Applied Data Science Capstone Project

Are there indicators of a Housing Bubble in Sweden?

Contents

1. Introduction

1.1. Business background and problem

The housing and construction market is an essential pillar of the Swedish economy, with direct effects of about 16 % of the national GDP in 2019. This does not include several related services that fall into other GDP categories, e.g. "Business Services" (1, 4, 5). To a significant extend, people in Sweden own their houses, flats or Bostadsrätt, which is owning the right to live in a flat, not the flat itself. In 2019, more than 60 % of the Swedish population owned their place of living in one of these ways (2). Both, the high importance for the national GDP as well as the high dependence of Swedish inhabitants, make the housing market and housing prices an important factor in the country. In recent years, these prices were significantly increasing, which increased the Swedish GDP as well as the capital of the housing owners. At the same time, this hinders people that do not have housing the access to the market.

The trend was going steeper and steeper upwards since the last real estate downturn in the 1990s (11). Several scientists claimed that a severe housing bubble developed in Sweden since 2004 that requires corrective action (12). In 2016, the Swedish central bank asked: "*Is there an evident housing bubble in Sweden?"* (3). This was after the housing bubble in the United States had been one of the causes of the global financial crisis of 2008 (6,7, 12). In 2017, Bloomberg assessed that "*Warning Signs Are Mounting for Sweden's Once-Hot Housing Market",* in 2018 *Goldman Sachs* saw *"Swedish property market heading for worst crash since 1990s banking crisis"*, and Reuters agreed in 2019: "*Sweden grapples with housing market reform as risks mount*" (8, 10, 11). In 2020, the central bank again reported this as a significant risk in its report about *"A new indicator of risks and vulnerabilities in the Swedish financial system"* (9).

Up to now in July 2020, the crash the experts and scientists expected did not come. The questions arising from this fact are:

- What factors determine if there a housing bubble in Sweden?
- Are the factors for a housing bubble in Sweden fulfilled?
- In which areas of Sweden might housing bubbles be fulfilled?

Moreover, an important variable for the analysis is the changed economic environment due to the COVID 19 crisis. Therefore, another question is:

- How does the COVID 19 crisis affect the Swedish housing market?
- Is there a higher risk of a crash in the housing market due to these factors?

Another interesting factor is to see the housing prices in the context of the Swedish government's legal task to ensure affordable housing for everyone living in the country.

1.2. Target audience

The potential target audience for this data science project is brought. There are several stakeholders acting in the Swedish housing markets that are interested in the question if there is a housing bubble. These include the Swedish government, domestic as well as foreign investors, and people owning or planning to own housing in Sweden.

2. Data requirements and sources

2.1. Relevant data to analyse the business problem

The key for the analysis of the housing market in Sweden and the potential housing bubble is to understand the criteria for such a bubble. Following the definition of the investing and finance dictionary Investopedia, which is part of the Dotdash publishing family, possible criteria are (14):

- Temporary events that can last years with high demand, low supply and inflated prices
- Caused by
    - Economic prosperity
    - Low interest rates
    - Better mortgage product offerings
    - Easily accessible credit

A crash of such a bubble is then possibly caused by:

- Downturn in the economy
- A rise in interest rates
- Drop in demand

The data behind the factors above will be analysed to answer the questions raised in section 1.1.

2.2. Data sources

The main data source for this project is officially available data at the Swedish Central Office for Statistics (Statistiska Centralbyrån, short SCB). The SCB has the following data:

- Supply, demand and housing prices in Sweden
- Economic situation of Sweden
- Interest rates in Sweden

Only the factors mortgage product offerings and accessibility of credit will be provided by the Swedish Central Bank (Riksbanken) and other sources, like research papers or newspaper articles.

Foursquare will then be used to create a map of areas and corresponding housing prices in Sweden. This map can then provide the main areas that will potentially be affected by a crash of a housing bubble.

3. Methodology

3.1. Exploratory analysis of statistical housing data in Sweden

3.1.1. Demand, supply and prices

First step in the simplified data analysis was to analyse the demand, supply and prices of housing in Sweden. For demand, Sweden's population has been used, for supply the available housing and for the price the housing price index in Sweden, which is a price relative to the value in 1980. Since all the values for population and housing were very different from the housing index, the percentage change has been analysed, see table 3.1. During the data wrangling, the raw data has been manually adjusted.

