

# House Price Analysis & Prediction Amsterdam

Are you looking to buy or sell a property ?

What's the best price I can sell or buy the property?



# Table Of Contents

1

OVERVIEW  
DATASET

2

FORECAST &  
EXPECTATIONS  
HOUSE MARKET

5

EVALUATION &  
CONCLUSION

3

EXPLORATORY DATA  
ANALYSIS (EDA)

4

PREDICTION MODELS

# Overview dataset | House price prediction Amsterdam

**Our dataset:** House prices of properties advertised in Amsterdam in 2021.

**Source:** Pararius.nl

The original data provided features (variables) such as **price for sale**, **price per sqm**, **area** , **neighbourhood** (zip code, address) and the **number of rooms**

Our database comprise **924 properties listed on Pararius in August 2021**. We will examine **correlations and patterns among various variables** and gain valuable insights

# Forecast & Expectation House Market |

## **Strong Demand | Supply limitations | Modest Growth in Amsterdam**

Most real estate experts and Dutch banks remain of the opinion that house prices in the Netherlands will continue to rise because the demand for homes is still much greater than the supply/offer, specially in Amsterdam.

Market is likely to remain competitive, specially in central areas, with fluctuations influenced by broader economic trends.

# Forecast & Expectation House Market |

## Several factors can influence house price predictions in Amsterdam

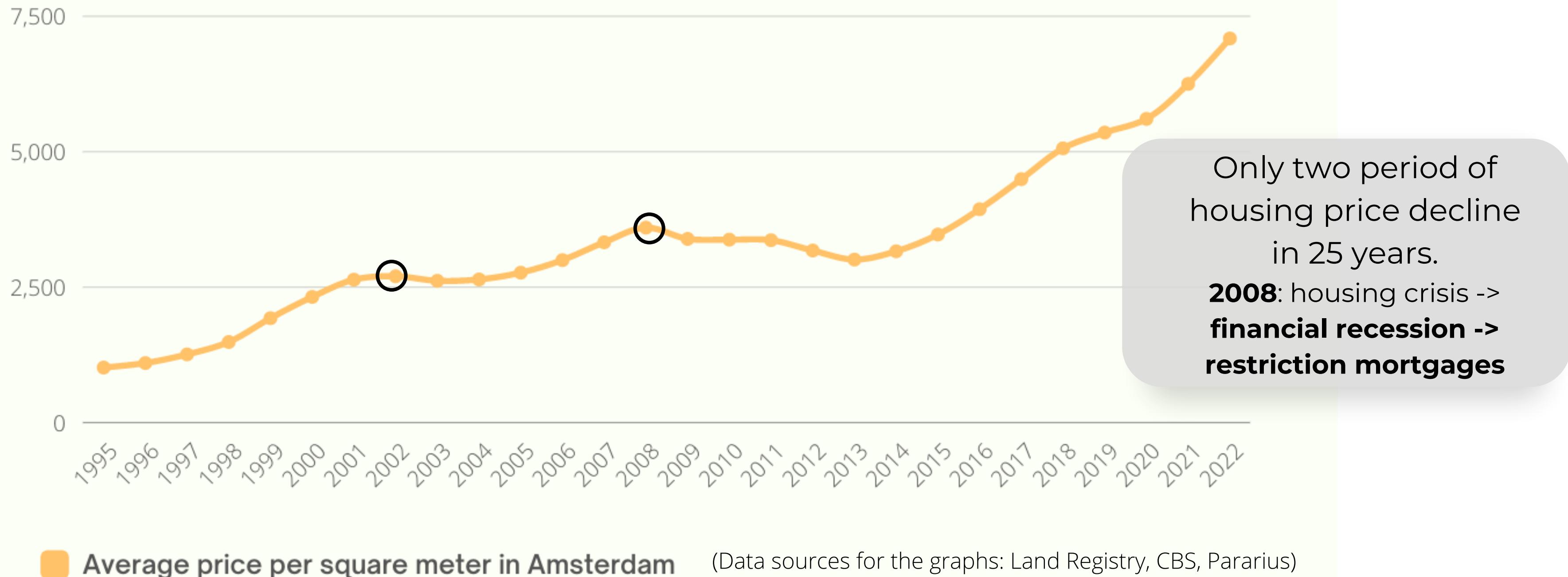
Internal and external factors such as **supply-demand balance**, economic conditions, and **government policies**, **interest rates**, global trends, and **urban development**, collectively shape the housing market. **Market sentiment** and regulatory changes further impact price dynamics, highlighting the complexity of predicting house prices in Amsterdam.

### Overbidding is still standard in Amsterdam

In 2022, **an average of 7.3% more is paid than the asking price** in Amsterdam.

# TENDENCY HOUSE MARKET AMSTERDAM FROM 1995-2022 | PRICE PER SQUARE METER

## Housing prices in Amsterdam (NL)



# FORECAST AND EXPECTATIONS FROM THE REAL ESTATE EXPERTS FOR 2022 AND 2023:

## PREDICTIONS DUTCH HOUSING MARKET 2022-2023

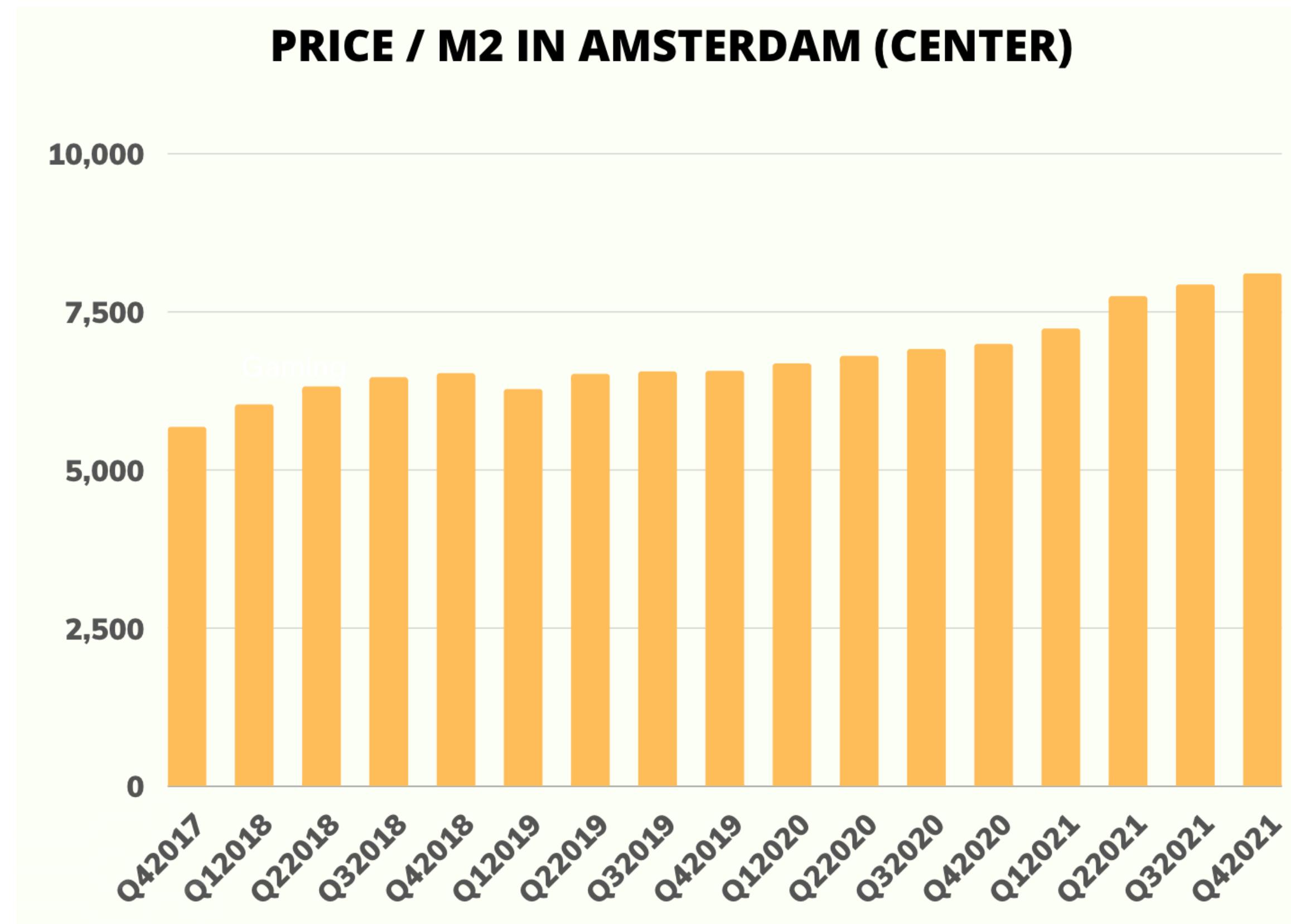
Bank	2022	2023
<b>ABN Amro</b>	<b>15%</b>	<b>2.5%</b>
<b>Rabobank</b>	<b>16.1%</b>	<b>4.5%</b>
<b>ING</b>	<b>15%</b>	<b>1%</b>

