R-Bootcamp - Analysis of Building Projects in Zurich
MSC.IDS - HSLU Lucerne

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Contents

Introduction to the Analysis

Selection of the dataset

The dataset we want to analyze in the cause of this project, is the "**Neubauwohnungen nach Bauprojektstatus, Eigentumsart und statistischer Zone seit 2009**" dataset from the opendata.swiss website. The dataset contains information about housing projects in the city of Zurich since 2009 and holds information such as project status, ownership and location of the project. Furthermore, we add enriching data regarding real estate prices as well as adress data from the City of Zurich Open Data Portal to enrich our main dataset.

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Goals of the Analysis

The goal of the Analysis is to get an insight into the development of the real estate market in Zurich throughout the past decade. We want to offer a diverse view on several aspects of the market, including the development of different types of projects, prices, owners and locations. Through this, we want to identify trends and offer an overview of the market structure.

Research questions

Following the previous introduction and the goals of our analysis, we aim to answer the following research questions:

1) How did the number of overall building projects develop over time in different statistical zones / quartiers?

2) Who are the main owners / drivers of building projects?
3) Does the share of different building size groups change over time?
4) How did prices in the different parts of the city (quartiers) change over time?
5) Is there a relation between price development and building project development?

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Data Preparation

Data preparation consists of several steps. These include:

- Deletion of obsolete columns from the different data sets
- Renaming of several columns
- Grouping and summarising of several columns
- Merging of the different datasets

Exploratory Data Analysis

The summary of the final dataframe reveals several insights about the general structure of the data as well as the real estate market itself.

Regarding the general structure of the data, we can see that in total **27950 different datapoints** spread over a period of 13 years from **2009 until 2021**. In total, projects with a volume of **51016 apartments received approval** while **69194 appartments started construction** in Zurich during this period. *It is not clear, if individual apartments can appear in both categories at different points of time.*

The projects are located within **12 "Kreise" / regions**, split into **34 "Quartiere" / districts** which are then again differentiated into **215 statistical zones**, the most granular geo-statistical level for the city of Zurich. While data about the number of apartments and geographic coordinates is available on this level, price data is only available on Quartier-level. Furthermore, the projects are assigned to **5 different types of ownership**.

Visual Data Analysis

In this chapter, we want to visually analyze the structure of the real estate market. Lorem ipsum. . .

Price developments and differences

Average price development per sq.m. of condominium ownership and ground (CHF) As a first visual analysis of the data we will look at price developments on different levels. We want to get an overview of the development of yearly-averaged prices over time, split in the different categories available. These are CHF / m^2 Boden (Ganze Liegenschaft), CHF / m^2 Boden (Stockwerkbesitz), CHF / m^2 Boden (Kombiniert) as well as CHF / m^2 Wohnfläche (Stockwerkbesitz).

The following table and plot show information about real estate prices averaged over the whole city of Zurich for each year in CHF:

Jahr

CHF / m^2 Boden (Ganze Liegensch.)

CHF / m^2 Boden (Stockwerkb.)

CHF / m^2 Boden (Kombiniert)

CHF / m^2 Wohnfläche (Stockwerkb.)

