Comparison of property price development in regions affected by mining with other regions of the CR

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Abstract
The property market has experienced a sharp increase in prices recently, which indicates a different nature of the Covid 19 downturn of the economy compared with usual economic crises. This paper identifies key features of the property market which may help understand why the property market performs differently from other markets. A number of factors play an important role in shaping real estate prices, some of which can and cannot be influenced. The quality of the environment is often one of the main important factors, which is also presented by air pollution values. Apart from transport, waste incineration and thermal power plants, the most common causes of air pollution include the mining industry's activities. We aim to explain why property prices do not converge across regions, but prices in expensive regions experience an even stronger price dynamics, a recent phenomenon. We argue that the price dynamics have been predominantly demand-driven in a market with an unelastic and lacking supply of new properties. The real estate market was also significantly affected by the monetary and fiscal policies of individual states. It has been found that money, which has been invested on a large scale in all sectors of the economy in order to limit the negative effects of pandemic measures, has often found its way to investing in assets of all kinds. As a result, real estate prices are rising sharply, especially in richer areas with minimal unemployment. This article aims to offer a deeper insight into the relationship between flats/house prices and variables that proved to be significantly correlated to prices in regional decomposition. Finally, we suggest ways for sustainable future development of the property market.

Keywords
Property market; Housing affordability; Income; Monetary policy; Own housing

Introduction

Property prices have experienced a well observable sharp increase during the Covid pandemic (Hromada, 2021). States have been affected by many restrictions (Vrtikova, 2020). The intuition would suggest people move from cities to areas with cheaper properties in times of increased home office and online regime working. Also, other factors such as lockdowns, tourism freezing or increased uncertainty in the labour market (typical for periods of economic crisis) seemed to cool down the property market at the time of the pandemic start (Kaderabkova et al. 2020). However, quite the opposite happened, and the speed of increase in property prices during the last two years has surprised even the most pessimistic analysts. A question to be asked is why the property market responded to the economic downturn in a completely different way compared to previous downturns in the economy? Zhang et al. (2020) state that the price of real estate is influenced by a number of factors. One factor that affects the market price of real estate is the quality of the environment. The price mainly reflects resources in the external environment, i.e. high degree of pollution, water eutrophication, and high noise level). If the other conditions are identical, it can be assumed that the market price will be higher in locations with a higher quality of the environment. Pavolová et al. (2021) are of the opinion that a polluted environment is often associated with the extraction and processing of raw materials. At the same time, raw materials are a vital and driving force not only for the EU but for the whole world (Bednárová, 2020). Production and consumption activities in industrialised countries are increasingly dependent on materials and energy resources from other regions of the world and imply significant economic and environmental consequences, which ultimately affect the real estate market (Haque et al., 2020).

We will analyse the features specific to the property market and look for factors that may be relevant in influencing property prices. In this study, we will focus on regional data in order to observe differences in the dynamics of price increase in single regions, as it seems that the speed of property price increase in large cities has even exceeded the price dynamics in regions with a lower density of population. At first sight, this phenomenon would contradict the intuition as some previous studies have found that people tend to move to cheaper areas (Lukavec, 2017; Jansky, 2016; Haviernikova et al., 2020) and property prices would converge. Intuitively, this phenomenon could be reinforced by the current changes in the labour market, which are believed to be rather permanent (Jasova, 2021; Majerova and Fernandez, 2020; Kmecova et al., 2019; Novak et al., 2016). The second question tackled in this paper is whether the property price convergence hypothesis is valid or, on the contrary, property prices across regions will diverge. The intuition behind this question is that price divergence would indicate a significant share of speculative demand present in attractive cities and a large share of properties not used for own housing.

With an ambition to find arguments to answer these questions, we first provide a more general discussion on property market specifics compared to goods and services markets. We believe that either suppliers or buyers make several considerations which are not made in transactions with other goods. We offer insight into the property market demand and supply-side specifics, which we believe can help us understand what is happening in the property market. Next, we offer an econometric analysis (GSL) testing changes in property prices in regional decomposition and looking for variables that proved to be significantly correlated to property prices.

This study uses data for the Czech property market; however, its conclusions reflect the worldwide trends prevailing in this market.

Theoretical foundation

The decision-making process in the property market is not substantially different from other markets, but still, it differs in many features.

