

# Forecasting future house prices



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## Oriented by:

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# Presentation map



# OP Project GOAL



## ■ Goal :

- ✓ Predict housing prices one year from now => (end of 2021).

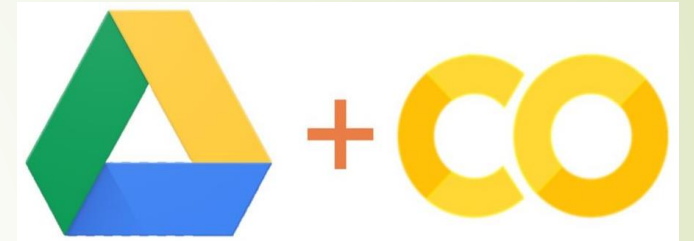
## ■ Requirements :

- ✓ Ability to follow the development **quarter-to-quarter** => (Q1/2021, Q2/2021, Q3/2021, Q4/2021).
- ✓ Ability to follow the development **per region** => Postal code / Province.
- ✓ Ability to follow the development **per type of housing** => Flats (one-room flat, two-room flat, three-room flat+), row houses (Terraced houses).

# Communication channels



- ✓ Telegram
- ✓ Google drive
- ✓ Google Colab
- ✓ Microsoft Teams



## ■ Main source :

✓ Tilastokeskus => Statistics Finland's PxWeb databases

## ■ Possible DBs :

112t -- Price indices of old dwellings in housing companies, (1970=100, 1983=100, 2000=100, 2005=100, 2010=100), 1988Q1-2020Q2\*

Select variable

About table

Mark your selections and choose between table on screen and file format. Marking tips  
For variables marked \* you need to select at least one value

<div><div>Information *</div><div><input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></div><div>Total 10 Selected 0</div><div><div>Index (1970=100)</div><div>Real price index (1970=100)</div><div>Index (1983=100)</div><div>Real price index (1983=100)</div><div>Index (2000=100)</div><div>Real price index (2000=100)</div></div><div><div>Search <input type="text"/></div><div><input type="checkbox"/> Beginning of word</div></div></div>	<div><div>Region *</div><div><input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></div><div>Total 83 Selected 0</div><div><div>Whole country</div><div>Greater Helsinki</div><div>Whole country - Greater Helsinki</div><div>Uusimaa</div><div>Itä-Uusimaa</div><div>Varsinais-Suomi</div></div><div><div>Search <input type="text"/></div><div><input type="checkbox"/> Beginning of word</div></div></div>	<div><div>Building type *</div><div><input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></div><div>Total 3 Selected 0</div><div><div>Building types total</div><div>Terraced houses</div><div>Blocks of flats</div></div><div><div>Search <input type="text"/></div><div><input type="checkbox"/> Beginning of word</div></div></div>	<div><div>Number of rooms *</div><div><input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></div><div>Total 4 Selected 0</div><div><div>Total</div><div>One-room flat</div><div>Two-room flat</div><div>Three-room flat+</div></div><div><div>Search <input type="text"/></div><div><input type="checkbox"/> Beginning of word</div></div></div>	<div><div>Quarter *</div><div><input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></div><div>Total 130 Selected 0</div><div><div>2020Q2*</div><div>2020Q1*</div><div>2019Q4</div><div>2019Q3</div><div>2019Q2</div><div>2019Q1</div></div><div><div>Search <input type="text"/></div><div><input type="checkbox"/> Beginning of word</div></div></div>
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# Data sources

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- Main source :

- ✓ Tilastokeskus => Statistics Finland's PxWeb databases

- Possible DBs :

112p -- Average prices of old dwellings in housing companies and numbers of transactions by postal code area, 2010Q1-2020Q2\*

Select variable

About table

Mark your selections and choose between table on screen and file format. Marking tips  
For variables marked \* you need to select at least one value

<b>Information *</b>	<b>Postal code *</b>	<b>Building type *</b>	<b>Quarter *</b>
<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Total 2 Selected 0	Total 1,664 Selected 0	Total 6 Selected 0	Total 42 Selected 0
<div>Price per square meter (EUR/m2)</div> <div>Number of sales</div>	<div>00100 Helsinki Keskusta - Etu-Töölö (Helsinki )</div> <div>00120 Punavuori (Helsinki )</div> <div>00130 Kaartinkaupunki (Helsinki )</div> <div>00140 Kaivopuisto - Ullanlinna (Helsinki )</div> <div>00150 Eira - Hernesaari (Helsinki )</div> <div>00160 Katajanokka (Helsinki )</div>	<div>Blocks of flats, one-room flat</div> <div>Blocks of flats, two-room flat</div> <div>Blocks of flats, three-room flat+</div> <div>Blocks of flats total</div> <div>Terraced houses total</div> <div>Building types total</div>	<div>2020Q2*</div> <div>2020Q1*</div> <div>2019Q4</div> <div>2019Q3</div> <div>2019Q2</div> <div>2019Q1</div>
Search <input type="text"/> <input type="button" value="➤"/>	Search <input type="text"/> <input type="button" value="➤"/>	Search <input type="text"/> <input type="button" value="➤"/>	Search <input type="text"/> <input type="button" value="➤"/>
<input type="checkbox"/> Beginning of word	<input type="checkbox"/> Beginning of word	<input type="checkbox"/> Beginning of word	<input type="checkbox"/> Beginning of word



# Data sources

7

- Main source :

- ✓ Tilastokeskus => Statistics Finland's PxWeb databases

- Possible DBs :

112r -- Average prices of old dwellings in housing companies and numbers of transactions, quarterly, 2006-, 2006Q1-2020Q2\*



Select variable

About table

Mark your selections and choose between table on screen and file format. Marking tips  
For variables marked \* you need to select at least one value