Table 3.1 Demand, supply and price of housing in Sweden (Own illustration based on raw data by SCB)

Year	HouseholdsIncrease%	PopulationIncrease%	Housing index increase%
2012	0.3	0.8	-1.3
2013	0.7	0.9	3.6
2014	1.0	1.1	6.9
2015	1.1	1.1	10.8
2016	1.2	1.5	8.4
2017	1.3	1.3	8.3
2018	1.4	1.1	0.0
2019	1.3	1.0	2.7

Figure 3.1 illustrates this data to make the relative development clearer.

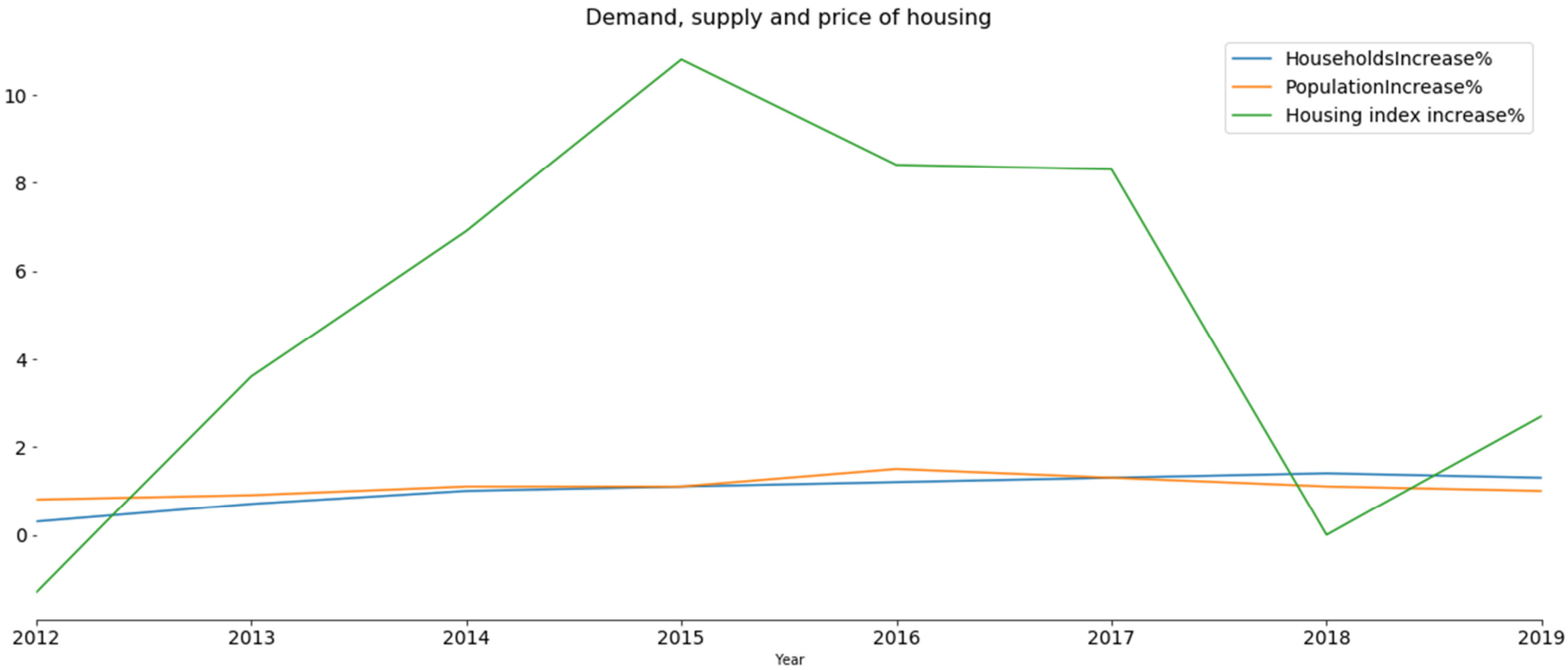

Figure 3.1 Demand, supply and price of housing in Sweden (Own illustration based on raw data by SCB)

As can be seen in figure 3.1, there was a stronger increase of the housing prices between 2013 and 2019 relative to the housing and population development. The development of housing and population was similar in this time period. One possible explanation for the higher price development could be that there are less people in each housing accommodation. This is illustrated in figure and tabe 3.2.