First, housing is not only a consumption good but also an investment at the same time. The property market will thus reflect the condition of capital markets, undoubtedly. On the other hand, investment in a property differs from other investment tools, as property ownership generates transaction and maintenance costs and, possibly, tax burden (Case, 1989; Vrbka et al., 2020a). Gilber (2003) summarises that the property value for a buyer reflects financing possibilities (cost and availability of capital), investment expectations, liquidity preferences, tax circumstances and risk aversion.

Second, given the price of a property relative to the annual income of economic subjects, an increased motivation may be expected to acquire information prior to the transaction. Thus, we can expect a high share of informed economic subjects present on the market. Baryla (1995) finds that economic subjects will be willing to put out significant expenditures on gaining information before they participate in the market, as the transactions are rare during the life of economic subjects, and they cannot benefit from their previous experience. This is why transactions are often performed via intermediaries who, among other effects, decrease the volume of arbitrage trading. Gill (2020) finds a correlation between the rate of information seeking and the education of the buyer. Burke (1979) proved that in the property market, the primary source of information comes from recommendations from persons close to the buyer or from reference group persons.

Third, an important characteristic of the property market is the supply structure. The demand for properties is not met only by the newly built property, but used property constitutes a prevailing share of the market (Kaderabkova and Jasova, 2020). While the price of new properties will generally be a function of construction costs and the cost of capital (as documented by Schneiderova-Heralova, 2017), the price formation of used properties is much more complicated. Used property is, to an extent, a substitute for a newly built property, but in their price formation, the primary role is played by demand factors. Case (2000) finds that property prices are downward rigid, similarly to wages in the labour market. If the property market undergoes a decrease in prices occasionally, this lasts only for a short period of time or, more frequently, it is limited regionally (Soltes and Gavurova, 2014). In his following study (2003), Case explains factors of downward price rigidity in property markets. In fact, in case of decreased demand for properties, the number of transactions is likely to decrease, but prices do not fall significantly. It can be understood that subjects selling their property are not willing to discount their price; often, they prefer to wait for better times. Only a small share of suppliers will discount their price, as probably, they cannot afford to wait with their transaction. In this regard, the property market needs a substantially longer time horizon in order to achieve an equilibrium compared to markets for other consumer goods. Roulac (1996) argues that expectations correlate and are formed based on the existing trend in the property market, making the permanent equilibrium hardly achievable in this market.

The study (Łuczak, Wysocki, 2019) compared the state of social and economic development of the countries of the European Union. Four main types of development status have been identified: socially and economically beneficial; economically advantageous; socially beneficial, and socially and economically less beneficial. The countries of Central and Eastern Europe have seen a clear improvement in their development over the last 10 years. Greece is one of the countries with significant deterioration (Bilan et al. 2017; Sinicakova et al. 2017).

Fourth, the property is understood to be one of the best stores of value in times of high or variable inflation (Cecrdlova, 2021), volatile markets (Andelinovic, 2020; Dias et al., 2018; Masood et al. 2017) and unpredictable or insufficient pension system (Kliber, 2020; Rybacek, 2018). In this regard, the decision to buy a property is made independently of the potential profit from its rental. Buyers may buy the property without even offering it in the rental market. This is an important feature for understanding property price formation. Property prices will increase all-time investors believe in their future continuous increase. Since a share of properties is not used for housing in this case, there may be observed a shortage of properties available to buy or rent for housing purposes. Prices of the available properties will thus further peak. At this point, it should be mentioned that vast research has recently focused on housing un/availability (Le Goix et al., 2021; Cermakova, 2021; Vrbka et al., 2020b), and many of them found alarming the decrease in their own housing unaffordability (Hyötyläinen and Haila, 2018; Kowalik, 2020; Leung et al., 2020), many other proposed fiscal instruments that should be undertaken to increase the affordability of own housing (Hromada, 2020; Ministry for regional development, 2020). It is not our purpose here to split the discussion in this direction, although this is a hot topic either on an academic or an institutional basis (Deloitte, 2021; OECD, 2021; etc.).

To increase housing affordability, it is also important to focus on building budgeting in conjunction with BIM (Building Information Modeling). BIM will make the entire construction process as well as the operational phase of the project more efficient (Vitasek, 2019). The level of material deprivation is closely related to the availability of housing. For example, the authors (Łuczak, Kalinowski, 2020) found that the population of the old countries of the European Union is less severely affected by material deprivation than people living in the new EU member states.