**ABNAmro** forecasts a **15%** increase for 2022 and a **2.5%** increase for 2023.

**Rabobank** forecasts a **16.1%** increase for 2022 and a **4.5%** increase for 2023.

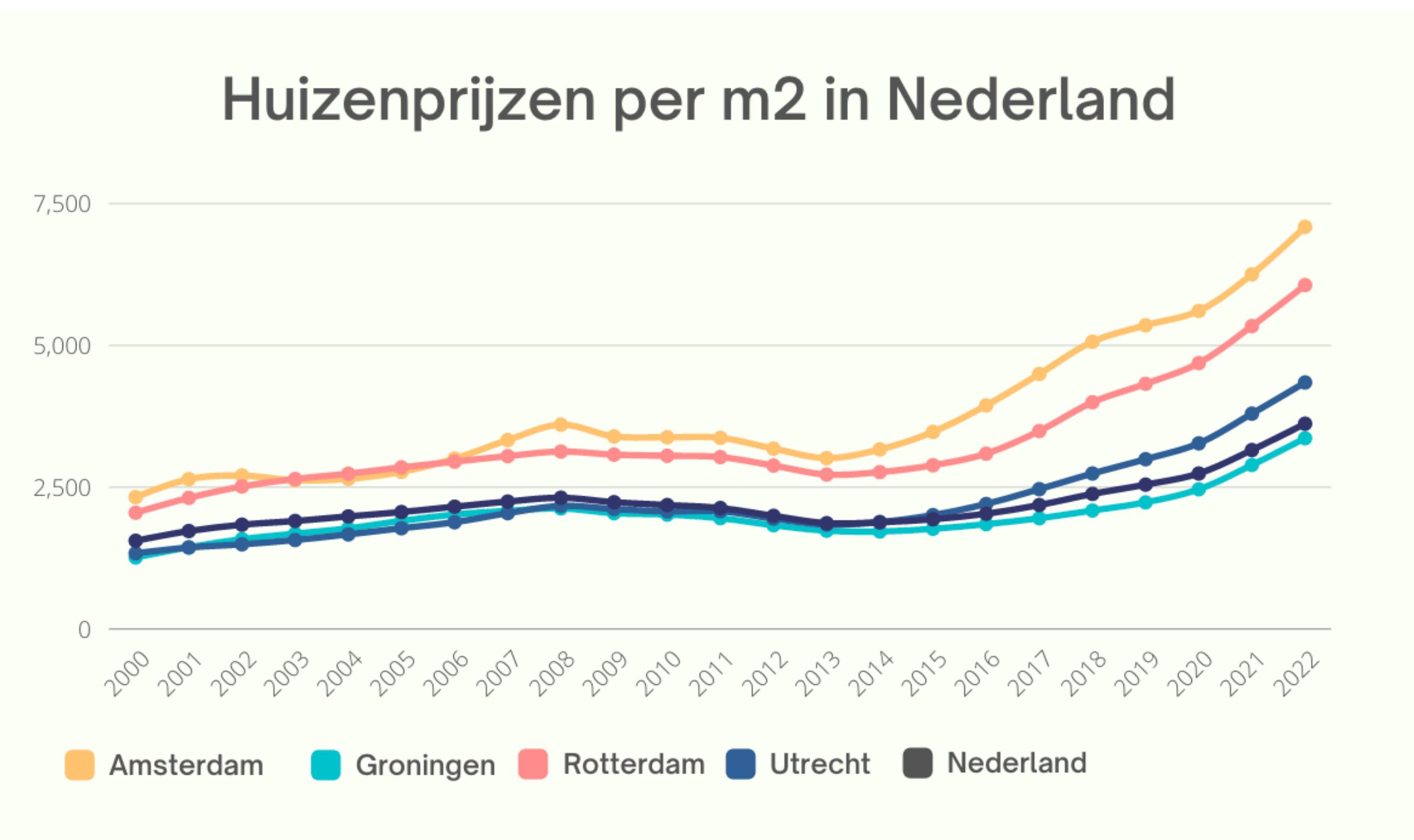
**ING** forecasts a **15%** increase for 2022 and a **1%** increase for 2023.