Table 3.2 Development of people per household in Sweden (Own illustration based on raw data by SCB)

Year	1person	2personer	3personer	4personer	5personer	6personer	7+personer
2011	1716073	1321921	524780	522175	180459	49654	30520
2012	1707925	1331008	530846	525714	181532	50842	32501
2013	1712192	1342839	534982	528655	183931	51826	34582
2014	1727447	1359792	538172	531686	186512	53052	35953
2015	1752604	1372503	540654	535123	188972	54436	37454
2016	1772498	1387978	545438	540655	192648	56725	40272
2017	1800832	1401635	549189	544868	196559	58618	41807
2018	1839986	1415910	552514	548232	198683	59726	42344
2019	1879405	1430612	554162	551937	199673	59970	42512

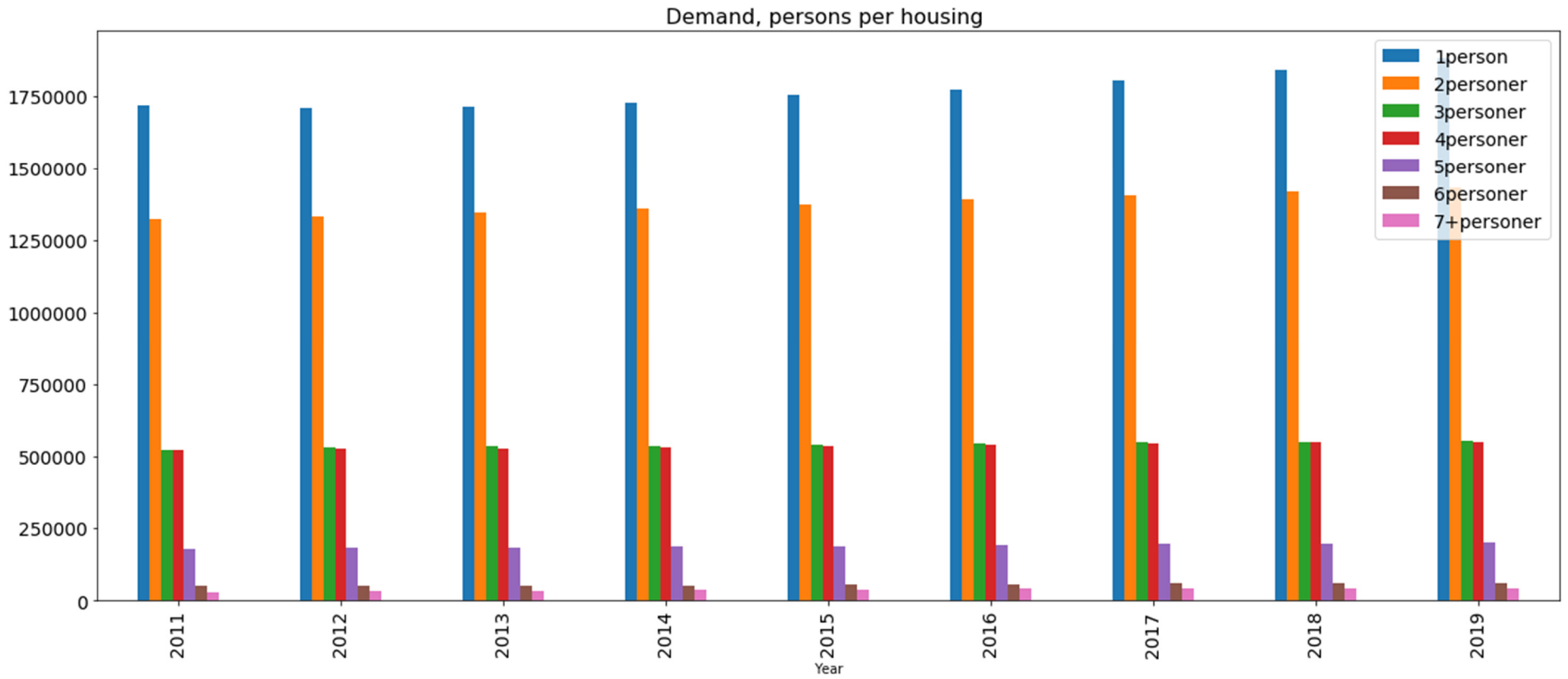

Figure 3.2 Development of people per household in Sweden (Own illustration based on raw data by SCB)

This data shows rather constant number of households with more than 3 persons between 2011 and 2019. The big increase, though, is in households with 1 person (44 % of the total increase) and 2 persons (29 %). In total, the household increase of 372,689 between 2011 and 2019 needed to catch up with a population increase of 844,734; which is about 2.3 times as much as the household increase. With a total population of 10,327,589, housing options of 4,718,271 would be enough to provide housing for about 2.2 theoretical persons. In 2019, however, 70% of the population lived alone or with another person. This could potentially show a supply shortage in the housing market in Sweden, but this share was with 64% about the same in 2011. Therefore, this cannot explain the strong increase of housing prices in this time period.