Obviously, all the above factors have contributed to the current dynamics of property prices, which have shown to have the opposite trend than during and after the 2009 crisis. We have discussed this topic in our previous research (Hromada et al., 2021). Our next ambition in this paper is to observe the price dynamics and look for factors at the regional level which may be important for property price formation.

The article by Hromada (2019) deals with the analysis and evaluation of selected social, technical and economic parameters of the real estate market, and the relationship between the market value of rents and the market value of the real estate was investigated. For his analysis, the author used static and econometric methods, and to obtain the input data; he used software that he developed himself. This is EVAL, which is able to automatically collect data from the real estate market of the Czech Republic, specifically from the area of sales and rental offers published on the Internet. The software was launched in 2007, and every six months, it has been extended by more than seventy thousand offers of real estate for rent or for sale of different types and kinds (residential, commercial, etc.). Subsequently, the author extended the software with the ability to retrieve data from the land registry. For his analysis, he selected over 100 of the largest cities in the country, which were chosen on the basis of sufficient turnover in the real estate market.

Also, Vrbka et al. (2019) deal with rent and its determination in the case of built-up land with several owners. In this paper, the land on which the buildings stand was very widespread in the past. These were very specific phenomena. The authors focused in their paper on compiling the methodology in force, which determined the usual rent for 2016. They did this by using a model example, where the simulated rent method

was used to determine the rent of this specific phenomenon. In doing so, they based this on the performance of the property and its rate. The performance was then set at 5%, and as a result, the model rent was then set at over thirty-three thousand Czech crowns for 2016.

The topic is then revisited by Hromada and Krulicky (2021) but from a slightly different perspective, namely with the dependence between selected socio-economic and technical factors affecting the return on investment, and they used regression analysis to examine their parameters. Again, the authors used the author's EVAL software for their study and also used mathematical and descriptive statistics methods. In this paper, data from individual districts of the Czech Republic were used. The study found significant and important relationships between specific parameters, especially between the sale price and the average annual return on the sale of an apartment and between the average number of months needed to pay and the average annual return on an apartment rental. Another key relationship was found between the proportion of people facing foreclosure and the average rental yield. Thus, the study shows that differences between specific parameters were found.

In contrast, the authors Krulicky and Vochozka (2021) focused on valuation methods and their modifications. In their paper, they selected methods focusing on real estate, which they use in cases where it is not possible to estimate a specific property's market price. They then modified the selected models. The authors describe the modification itself as a double application of correction coefficients in the creation and its process. In other words, they are standardised units of measurement. These units serve as a proxy in the valuation of the selected specific property. The aim of the whole paper was to present a proposal with application results where the modified method is used in the valuation of a set of properties and its estimation of the market price.

Another way of looking at property valuation is in the manner of GIS, or geographic information systems. The authors of the article by Chiorean et al. (2018) suggest the use of this system in real estate valuation. It is a system of two tools, more specifically, real estate valuation and GIS. The authors focus on how their use and integration could improve and enhance the valuation process, specifically in the valuation process in easily accessible data environments. GIS can be used in the valuation of large data sets. Statistical modelling can also be used, but GIS can lead to practical and useful valuations for all valuers.

Kovac and Rakar (2008) take a different approach to valuation. They analyse the information that is needed to value real estate alone. They focus on Slovakia. They found that there does not have single valuation tradition for real estate. They found that the existing data collected for the valuation of mass properties were insufficient. This fact was discovered only a short time ago. They also point out in the article that adequate information would be more useful and contribute to greater objectivity and neutrality. They analysed the take specific concepts, namely objectivity, neutrality and independence and their links to adequate information. In their article, they point out methodological approaches to information gathering. At the same time, they take a concrete example in Slovakia. More specifically, an example on the mean construction cost system of typical buildings using cost methods.

