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## **IMPACTS OF THE COVID-19 PANDEMIC ON THE RESIDENTIAL MARKET IN PRAGUE**

### **Abstract:**

The paper describes the changes in the residential market in individual city districts in Prague due to the COVID-19 pandemic. In Prague, there is a significant decrease in the use of short-term rental of apartments through Airbnb and Booking services. Due to the impossibility of renting an apartment to tourists, the owners offered their apartments on the market of long-term rentals. There is an increase in the supply side, which has an impact on falling rental prices. The biggest changes are taking place in the centre of Prague. On the other hand, there is a significant increase in the selling prices of flats, which is mainly related to the monetary policy of the central bank, low mortgage interest rates and citizens' fears of rising inflation. The paper compares the price development in individual city districts of Prague for the period 2018 to June 2021. To describe the development of the residential market in Prague, the EVAL software is used. The EVAL software collects, analyses and evaluates real estate advertising in the Czech Republic.

### **Keywords:**

Real estate market, data mining, data analysis, Prague

**JEL Classification:** E10, C30, R30

## 1 Introduction

The COVID-19 pandemic changed the living and working conditions of the population, affecting all sectors of the economy, including the real estate market. The effects of the pandemic on the real estate market manifested themselves differently in the individual regions of the Czech Republic. The city of Prague is the location where the impacts are highest.

The impacts of the COVID-19 pandemic on the real estate market are also being discussed by other authors. A study by Toro, Nocca and Buglione (2021) [1] analyses trends in the residential market in Italy, especially in the Naples metropolitan area. As many people were forced to spend much more time in their homes, including the implementation of work and leisure activities, the society began to place new demands on real estate. There is a growing demand for the use of common areas of buildings, terraces and balconies. Higher demands are placed on the surroundings of buildings, parks and natural lighting in buildings. The questionnaire survey also showed that 68% of respondents express overall satisfaction with the current housing situation, while 27.7% of respondents expressed the need to obtain more living space. In a more detailed analysis of the need for new living space, respondents required open spaces in 53% of cases, spaces for leisure activities in 33.1% of cases and spaces for work from home in 23.4% of cases.

A study by Tanrivermiş (2020) [2] examines the impact of the COVID-19 pandemic on the real estate market in Turkey. The introduction of restrictive and preventive measures has a significant impact, especially on the tourism sector, where incomes are declining. There is also a reduction in the volume of real estate transactions, an increase in the vacancy rate of hotels and flats, an increase in the operating costs of real estate and a decrease in rent collection.

A study by Allen-Coghlan and McQuinn (2020) [3] analyses the effects of the economic slowdown caused by the COVID-19 pandemic on the Irish housing market. The authors expect that the decline in economic activity will cause a decline in house prices. This decrease in prices will be caused by a decline in household disposable income and a significant decline in activity in the mortgage market.

A study by Thackway and Pettit (2021) [4] examines how the overall decline in short-term leases through Airbnb due to the COVID-19 pandemic has affected the supply of long-term leases and rental prices in Sydney. The authors found that in neighbourhoods where the Airbnb service was very active, there is an increase in the supply of apartments for long-term rent. At the same time, however, the supply of apartments for long-term rent decreased in neighbourhoods where the Airbnb service was not very widespread. Since its inception in 2008, Airbnb has initially only affected tourism and the hotel industry. At present, however, it is clear that it has disrupted the standard functioning of housing markets in major cities around the world. The COVID-19 pandemic is an opportunity to set sustainable conditions for the operation of this service so that the availability of housing for ordinary citizens is not reduced.

The long-term effects of the COVID-19 pandemic on short-term rental trading through online platforms, in particular Airbnb, are addressed in the Dolnicar and Zare (2020) study [5]. The authors predict that the share of homeowners who use this platform fully for business purposes will decline. These are apartment owners who use the Airbnb platform for purely commercial reasons, often use a mortgage loan to purchase an apartment and rent the apartment through the