Another interesting consideration is to have a look at the type of housing supply, which is shown in table 3.3 and figure 3.3.

Table 3.3 Housing types in Sweden in 2019 (Own illustration based on raw data by SCB)

Housing type	Amount in million
Small house	1.8847
Rental apartment	1.3301
Owned apartment	0.9635

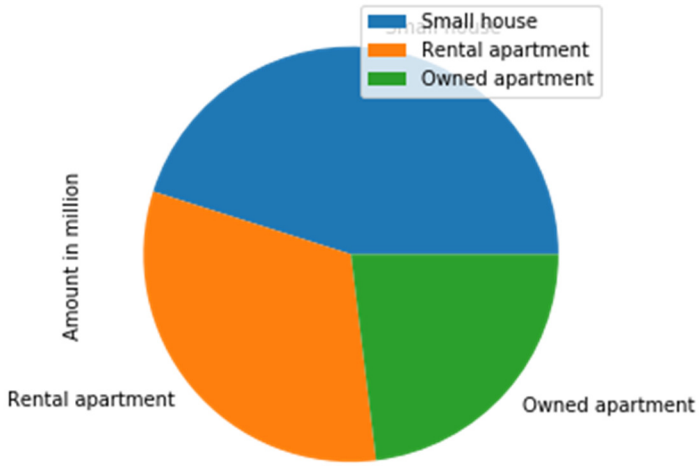

Figure 3.3 Housing types in Sweden in 2019 (Own illustration based on raw data by SCB)

This information shows that almost half of Sweden's population (45%) lived in small (owned) houses in 2019. Together with owned apartments, the share of the housing that is owned by the people living in them was about 68%. Only 23% are rental apartments. Thus, many people living in Sweden must have the funds to

buy accommodation, which the 1.1 million immigrants that came to the country between 2011 and 2019, like during the refugee crisis beginning in 2015, might not have (Reference 15).

Figure 3.4 shows that increasing prices is the same for all Swedish areas and beginning in the late 90s. While prices were close to each other in the different areas, the differences between them increase in the late 90s as well. Both trends intensified and continued until 2019, with the largest increases in the areas around the biggest cities Stockholm, Göteborg and Malmö.