In contrast, Majewska et al. (2020) tend to focus on regressive procedures in valuation and also prefer to rely on best practices. Here, they use a comparative approach as the main method of valuing real estate. However, the authors point out that this best practice requires the identification of the impact of different property characteristics on transaction prices. Again, the static methods that the structure encourages are highlighted. In the paper, the authors present an evaluation of the application of methods that were based on regression analyses as an example of parametric methods. They presented in the paper the advantages and disadvantages of using the given methods. At the same time, they also suggest a procedure of best methods and procedures that are specific to individual valuation. Subsequently, the authors also presented the advantages of following standard procedures versus procedures that are developed in an automated solution. Finally, they mentioned the fundamental advantages of experience over technical solutions.

A very different way of looking at valuation is provided by Rong et al. (2020). They focus on whether design contributes to the value of a property. In the case where a property becomes an asset, it is valued using models taking into account specific proxies to understand the value. However, they also highlight where a lack of linkage could lead to poor design and economic outcomes. This is the link between valuation and design. They also outline a solution that can prevent this poor outcome. The authors examined the performance of transaction pricing of external elements (four to be precise), namely diagonality, curvature, setback and podium. They focus on controlling for the factors and explaining the factors. When valuing properties with these elements, price differences change. As a result, the authors suggest the existence of a significant economic impact when intervening in the architectural form of a building.

Chanasit et al. (2021) focus their paper on property valuation models using augmented feature selection. They focus on property values in modern research where complex valuation models based on neural networks are used. In particular, high-dimensional data are used. However, the data is often very limited. It is necessary to use this method for property valuation in larger locations where the data will be more accessible and more plentiful. The goal of valuation techniques using extended attribute selection is to improve performance by identifying significant factors and reducing overload. The authors use a combination of boosting strategy and sensitivity analysis in their research. The combination is then compared with other traditional symptom selection

techniques. As a result, the authors show that the authors' model can preserve the sensitivity coefficient for each informative feature. The study improves the static and, in most cases, lowers error valuation.

Gruzauskas et al. (2020) have a similar view on valuation as previous colleagues. They use the basic main approaches in valuation, namely comparative, income and cost approaches. The paper presents an analytical method which limits the subjectivity in determining the adjustment factor. This method is used in the comparative method. The paper then provides an analytical approach by incorporating macroeconomic indicators in the calculation. The authors used machine learning approaches to determine the average price. The research, specifically the alternative ones, were aimed at estimating the price of the real estate object that was selected. The approaches can be used as a supporting estimate for the appraiser.

The pandemic impact of Covid-19 has a large impact on commercial real estate prices. More specifically, focusing on European markets. In their paper, authors Hoesli and Malle (2021) analyse the behaviour of commercial real estate prices during a pandemic. They also highlight a direct real estate index. Subsequently, the authors analyse commercial real estate prices. Then the authors discuss the main factors and their changes. These factors affect commercial real estate and its prices. In the discussion of the article, the authors mention the price trajectories that affect the price of commercial space going forward. In conclusion, the authors highlight how the Covid-19 pandemic period has strongly affected overall hospitality properties, retail space, and then to a lesser extent, office properties. The industrial and residential sectors were somewhat less affected by the pandemic. They also strongly emphasise that in the case of future price trajectories, prices will vary in specific sectors. The authors try to describe the behaviour of commercial real estate prices during the Covid-19 pandemic.

The Covid-19 pandemic has its effect on commercial real estate rent dynamics. Allan et al. (2021), in their paper, examine the current impact of the Covid-19 pandemic on commercial rents. The paper focuses on the Asia-Pacific region. However, the real estate market here has also been affected by the Covid-19 pandemic. Research has found that there has been a significant decline of approximately 15%. This was only in the first six months of the first wave of the pandemic, which was 2020. The subsequent decline in rents occurred in the retail sector, specifically by 30%. There is a slight recovery in 2020. In the article, the authors show capital flows that were going into residential and industrial real estate were significantly subdued. The authors also allude to the fact that the overall study they produced shows that although the impact of the public health crisis on commercial real estate has been very strong due to the Covid-19 pandemic. Each region has had a different impact.

In this paper, the authors discuss the large, profound impact that the Covid-19 pandemic had on property returns. However, they find that the resilience of these returns varies significantly by given and specific regions. It also varies specifically across asset types of the same type in the same city. The authors focus primarily on the resilience of investments and their types. A resilient investment is an investment that will weather almost any crisis. Crises such as pandemics, climate change, design changes, or demographic changes, for example. However, there are also factors that are currently unknown and cannot be influenced. At the same time, the authors focus on the fact that some properties may not be insurable, meaning that a number of approaches can be taken to increase the resilience of properties. According to the authors, the most common and most important are building design and design flexibility. Clayton et al. (2021).