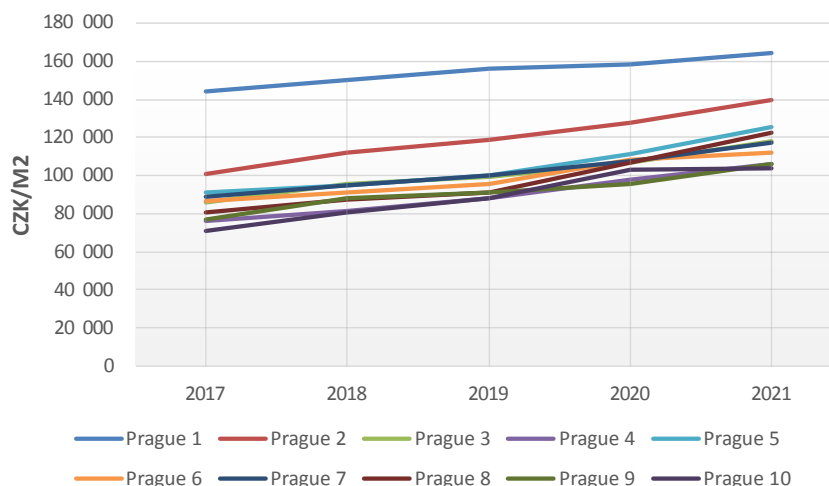
Airbnb service all year round. Some of these owners will then continue to operate in the long-term lease market and will not return to their original business concept, in an effort to minimize the risks associated with similar unexpected events, such as a pandemic. On the other hand, the share of hosts, i.e. people who rent only part of their apartment for a limited time of the year, in line with the original Airbnb concept, will increase. Efforts to regulate this sector will thus not be necessary to the extent originally planned.

Study by Tomal and Marona (2021) [6] is using the example of the city of Krakow to find out what effects the pandemic COVID-19 has on the amount of rent for housing. The study is based on statistical data on rental prices and compares these data with information from real estate agencies using a questionnaire survey. The research found that the first wave of the COVID-19 pandemic caused a 6-7% drop in rental prices in Krakow, while real estate agencies estimated a 13% drop in rents. The second wave of the pandemic between the third and fourth quarters of 2020 led to a further decline in rents of 6.25%. This decline was very accurately predicted by survey respondents from real estate agencies and econometric models. The survey assumes an increase in rental prices after the effects of the pandemic have subsided, however, reaching the original price level of rents before the pandemic is not expected.

## 2 Results and discussion

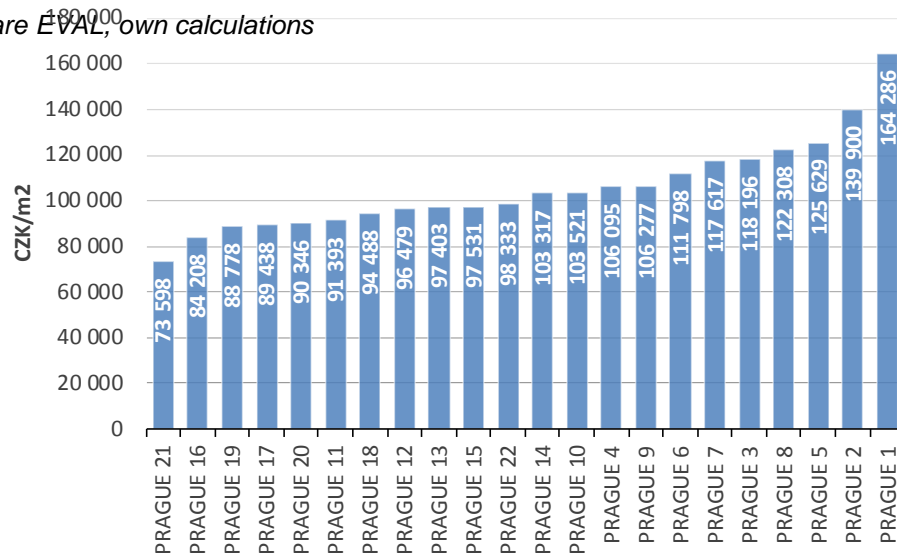
### 2.1 Development of offer prices of flats intended for sale

The following figures show the price development of flats offered for sale in the years 2017 to June 2021, broken down by city districts of Prague. The statistical results do not take into account the age of the apartment, the condition of the apartment and the structural and material characteristics of the building. We are seeing a rise in prices in all city districts. Only in March 2020 is there a short-term decline in prices due to uncertain further developments, however, due to the fact that the data capture annual results and this decline was offset very quickly, it is not captured. The most expensive city district has long been Prague 1, followed by Prague 2. In both city districts, the unit offer price is higher than CZK 100,000/m<sup>2</sup> throughout the period under review from 2017 to June 2021. The graph of the development of offer prices shows only the first 10 city districts for the sake of greater clarity.