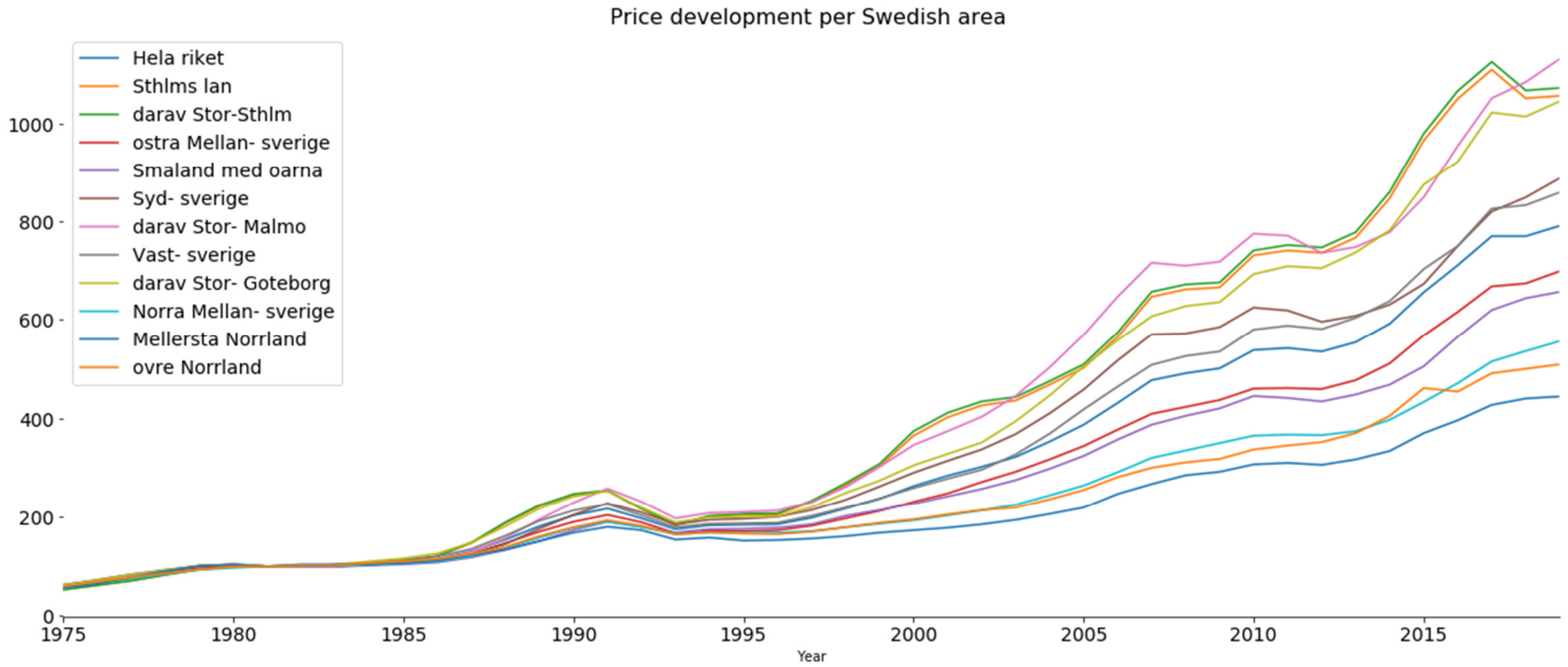

Figure 3.4 Housing price developments between areas in Sweden (Own illustration based on raw data by SCB)

Concluding for this section, it can be argued that there are indicators for inflated housing prices in the Swedish housing market. Some reasons for these inflated prices were identified in an insufficient management of available housing resources, i. e. high level of owned housing that might not be available for everyone.

3.1.2. Economic developments in Sweden

Figures 3.5 and 3.6 shed a brief light on basic economic development factors in Sweden.