Data and methods

This study is based on panel data (2000-2009) from the Czech Republic decomposed into the regional level (NUTS 3). The model includes yearly data for 14 regions; the final dataset includes 280 observations. Based on our intuition and presented the theoretical background, we will include the following variables in our model:

Tab. 1. Variables used in the model, including description and units of measure

variable	description	supposed correlation	units	transformation of data
explained variable				
Y1	Price of flats	.	CZK/m2	log
Y2	Price of houses	.	CZK/m3	log
Y3	Price of multi flats houses	.	CZK/m3	log
Explanatory variables				
supply	Value of newly constructed buildings	(-)	Millions of CZK	log
mig	Increase of inhabitants by migration	(+)	‰	
age30–34	Inhabitants aged 30-34	(+)	persons	log
income	Disposable income	(+)	CZK/person	log
crisis	Economic crisis	(-)	dummy	
ČNB	Institutional change	(+)	dummy	
Control explanatory variables				
lagY	Lagged variable Y (t-1)	(+)	CZK/m2	log

variable	description	supposed correlation	units	transformation of data
density	Density of population	(+)	persons/km2	log

We will use the following regression equation:

$$Price_{it}^{Y1,Y2,Y3} = \alpha + \beta_1 supply_{it} + \beta_2 mig_{it} + \beta_3 ratio\_age30\text{–}34_{it} + \beta_4 income\_obyv_{it} \\ + \beta_5 crisis_{it} + \beta_6 \text{ČNB}_{it} + \beta_7 Price_{it-1} + \beta_8 density_{it} + \mu_{it}$$ (1)

The explained variable $Price_{it}^{Y1,Y2,Y3}$ stands for the price of the property (flat/house/multi flat house). The correlation test has confirmed a strong correlation (correlation coefficients varied from 0,87 to 0,96 in different regions), but the data confirmed lower responsiveness of house prices to economic conditions in different regions as well as in the whole economy. This conclusion corresponds to intuition as houses are more frequently bought for own housing, which is rather independent of economic downturns, to the contrary of flats, where the market is more influenced by speculative demand.

The key explanatory variable in our model represents the property supply across regions. It can be expected that an increase in property supply will affect the price in a downward direction. The demand in the property market is represented by 3 key variables: migration, age 30-34 and income. In the case of migration, we expect that a positive balance of migration (an increase of inhabitants) will increase the demand for properties. We are aware that this approach ignores possible speculative demand important, especially in attractive regions such as mountains or tourist centres. However, we are convinced that including this variable (migration saldo) can help explain the price dynamics across regions in general. Next, we assume that persons aged 30-34 buy their first homes and, therefore, this variable represents the share of demand for properties used for own housing. Some studies used to refer to the group aged 25-29 (Breedon, 1992). However, in recent years, the age of buying first housing has moved for many reasons (such as the change in lifestyle, postponing marriage and family, etc. as documented by Malecek, 2021, or Stanimir, 2020) onward to age over 30 (Maalsen et al. 2021; Bryx et al. 2021). And last, traditionally, the demand for properties is believed to be influenced by purchasing power of households. Thus, as a demand factor, we have included disposable income per person in the regression. Intuitively, it is expected that an increase in income, as well as in migration saldo and number of persons in 30-34 group, will influence the property prices in the same direction.

We also expect that the monetary conditions and state of the economy/economic cycle will significantly impact property prices. As the Czech Republic has experienced a period of very loose monetary policy during 2015-2017 (Čečrdlová, 2020) and a period of a W-type economic downturn during 2009-2014 (Kaderabkova, 2021), we have included two dummy variables (Czech National Bank and crisis) to reflect these shocks.

In order to deal with autocorrelation and omitted variable bias, the model includes the lagged explained variable (property price in the preceding year), as we suppose that property prices are influenced by their change in the preceding period which formed the shape of expectations of agents. The second control variable, the density of population as an average value for the region in question, was included to approximate the attractivity of the region, which may influence the property prices. We expect a positive impact on property prices for both mentioned variables.

Results and discussion

Results presented in the following table were estimated in the Stata software using the GLS method.