**Figure 1 Development of offer prices of flats intended for sale, by city districts of Prague (medians, price per m<sup>2</sup> of floor area of the apartment, time period 2017 to 06/2021)**

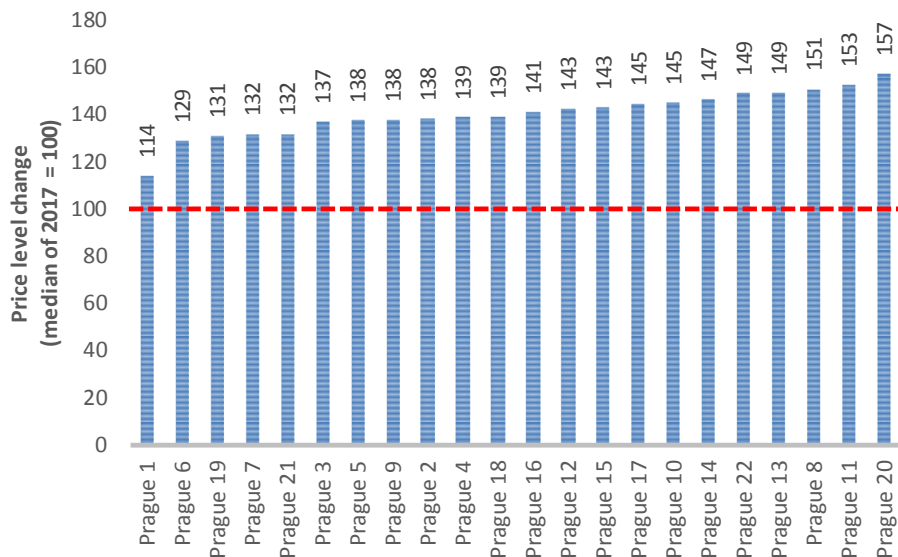
Source: Software EVAL, own calculations



**Figure 2 Order of city districts of Prague in terms of the unit offer price of an apartment for sale (medians, price per m<sup>2</sup> of floor area of the apartment, 2021)**

Source: Software EVAL, own calculations

It was found that the increase in the median unit offer price of apartments for sale over the last five years is not uniform within city districts. The following figure shows a comparison of price increases between city districts. The smallest price increase was recorded in Prague 1. There is a general dependence that the price increase is higher on the outskirts of Prague. The small increase in prices in Prague 1 is caused, among other things, by the Airbnb and Booking services, which were limited during the COVID-19 pandemic and the high comparative price base in 2017.



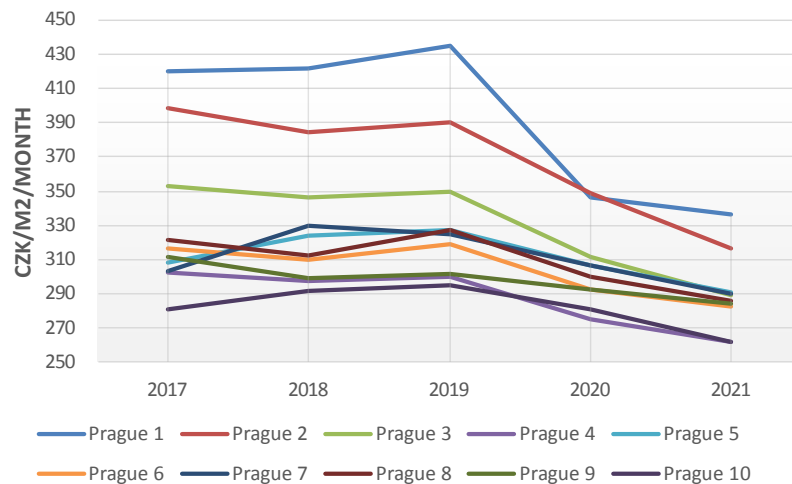
**Figure 3 Change in the price level of the median offer prices of flats intended for sale in city districts of Prague between 2017 and 06/2021)**