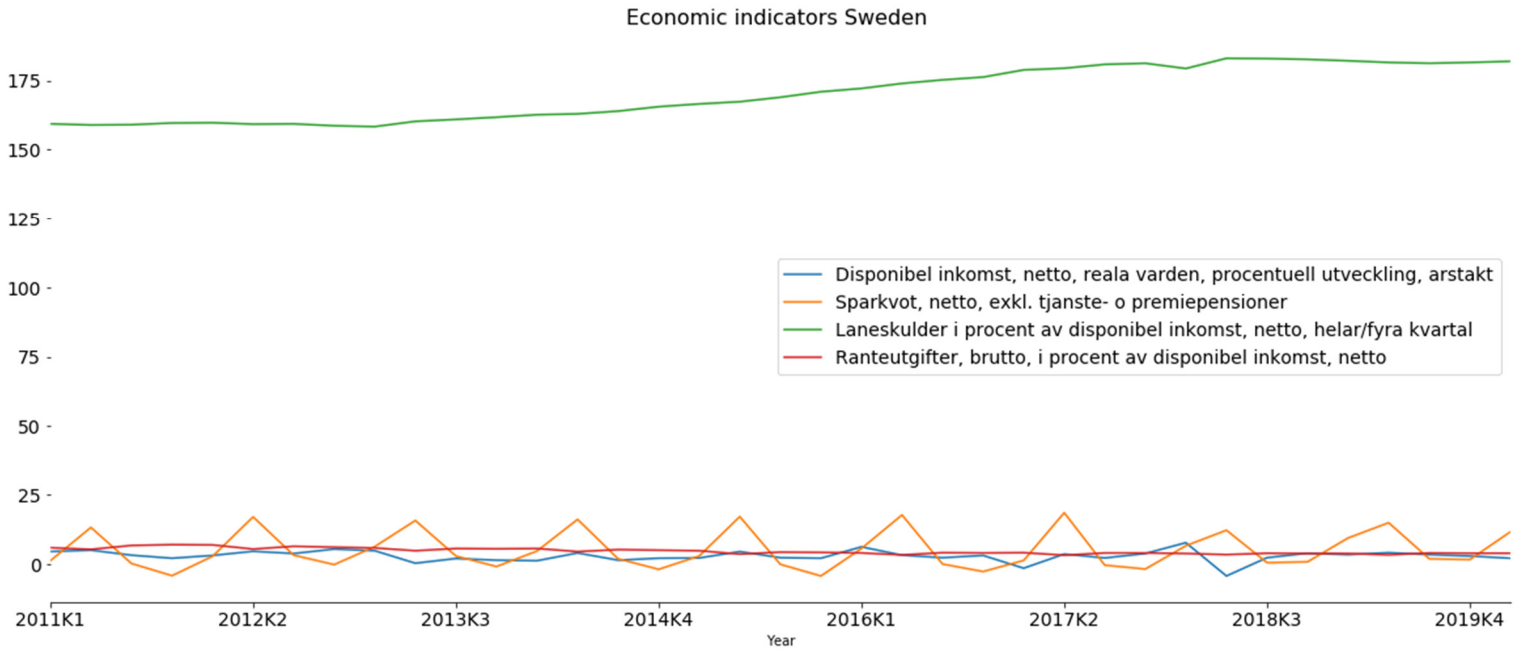

Figure 3.5 Development of available income, savings quota, debt and interest expenses in Sweden (Own illustration based on raw data by SCB)

While it can be seen in figure 3.5 that the available income is constant or even declining, the debt ratio of the income is constantly increasing over the years. At the same time, the savings ratio and interest expenses remain more or less constant. This points to low interest rates in the market and people living above their standards by making debt during a low interest period.

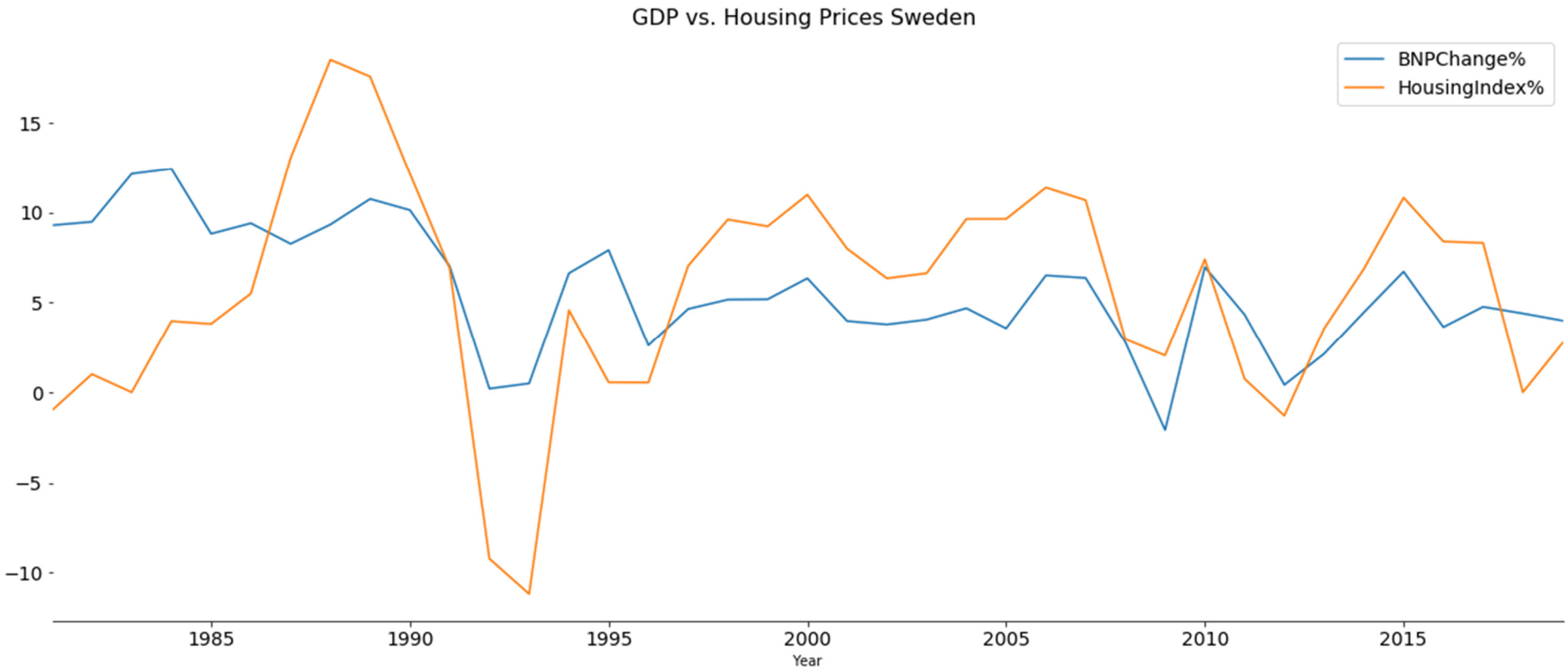

Figure 3.6 Development of GDP and Housing prices in Sweden (Own illustration based on raw data by SCB)

Figure 3.6 illustrates some correlation between the development of the overall economy in Sweden (GDP) and the housing prices. In several periods, it can be seen that the effect, either positive or negative, was stronger for the housing prices than for the GDP development.