# PRICE PER M<sup>2</sup> INSIDE THE RING ROAD 2017-2021



(Data sources for the graphs: Land Registry, CBS, Pararius)

# PRICE PER M2 IN AMSTERDAM, ROTTERDAM, GRONINGEN, UTRECHT AND THE NETHERLANDS 2000-2022



(Data sources for the graphs: Land Registry, CBS, Pararius)

# EDA | Exploratory Data Analysis

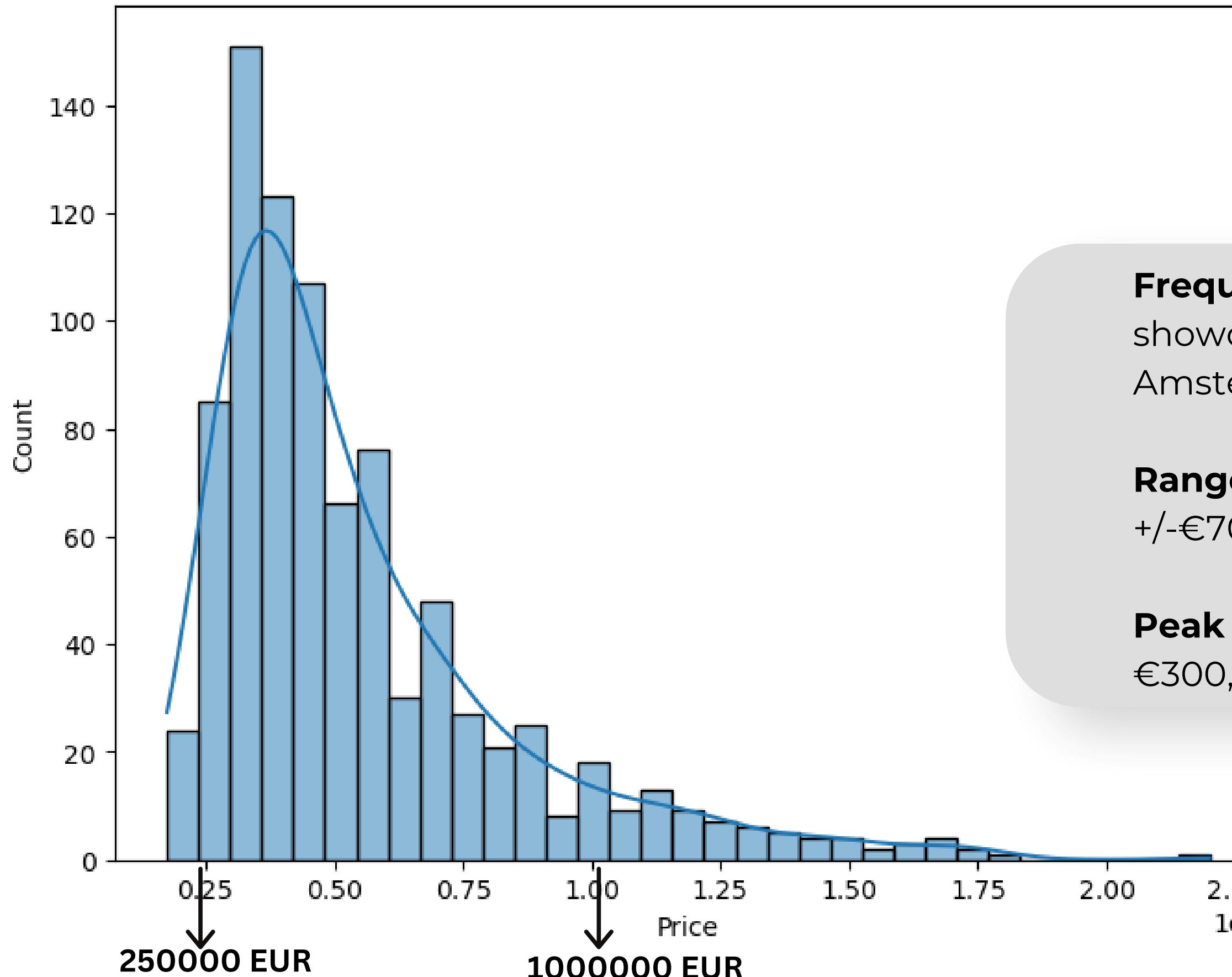
## Uncover patterns| Relationships | Visual Insights

We will understand the dataset, identifying patterns, generating insights that can influence the house price and its prediction.

We will analyze the price fluctuations, spatial distribution of properties and the features affecting price, see notable patterns or highlight anomalies.