<b>Information *</b>  <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Total 2 Selected 0 Price per square meter (EUR/m2) Number of sales  Search <input type="text"/> <input type="button" value="➤"/> <input type="checkbox"/> Beginning of word	<b>Region *</b>  <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Total 84 Selected 0 Whole country Greater Helsinki Whole country excluding Greater Helsinki Uusimaa Helsinki Helsinki 1  Search <input type="text"/> <input type="button" value="➤"/> <input type="checkbox"/> Beginning of word	<b>Building type *</b>  <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Total 3 Selected 0 Building types total Terraced houses Blocks of flats  Search <input type="text"/> <input type="button" value="➤"/> <input type="checkbox"/> Beginning of word	<b>Number of rooms *</b>  <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Total 4 Selected 0 Total One-room flat Two-room flat Three-room flat+  Search <input type="text"/> <input type="button" value="➤"/> <input type="checkbox"/> Beginning of word	<b>Quarter *</b>  <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Total 58 Selected 0 2020Q2* 2020Q1* 2019Q4 2019Q3 2019Q2 2019Q1  Search <input type="text"/> <input type="button" value="➤"/> <input type="checkbox"/> Beginning of word
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## Sequencing:

- ✓ Choose the filters => Make an overview on results => Download the table as CSV file => Use the CSV file.



112r -- Average prices of old dwellings in housing companies and numbers of transactions, quarterly, 2006-, 2006Q1-2020Q2\*

Select variable

About table

Mark your selections and choose between table on screen and file format. Marking tips  
For variables marked \* you need to select at least one value

Information *	Region *	Building type *	Number of rooms *	Quarter *
<div><input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></div> <div>Total 2 Selected 1</div> <div><div>Price per square meter (EUR/m2)</div><div>Number of sales</div></div> <div><input type="text"/> <input type="button" value="➤"/></div> <div><input type="checkbox"/> Beginning of word</div>	<div><input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></div> <div>Total 84 Selected 4</div> <div><div>Whole country</div><div>Greater Helsinki</div><div>Whole country excluding Greater Hels</div><div>Uusimaa</div><div>Helsinki</div><div>Helsinki 1</div></div> <div><input type="text"/> <input type="button" value="➤"/></div> <div><input type="checkbox"/> Beginning of word</div>	<div><input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></div> <div>Total 3 Selected 1</div> <div><div>Building types total</div><div>Terraced houses</div><div>Blocks of flats</div></div> <div><input type="text"/> <input type="button" value="➤"/></div> <div><input type="checkbox"/> Beginning of word</div>	<div><input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></div> <div>Total 4 Selected 1</div> <div><div>Total</div><div>One-room flat</div><div>Two-room flat</div><div>Three-room flat+</div></div> <div><input type="text"/> <input type="button" value="➤"/></div> <div><input type="checkbox"/> Beginning of word</div>	<div><input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></div> <div>Total 58 Selected 5</div> <div><div>2020Q2*</div><div>2020Q1*</div><div>2019Q4</div><div>2019Q3</div><div>2019Q2</div><div>2019Q1</div></div> <div><input type="text"/> <input type="button" value="➤"/></div> <div><input type="checkbox"/> Beginning of word</div>



## Sequencing:

- ✓ Choose the filters => Make an overview on results => Download the table as CSV file => Use the CSV file.

1

2

3

Choose table
Choose variable
Show table

Show table
About table

Edit and Calculate
Save table as
Show table

px
csv
xlsx
jstat

Semicolon delimited with heading

+ Table settings

+ Save your query

### Average prices of old dwellings in housing companies and numbers of transactions, quarterly by Building type, Number of rooms, Region, Information and Quarter

	Price per square meter (EUR/m2)				
	2018Q1	2019Q3	2019Q4	2020Q1*	2020Q2*
Blocks of flats					
One-room flat					
Helsinki 1	8,051	8,369	7,914	8,437	8,506
Helsinki 2	6,245	6,721	6,644	7,032	6,976
Espoo-Kauniainen 2	4,261	4,014	4,858	...	...
Espoo-Kauniainen 3	3,627	3,458	3,638	3,730	...

## ■ Sequencing:

- ✓ Choose the filters => Make an overview on results => Download the table as CSV file => Use the CSV file.

```
import pandas as pd
```

```
table = pd.read_csv("014_112r_2020q2.csv", sep = ';')
table
```

112r -- Average prices of old dwellings in housing companies and numbers of transactions, quarterly, 2006-, 2006Q1-2020Q2\*

Region	Building type	Number of rooms	2018Q1 Price per square meter (EUR/m2)	2019Q3 Price per square meter (EUR/m2)	2019Q4 Price per square meter (EUR/m2)	2020Q1* Price per square meter (EUR/m2)	2020Q2* Price per square meter (EUR/m2)
Helsinki 1	Blocks of flats	One-room flat	8051	8369	7914	8437	8506
Helsinki 2	Blocks of flats	One-room flat	6245	6721	6644	7032	6976
Espoo-Kauniainen 2	Blocks of flats	One-room flat	4261	4014	4858	...	...
Espoo-Kauniainen 3	Blocks of flats	One-room flat	3627	3458	3638	3730	...

# Next steps



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✓ Extract 4 DBs:

**Building type( Number of rooms )**

1. Terraced houses (total);
2. Blocks of flats (one-room flat);
3. Blocks of flats (two-room flat);
4. Blocks of flats (three-room flat+);

- ✓ Add the postal code of each region.
- ✓ Perform an EDA (Explanatory Data Analysis) on each DB.
- ✓ Preprocessing the data (Impute NA values, ..).
- ✓ As we have a regression problem, we will try first the Linear regression model.

Thank you for your kind attention