3.1.3. Interest developments in Sweden

The general development of the most relevant interest rates for the Swedish housing markets can be seen in figure 3.7.

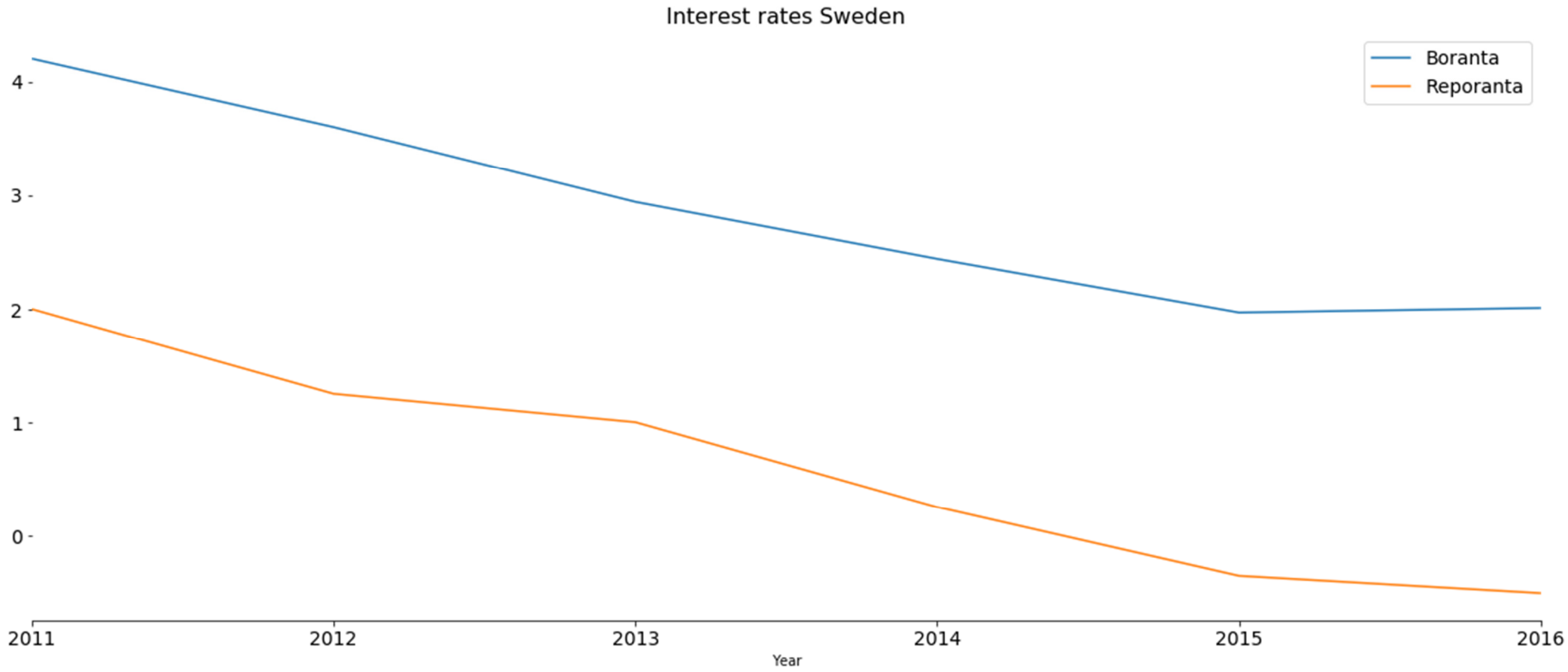

Figure 3.7 Interest on housing loans (Boränta), general market interest (Reporänta)[Own illustration based on raw data by SCB]

Here a very low level of interest can be seen; in case of the general market interest even a negative value in 2015 and 2016.