# WHAT IS THE PRICE DISTRIBUTION ?

Price Distribution

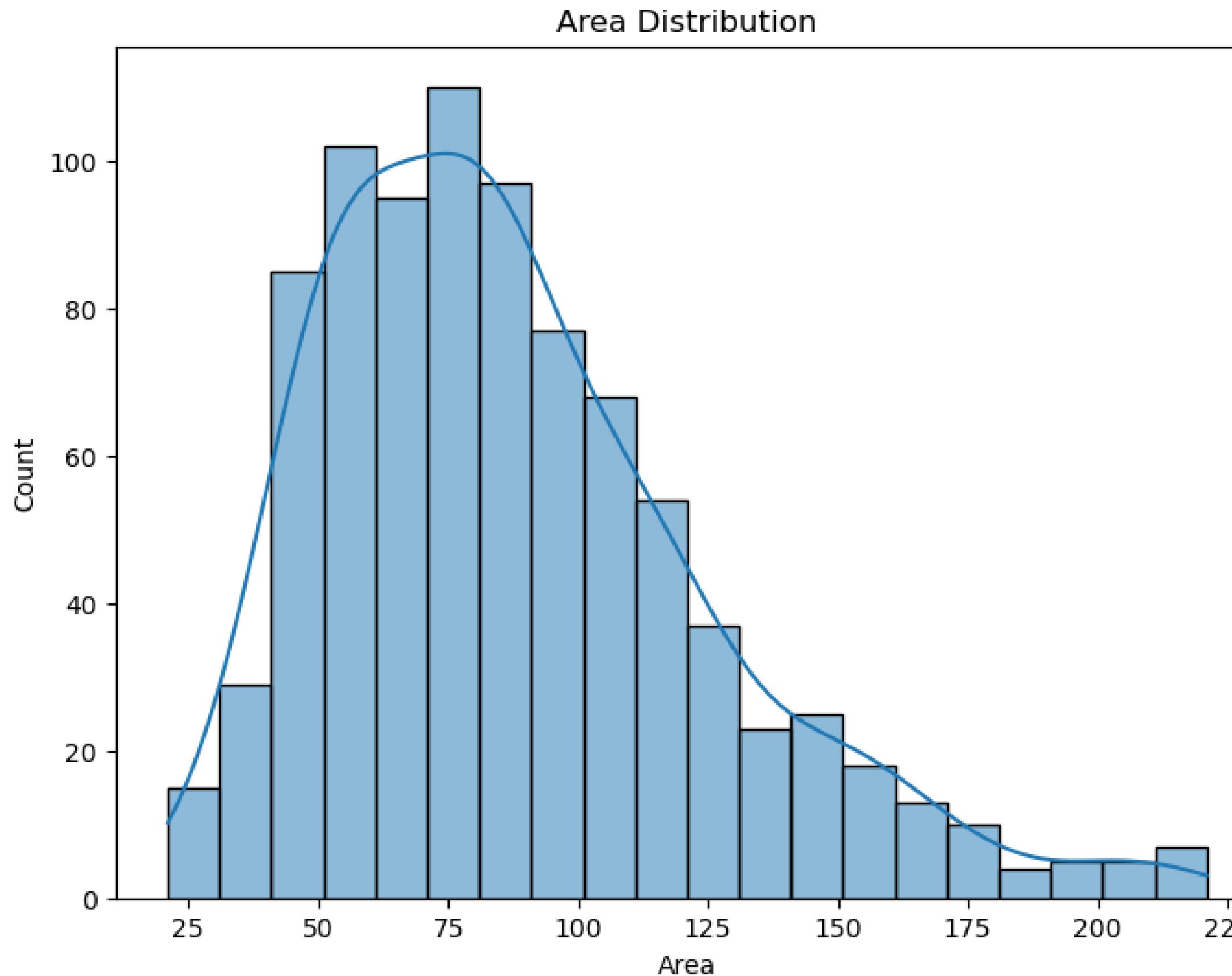


**Frequency distribution:** Histogram showcasing property prices in Amsterdam 2021

**Range price:** +/- €300,000 to +/-€700,000

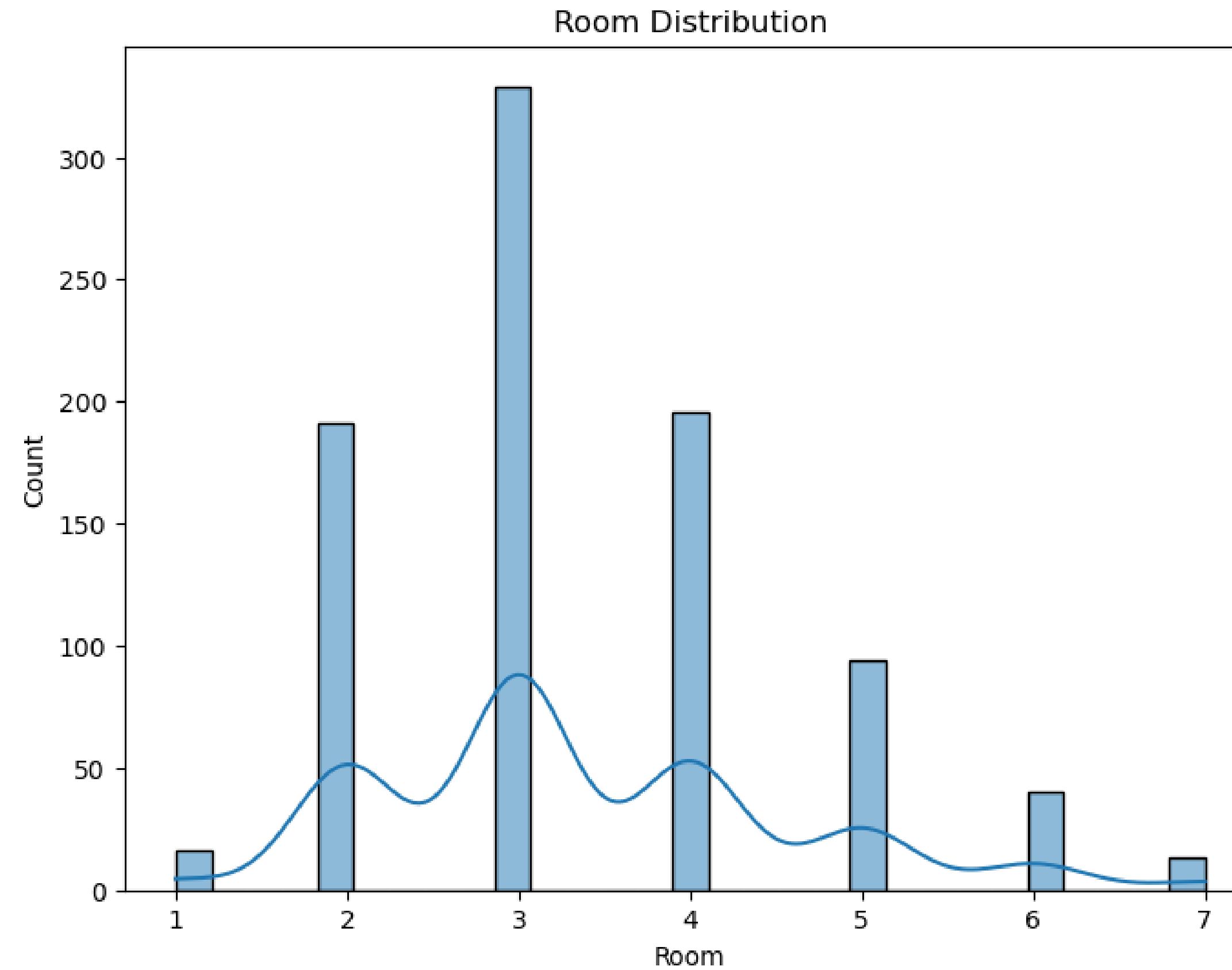
**Peak Frequency:** Highest at +/- €300,000 with 155 properties

# WHAT IS THE FREQUENCY AREA DISTRIBUTION?



Average Price per Square meter (area) is **6239 EUR**

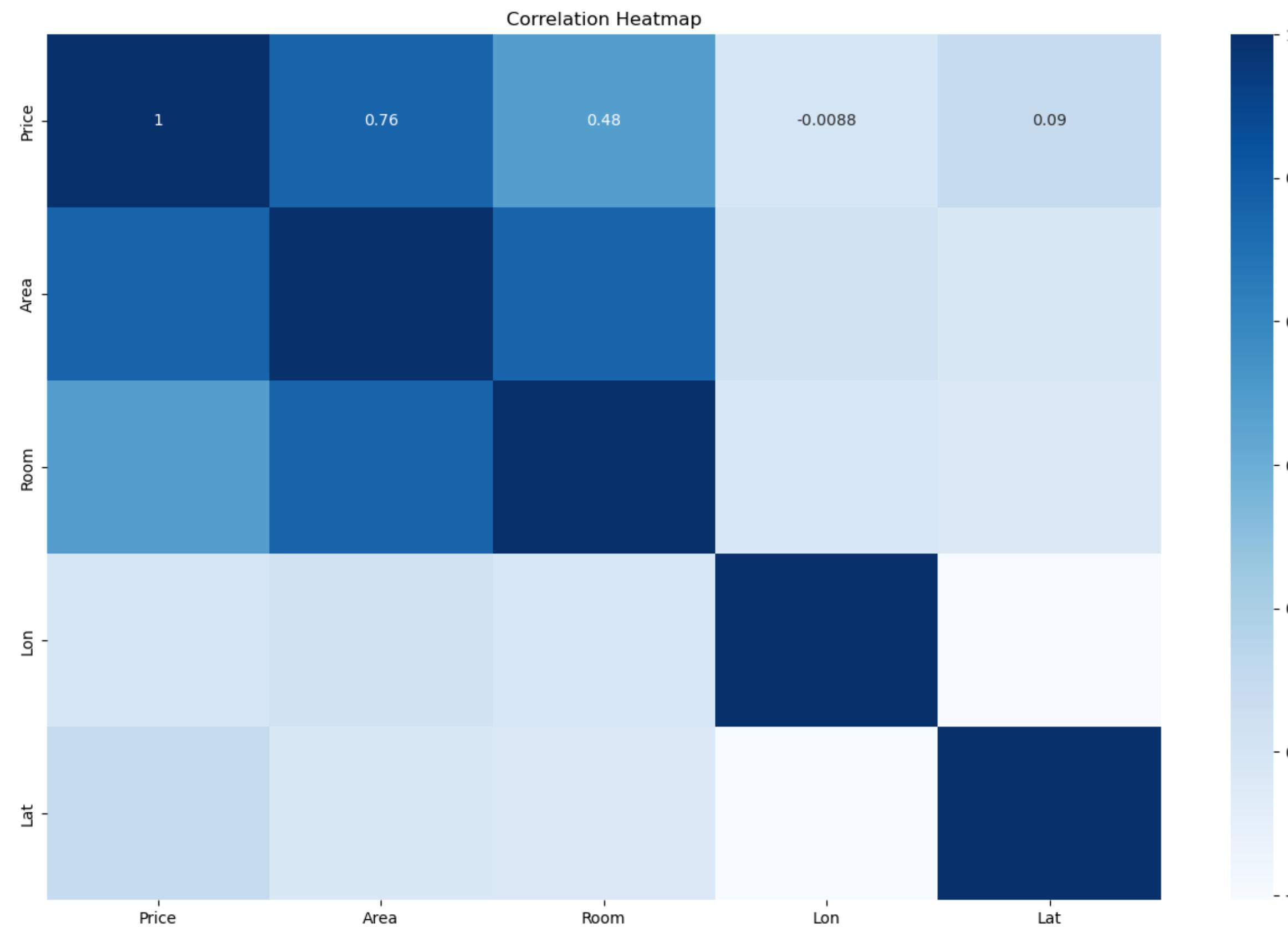
# WHAT IS THE FREQUENCY NUMBER OF ROOMS ?