Source: Software EVAL, own calculations

## 2.2 Development of offer prices of flats intended for rent

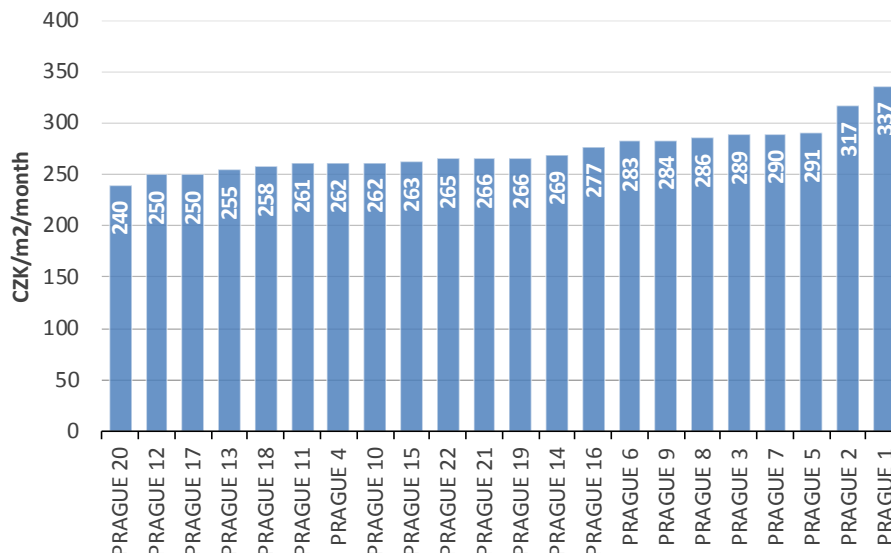
This chapter describes the price development of flats offered for rent in the years 2017 to June 2021, broken down by city districts of Prague. Aggregated annual values for all flats in a given locality are given, without distinguishing between the age and condition of the flat and the structural and material characteristics of the building.

Depending on the different impacts of the COVID-19 pandemic on the apartments offered for rent, unit prices have fallen in some parts of the city over the last five years. The largest decrease was recorded in the city districts of Prague 1 and Prague 2.



**Figure 4 Development of offer prices of flats intended for rent, by city districts of Prague (medians, price per m<sup>2</sup> of floor area of the apartment per month, time period 2017 to 06/2021)**

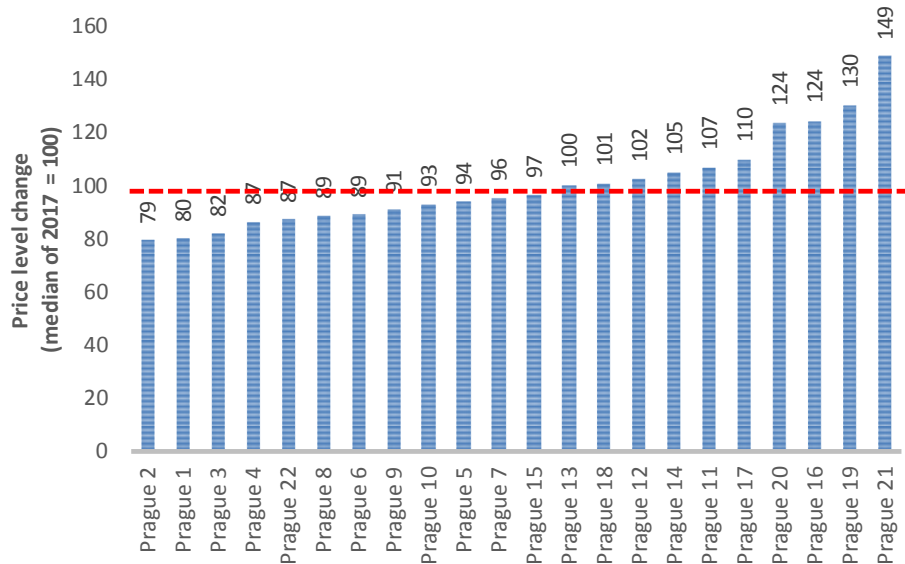
Source: Software EVAL, own calculations



**Figure 5 Order of city districts of Prague in terms of the unit offer price of an apartment for rent (medians, price per m<sup>2</sup> of floor area of the apartment per month, 2021)**

Source: Software EVAL, own calculations

Large differences in the price level were found between the city districts of Prague. Despite the effects of the COVID-19 pandemic, the city districts of Prague 1 and Prague 2 are still the most expensive in terms of the unit price of an apartment for rent.