4. Results

The results can be presented by answers to the questions raised in connection to the business problem in section 1.1:

What factors determine if there a housing bubble in Sweden?

As shown in section 2.1, criteria for a housing bubble are:

- Temporary events that can last years with high demand, low supply and inflated prices
- Caused by
    - Economic prosperity
    - Low interest rates
    - Better mortgage product offerings
    - Easily accessible credit

Are the factors for a housing bubble in Sweden fulfilled?

Section 3.1 showed indications that:

- There are signs of inflated prices in the Swedish housing market
- Sweden has economic prosperity that correlates to the housing prices, while income remains constant or decreases
- Significantly low housing interest rates and general interest rates, with and increasing level of debt that people are taking
- Good mortgage product offerings with the “Boränta”
- Easily accessible credit due to low interest rates and increasing private debt

In which areas of Sweden might housing bubbles be fulfilled?

Housing bubbles are possible in Sweden throughout the country, as section 3.1 has shown.

How does the COVID 19 crisis affect the Swedish housing market?

While the fact that indicators for a housing bubble do not tell when it will burst, the effects of COVID-19 might possibly be triggering such a crash. As shown in section 2.1, a crash of such a bubble is possibly caused by:

- Downturn in the economy
- A rise in interest rates
- Drop in demand

COVID-19 has already caused the first and third point in the list in Sweden. The remaining point, the rise in interest rates, cannot be postponed in the crisis situation for a very long time either, as the rates were already very low before the crisis.

Is there a higher risk of a crash in the housing market due to these factors?

As shown in the previous question, COVID-19 could be the trigger to burst the bubble.

To conclude, anyone willing to invest in the Swedish housing market should at least be aware of these risks.

5. Discussion

Although the data analysis of the housing market in Sweden has shown that there are strong indicators or a housing bubble, and that COVID-19 might be causing a crash, this is not necessarily so. Governmental measures to save the housing market might prolong the bubble into the future.

It has also to be mentioned that this data analysis is a very simplified approach that is not covering all aspects of the discussed topic. However, if the indicators shown herein can be supported by further data, the problem might not be limited to Sweden only, as figure 5.1 shows.

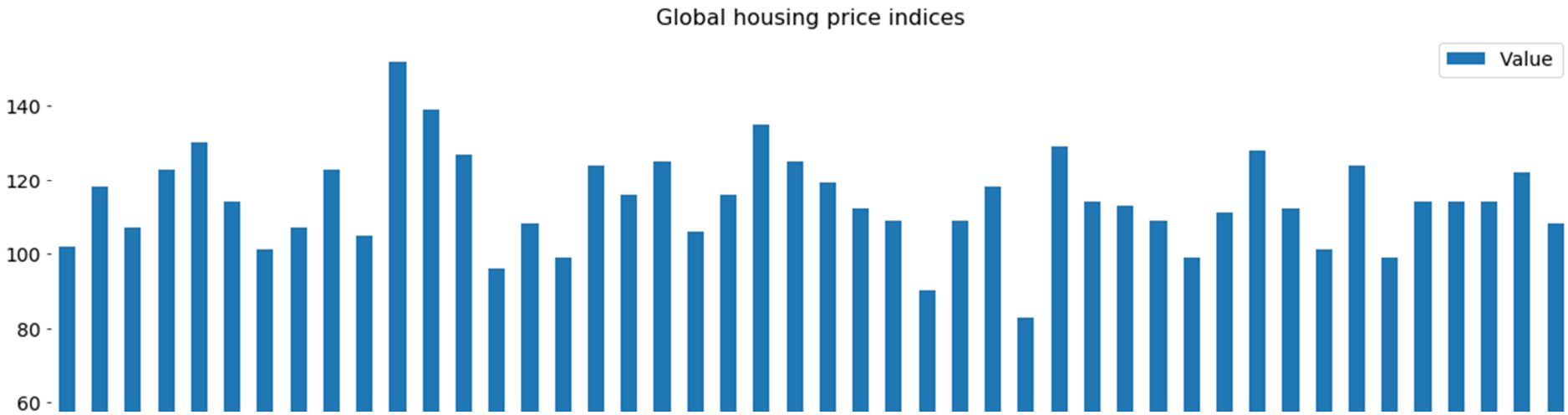

Figure 5.1 Global housing indices [Own illustration based on raw data by SCB]

As can be seen, Sweden is far from being the only country with significantly high housing indices in 2019. The problem might exist in other countries, maybe more in those more affected by COVID-19.