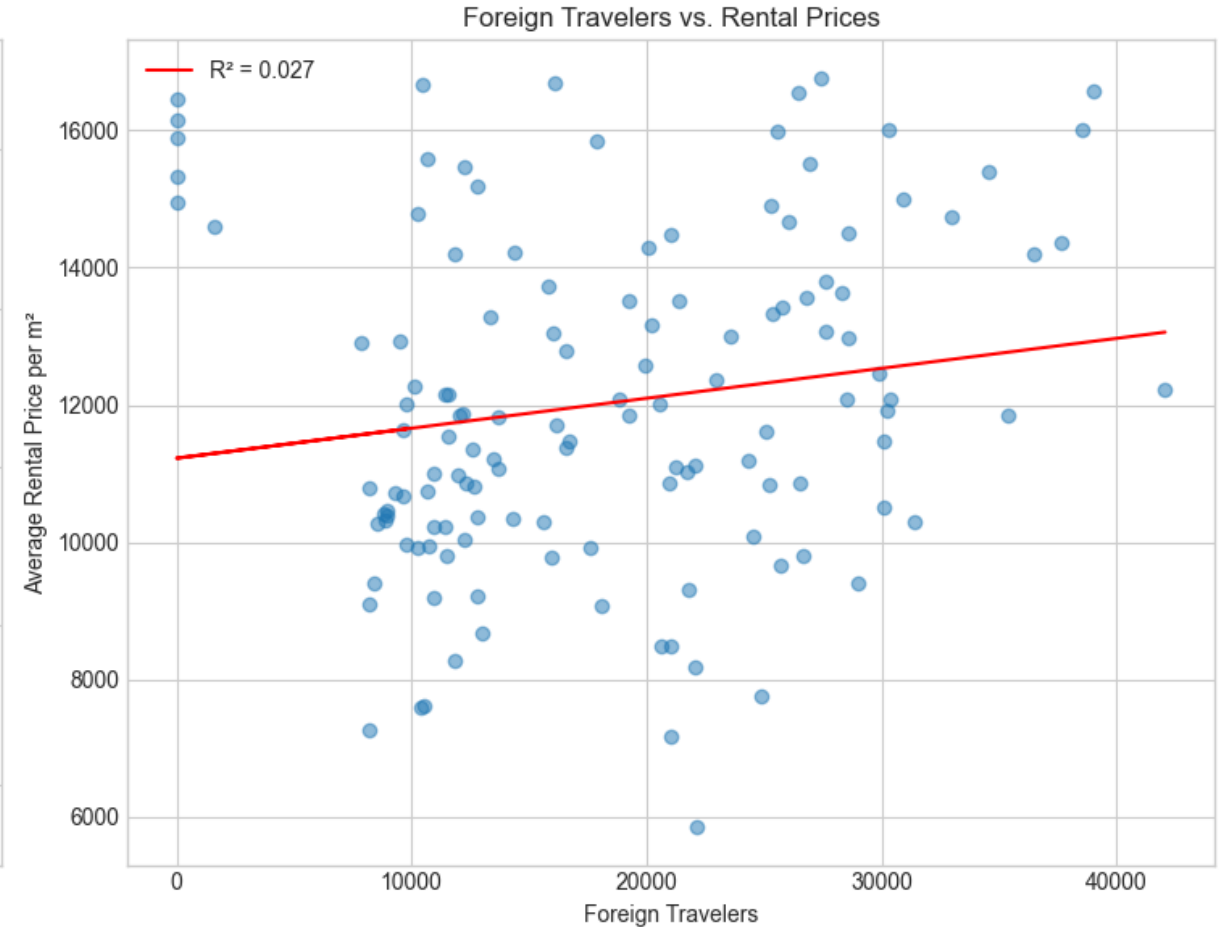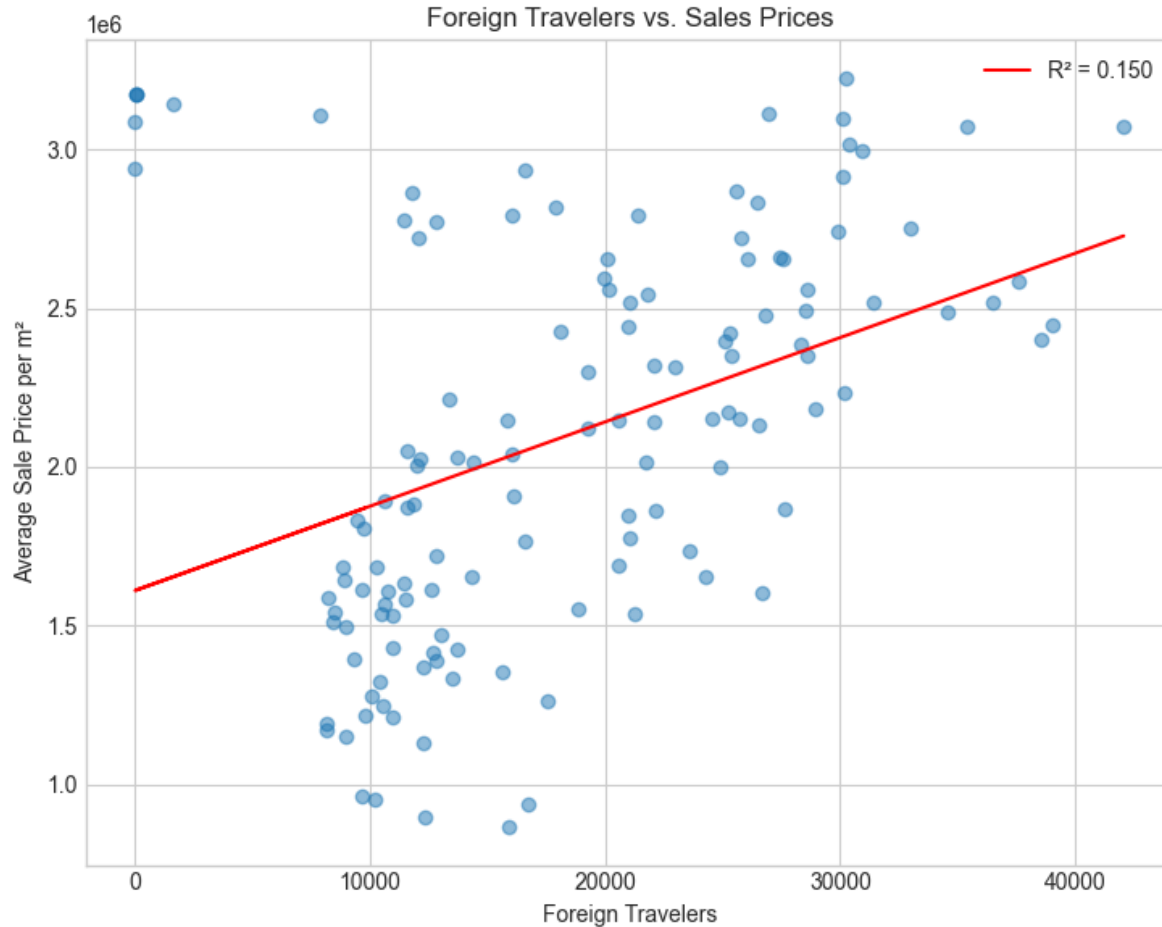
Granger Causality Test p-values
(Lower values suggest stronger causality)
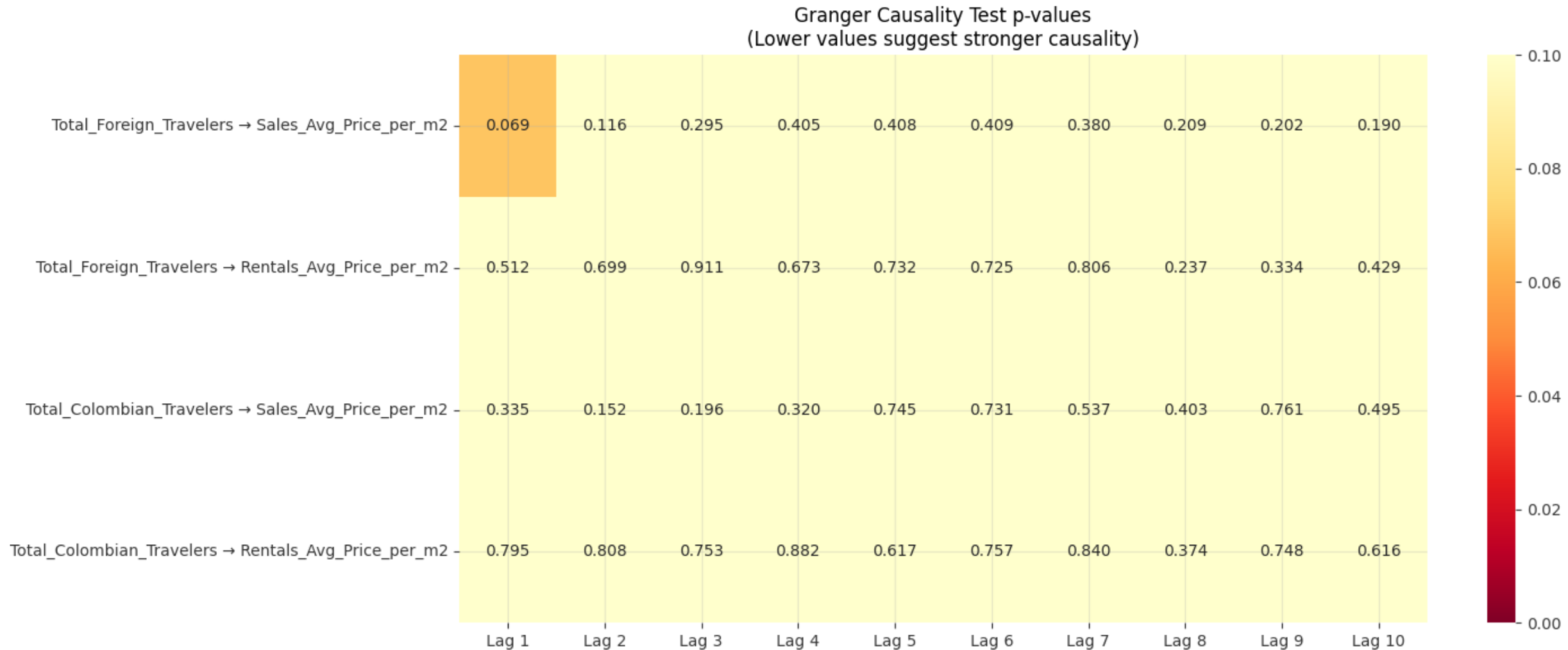
ANSWERS TO THE QUESTIONS RAISED

Correlation with Housing Prices?

There is a **moderate positive correlation** between **foreign tourist** arrivals and **average sale prices**, most noticeable after a 6–10 month lag. **Domestic** (Colombian) travelers show a **weaker correlation with sale prices**, and **both** foreign and domestic arrivals appear to have only **a small direct correlation with rental prices.**

Causal inference?

Based on Granger causality analyses, there is **no conclusive evidence that tourism causes changes in housing prices**. Any delayed relationship suggested by lag correlations does not translate into definitive predictive power.

THANK YOU