**Figure 6 Change in the price level of the median offer prices of flats intended for rent in city districts of Prague between 2017 and 06/2021)**

Source: Software EVAL, own calculations

### 2.3 Regression analysis of the dependence of the offer price of an apartment for rent on the number of offers of apartments for rent in Prague 1

Using regression analysis, the dependence of the offer price of an apartment for rent on the number of offers of apartments for rent in Prague 1 is examined. It is examined the basic relationship between supply and demand in the market for a certain service. The calculation does not take into account development over time.

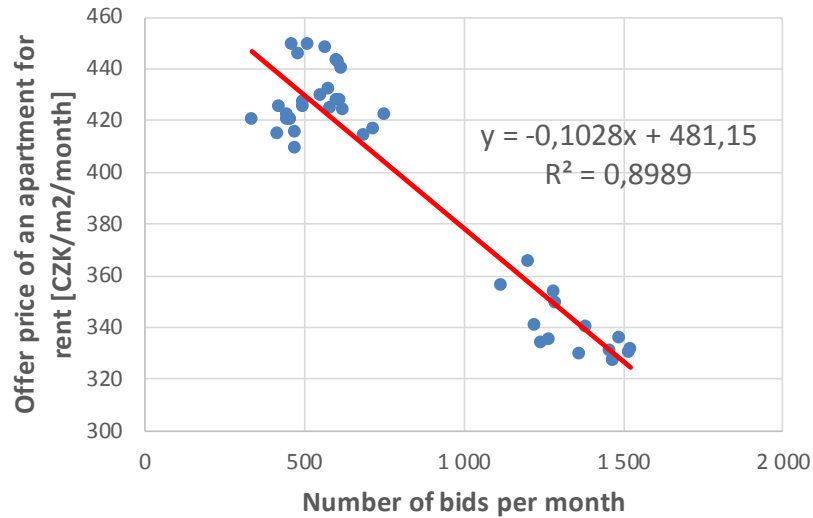
We estimate the parameters of the regression function  $y(x) = \alpha + \beta x$ , which characterizes the relationship between the offer price and the number of offers of flats for rent. Estimates of  $a$ ,  $b$  parameters  $\alpha$ ,  $\beta$  are performed by the least squares method:

$$b = \frac{n \sum_{i=1}^n x_i y_i - \sum_{i=1}^n x_i \sum_{i=1}^n y_i}{n \sum_{i=1}^n x_i^2 - (\sum_{i=1}^n x_i)^2} = \frac{42 * 13024018 - 34673 * 16643}{42 * 35583262 - 34673^2} = -0,102830$$

$$a = \frac{\sum_{i=1}^n y_i - b \sum_{i=1}^n x_i}{n} = \frac{16643 + 0,10283 * 34673}{42} = 481,1538$$

Estimation of regression function:  $\hat{y} = 481,1538 - 0,10283x$

The correlation coefficient:  $r_{xy} = -0,9481$



**Figure 7 Scatter plot of dependence and interpolated regression line - dependence of the offer price of an apartment for rent on the number of offers of apartments for rent in Prague 1 (time period 2018 to June 2021)**

*Source: Software EVAL, own calculations*

There are two clearly separated clusters of data in the scatter plot. This is due to the fact that between March and April 2020, both monitored parameters changed significantly at the same time - there is a jump in the number of bids and a jump in the bid price.

Conclusion: The dependence of the offer price of an apartment for rent on the number of offers of apartments for rent in the city district of Prague 1 was observed. With the growth of the number of offered apartments for rent, the offer price decreases. It can be expected that the price level will increase when the supply of vacant flats for long-term rent is reduced.

### 3 Conclusion

The result of the paper shows that there is a growing disparity between city districts in Prague. The COVID-19 pandemic hit the city centre the most. At present, there is an excess of the supply of apartments for rent on the market over the demand for apartments for rent. This discrepancy was caused mainly by the restriction of tourism, distance education of university students and the departure of foreign workers from Prague. At the beginning of the summer of 2021, however, there was a turnaround in the market and the supply of vacant flats for rent began to decline rapidly. It can be assumed that in the horizon of several months, supply and demand will equalize, followed by an increase in the prices of rented flats.

In the case of flat sales, the situation is completely different. At present, the offer of flats for sale is very limited and at the same time there is insufficient construction of new flats. This discrepancy will lead to further growth in sales prices of apartments in Prague. Buyers' queues are currently being created for attractive apartments in Prague. Real estate agencies conduct auctions of these

apartments so the final price is often higher than the price offered in real estate advertising. A change in the trend in this area cannot be expected.

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