# RELATIONSHIP BETWEEN AREA, PRICE, AND NUMBER OF ROOMS ?



# CORRELATION MATRIX | RELATIONSHIPS BETWEEN VARIABLES

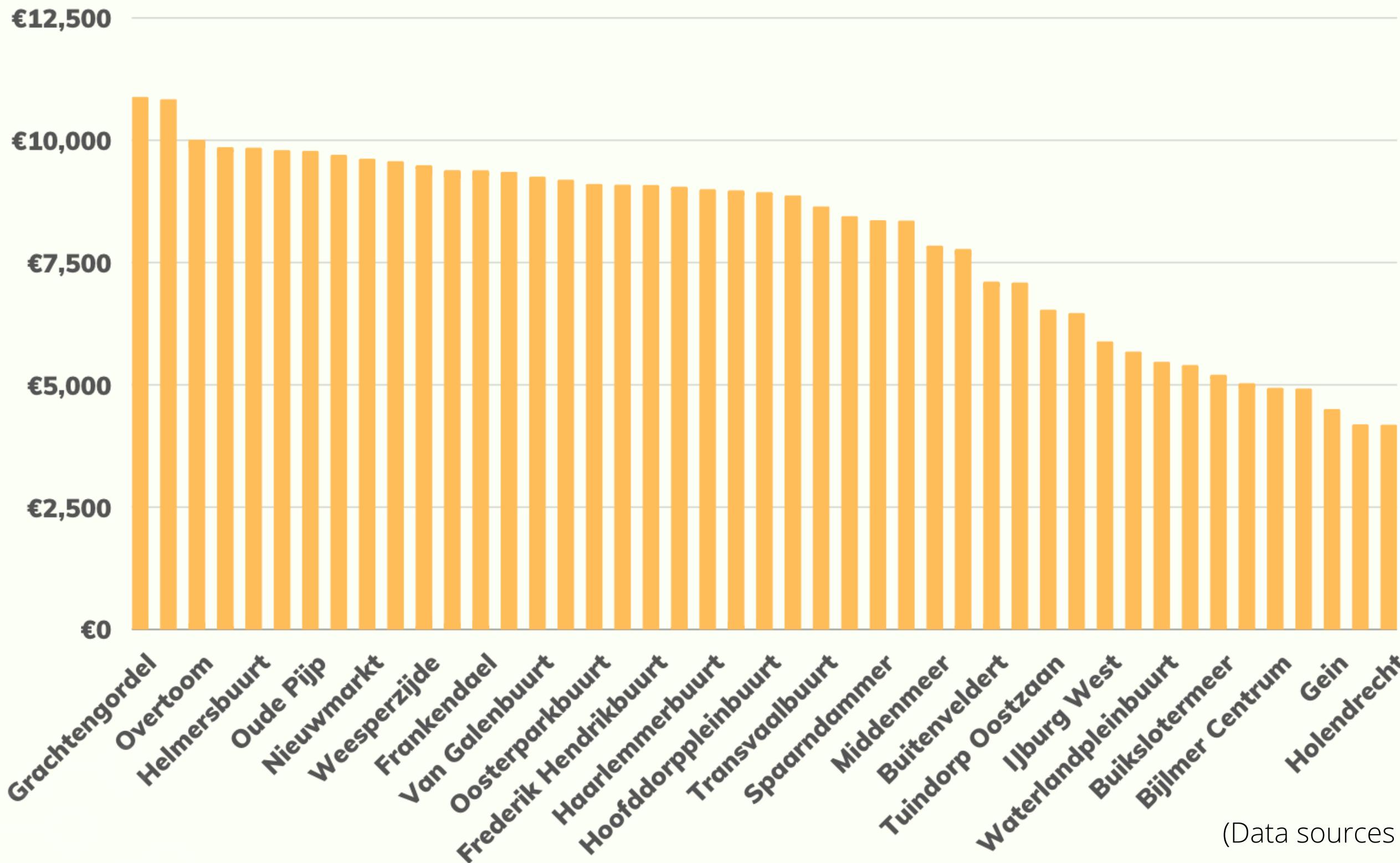


**Area vs. Price:**  
Generally positive correlation, the larger the property the higher price

**Number of Rooms vs. Price:** Moderate correlation with price, larger number of rooms correlates