2009

10901.27

12796.64

11935.92

8593.750

2010

12021.01

15576.15

13844.78

8992.903

2011

13333.41

15603.49

15023.58

9940.323

2012

14382.35

16967.21

17080.93

10363.448

2013

14220.12

16107.28

16627.28

10536.129

2014

16192.51

17519.03

16209.24

10913.667

2015

16116.10

21647.96

19382.91

11397.419

2016

19681.47

20815.68

20981.48

11909.688

2017

13076.26

19807.66

19117.49

12371.000

2018

17291.06

21467.14

18969.10

13303.226

2019

21432.53

21143.72

24311.94

12843.667

2020

19043.26

25945.96

22653.35

14330.667

2021

22267.91

26815.59

24229.06

15505.484
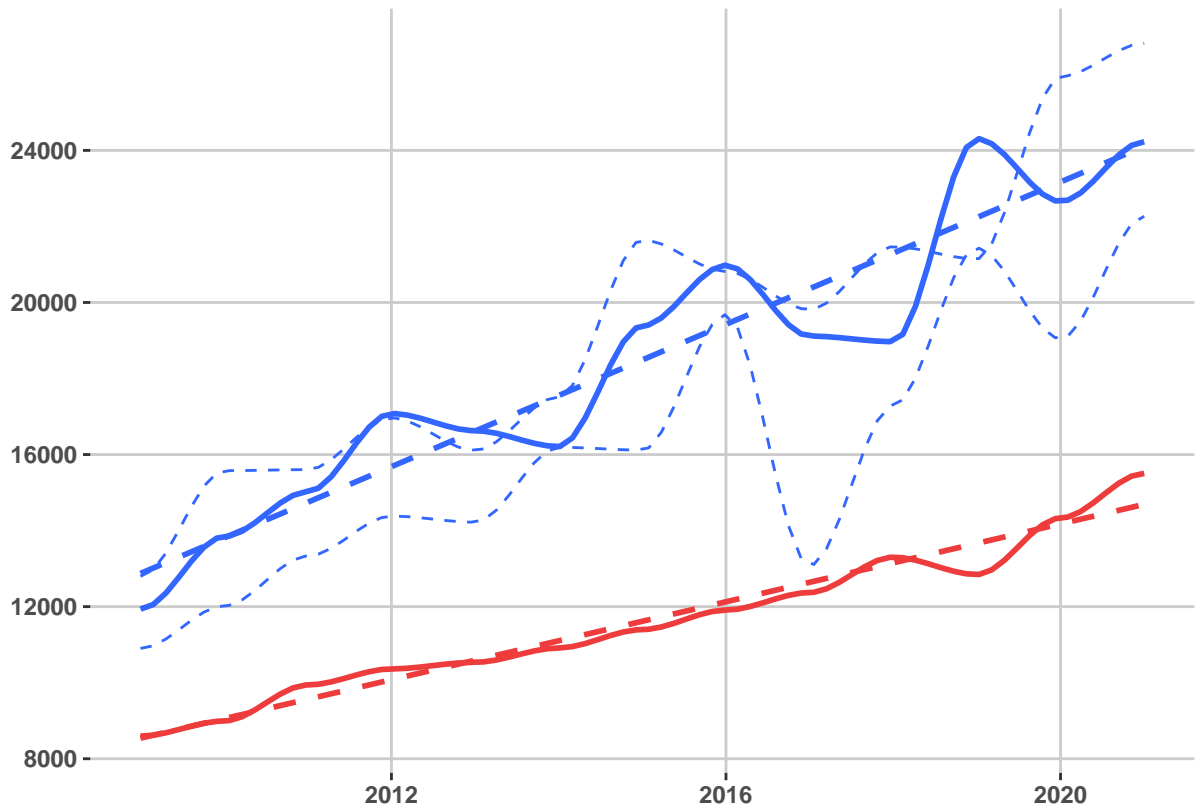
As we can see, the overall price trend is clearly upwards. The red curve, which represents the price for living space / Wohnfläche in condominium ownership / Stockwerkbesitz, is showing a continuous and constant **growth of about 575 CHF per year** over the observed timeline. The thick blue curve, which represents the price for ground / Boden, combined for both Stockwerkbesitz (upper dashed, blue line) and whole buildings / ganze Liegenschaft (lower dashed, blue line), reveals a yearly average **price increase of about 1000 CHF**.

Average price per sq.m. of condominium ownership and ground (CHF) per Kreis   Kreis

CHF / m^2 Boden (Ganze Liegensch.)

CHF / m^2 Boden (Stockwerkb.)

CHF / m^2 Boden (Kombiniert)

CHF / m^2 Wohnfläche (Stockwerkb.)