with higher price

# WHAT'S THE MOST EXPENSIVE VS. CHEAPEST NEIGHBOURHOODS IN AMSTERDAM?

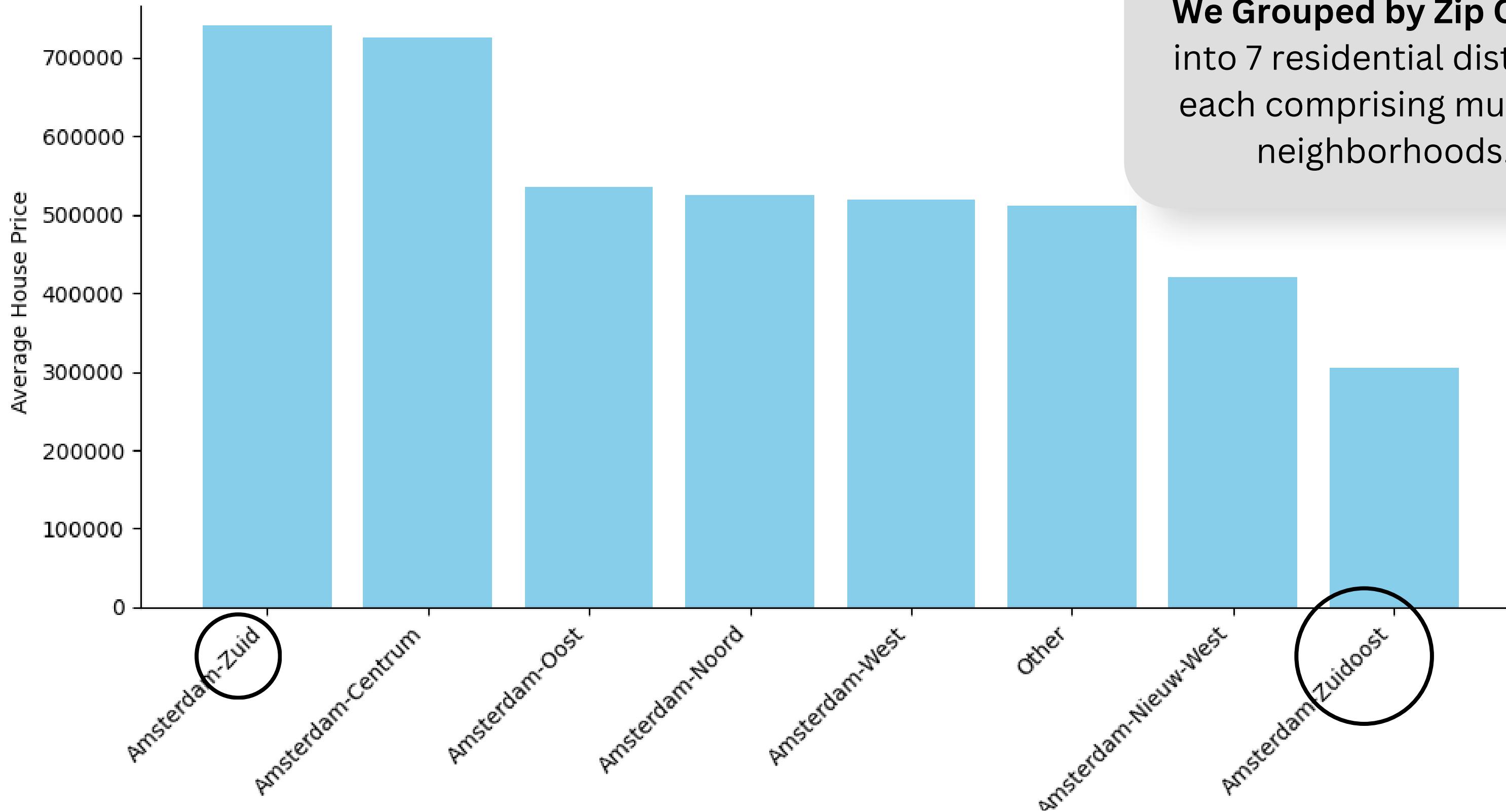
PRICE / M<sup>2</sup> IN AMSTERDAM PER NEIGHBORHOOD 2022



The most expensive neighbourhood is in **Grachtengordel**

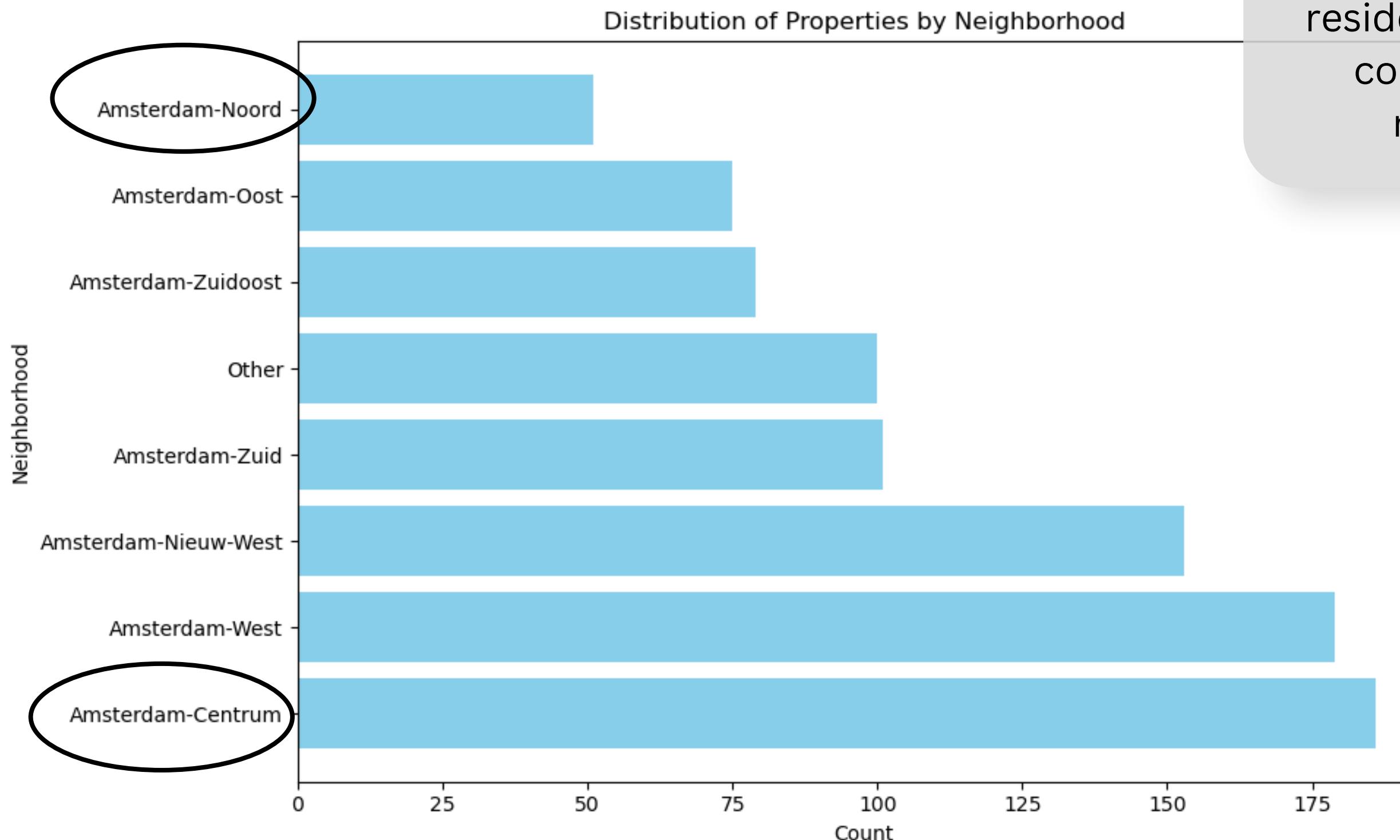
The most cheapest neighbourhoods is in **Gein and Holendrecht**

# AVERAGE HOUSE PRICE PER NEIGHBOURHOOD/DISTRICT IN AMSTERDAM ?



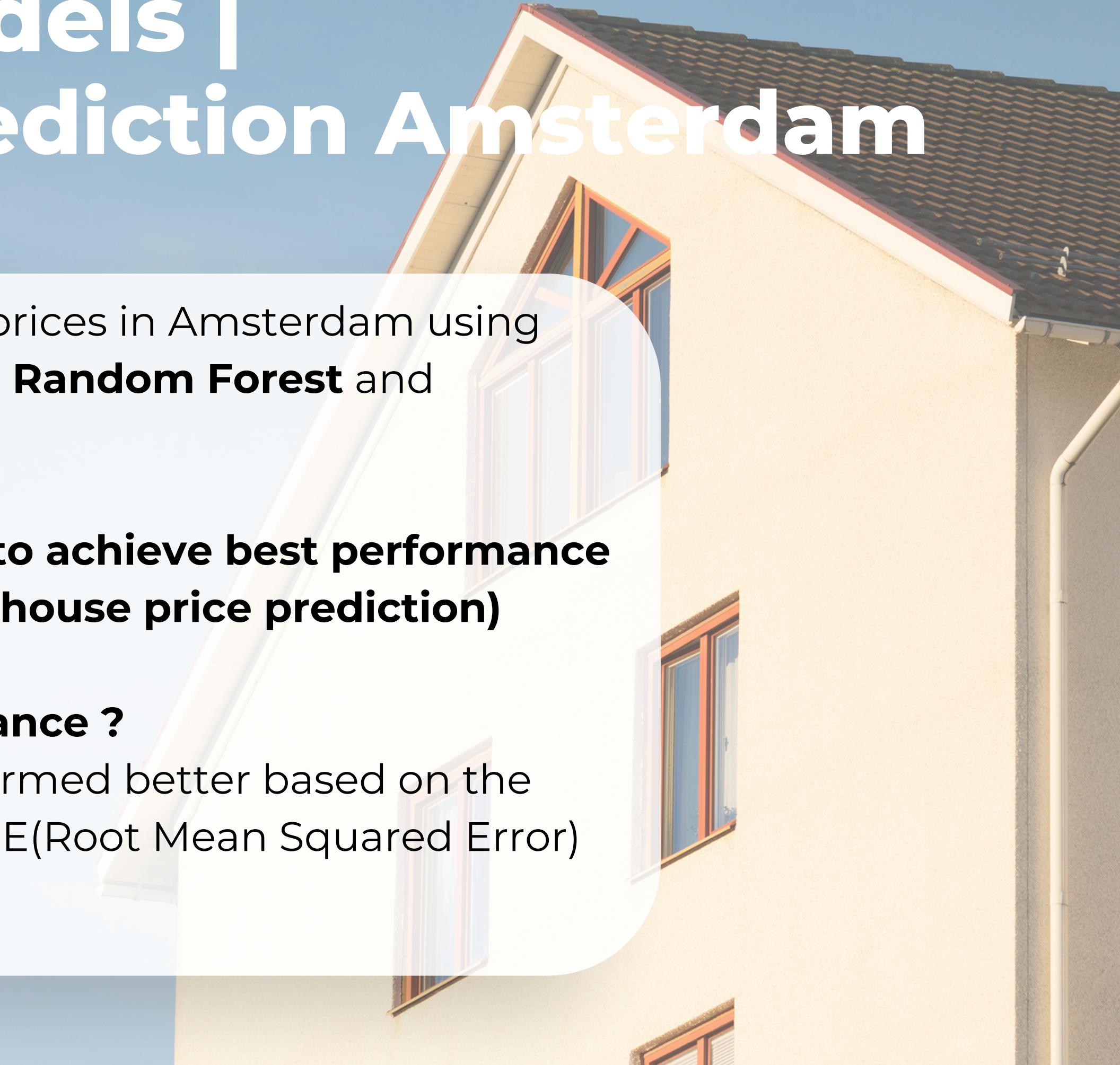
**We Grouped by Zip Codes**  
into 7 residential districts,  
each comprising multiple  
neighborhoods.

# DISTRIBUTION OF PROPERTIES BY DISTRICT/NEIGHBORHOOD ?



**Group by Zip Codes** into 7 residential districts, each comprising multiple neighborhoods.

# Prediction Models | House price prediction Amsterdam



We aim to predict house prices in Amsterdam using machine learning models: **Random Forest** and **XGBoost**

**Models were fine-tuned to achieve best performance  
(accuracy & efficiency in house price prediction)**

**The best model performance ?**

**XGBoost** slightly outperformed better based on the evaluation metrics of RMSE(Root Mean Squared Error) and R-squared.

# Prediction Models I

## House price prediction Amsterdam

### **Root Mean Squared Error (RMSE):**

**Random Forest:** RMSE of approximately 30,254.59.

**XGBoost:** RMSE of approximately **20,071.18.**

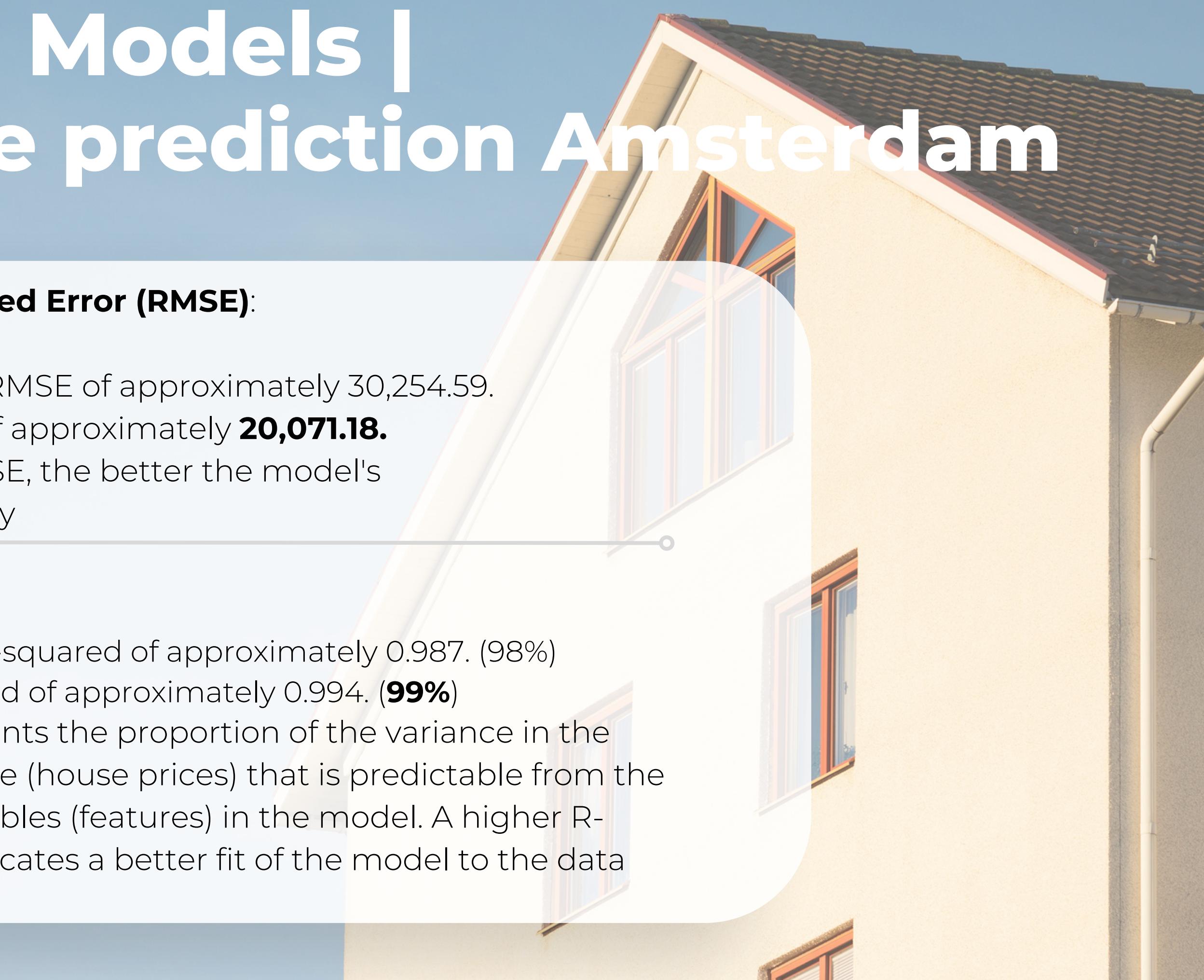
The lower the RMSE, the better the model's predictive accuracy