Kreis 1

66331.745

54126.194

60143.031

15309.600

Kreis 10

6715.157

11173.218

9471.065

10699.615

Kreis 11

6066.582

10193.949

8760.521

8791.795

Kreis 12

3603.991

7848.958

5259.269

8128.611

Kreis 2

9517.523

15630.428

12573.564

11234.615

Kreis 3

10022.699

16611.077

11702.246

10591.667

Kreis 4

19754.423

28229.548

23896.731

9976.452

Kreis 5

12651.683

30571.173

21600.013

12295.600

Kreis 6

10491.287

17741.990

14187.053

12800.769

Kreis 7

8311.202

13618.579

11569.249

14019.615

Kreis 8
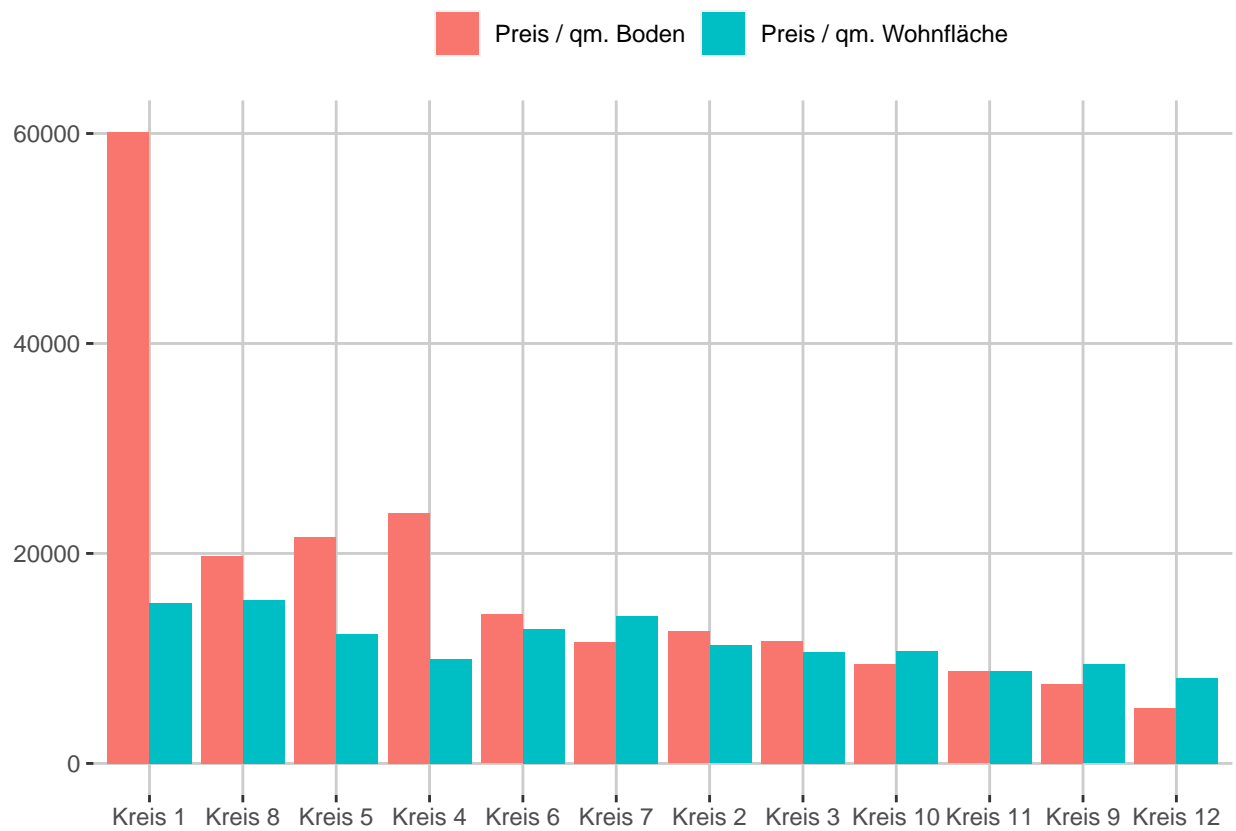
16643.761

24388.579

19718.626

15552.368

Kreis 9

5677.249

9945.179

7550.902

9422.308

Legend: ■ Preis / qm. Boden   ■ Preis / qm. Wohnfläche

Special Topic: Leaflet with R/Shiny

For our chapter of choice, we chose leaflet and integrate it with a simple Shiny App.

```
knitr::include_app("https://vordaten.shinyapps.io/StadtZurich/", height = "600px")
```

```
## PhantomJS not found. You can install it with webshot::install_phantomjs(). If it is installed, please
```

Modelling and Prediction

Model XYZ

Prediction XYZ

Summary and Conclusion