### **R-squared ( $R^2$ ):**

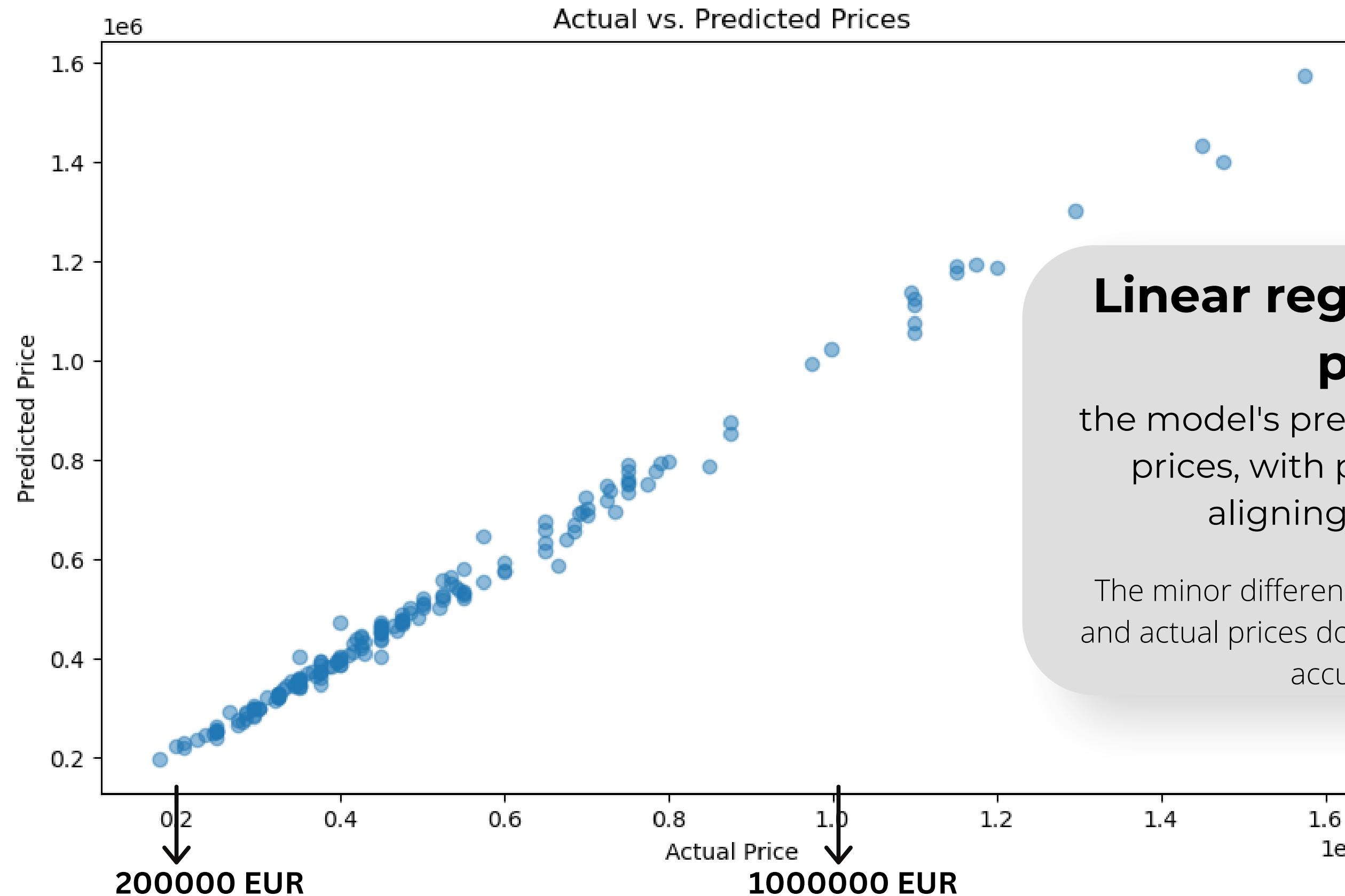
**Random Forest:** R-squared of approximately 0.987. (98%)

**XGBoost:** R-squared of approximately 0.994. (**99%**)

R-squared represents the proportion of the variance in the dependent variable (house prices) that is predictable from the independent variables (features) in the model. A higher R-squared value indicates a better fit of the model to the data



# ACCURACY ACTUAL VS. PREDICTED PRICES?



## Linear regression | model's precision

the model's precision in predicting house prices, with predicted prices closely aligning with actual prices

The minor differences observed between predicted and actual prices do not significantly affect the overall accuracy of the model

# ACCURACY ACTUAL VS. PREDICTED PRICES?

	<b>Area</b>	<b>Room</b>	<b>Lon</b>	<b>Lat</b>	<b>Price_per_sqm</b>	<b>Neighborhood</b>	<b>Actual Price</b>	<b>Predicted Price</b>	
	<b>365</b>	49	2	4.872222	52.366766	8163.265306	4	400000.0	407000.00
	<b>266</b>	90	3	4.903526	52.374705	5211.111111	0	469000.0	469456.38
	<b>831</b>	98	3	4.956816	52.317410	3316.326531	6	325000.0	326200.00
	<b>350</b>	60	2	4.947171	52.325081	4166.666667	6	250000.0	228410.00
	<b>229</b>	66	4	4.920472	52.357987	6212.121212	3	410000.0	404940.11
	<b>719</b>	75	3	4.790104	52.381911	4133.333333	1	310000.0	320710.00
	<b>622</b>	155	6	4.832889	52.367757	4838.709677	1	750000.0	814670.00
	<b>496</b>	27	2	4.818173	52.381780	7407.407407	1	200000.0	250260.00
	<b>857</b>	98	3	4.861985	52.322384	7132.653061	7	699000.0	702099.00
	<b>42</b>	91	4	4.987296	52.300656	3571.428571	6	325000.0	324550.00

# Evaluation & Conclusion



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While our models demonstrated promising accuracy in predicting house prices based on internal property attributes, it's essential to acknowledge the limitations regarding external market factors. Factors such as economic conditions, government policies, and market sentiment.

our predictive models offer guidance and leverage internal property attributes to forecast prices to facilitate confident decision-making for anyone interested in buying or selling property in Amsterdam.

# THANK YOU

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