Tab. 2. Results calculated using the Stata software

	Model Y1 GLS_PANELS_PSAR1		Model Y2 GLS_idd_PSAR1		Model Y3 GLS_idd_PSAR1	
	coef	se	coef	se	coef	se
_cons	0.262	0.578	0.349	0.378	-6.391***	1.345
supply	-0.056**	0.023	0.020	0.015	-0.078	0.054
mig	0.005***	0.002	0.004***	0.001	0.000	0.004
age30–34	0.067**	0.029	-0.019	0.019	0.139*	0.076
income	0.022	0.056	0.020	0.040	0.719***	0.113
crisis	-0.151***	0.013	-0.055***	0.012	-0.020	0.032
ČNB	-0.064***	0.016	-0.054***	0.012	-0.015	0.040
lagY1	0.942***	0.022				
lagY2			0.919***	0.026		
lagY3					0.550***	0.050
density	-0.004	0.008	0.022***	0.008	0.056***	0.020

	Model Y1 GLS_PANELS_PSAR1		Model Y2 GLS_idd_PSAR1		Model Y3 GLS_idd_PSAR1	
	coef	se	coef	se	coef	se
N		266		266		266
Chi2		13 503.054		28 168.577		1 480.128
note: .01 - ***; .05 - **; .1 - *;						

The results have confirmed expectations about the indirect proportion between price and property supply and the direct proportion between price and demand factors. From our data, we can conclude that increasing demand for properties is driven to a lesser extent, by the balance of migration, to a larger extent by the number of young persons and by the increase in income. These results were found valid for all tested regions. On the other hand, it was not confirmed that regions with lower property prices attract more buyers as it can be observed that high-price regions (Prague and South Moravian region in our case) have experienced the highest dynamics of price increase (graphs available in appendix). This finding indicates a low level of mobility of economic subjects in the Czech Republic and, at the same time, a large share of speculative demand in attractive regions. We are convinced that these two reasons contribute to a great share of the price divergence trend between the Czech two major cities (Prague and Brno) and regional towns and cities. Regardless of the changes in the labour market during the Covid-19 pandemic (online working), it seems that people are unwilling to move to regions with lower property prices. Perhaps this is the point where the state policy should be aimed to. The Czech government subsidises own housing by subsidising the demand side, for example allowing subsidised loans to property buyers, which boosts the demand for properties further. What could be done instead is introducing an active housing policy at the regional level, facilitating mobility (by providing a convenient commuting infrastructure), and lowering transaction costs at the supply side of the property market. To illustrate the current situation, we also present two graphs and a table that describe the change in the prices of flats for sale and flats for rent in selected cities in the Czech Republic between January 2019 and January 2022. Data from EVAL software, created by one of the co-authors of this article, were used for the calculation.

Graph.1. Development of offer prices of flats for sale in selected cities of the Czech Republic, January 2019 to January 2022, medians
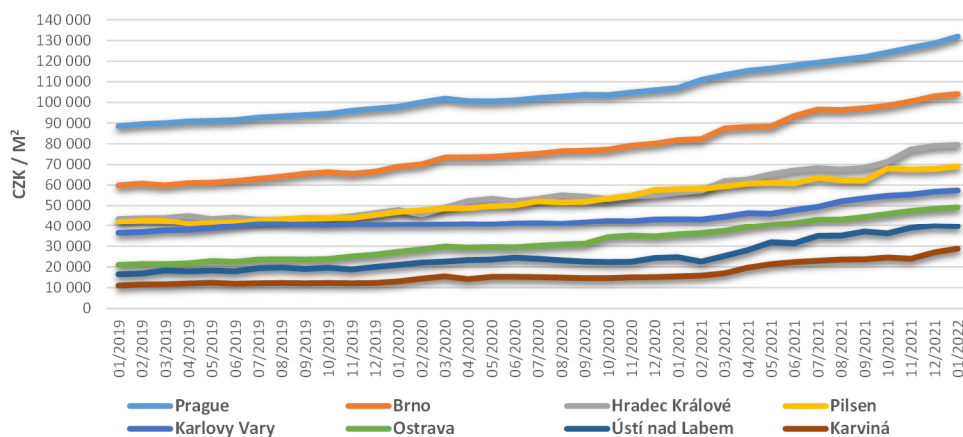
Graph. 2. Development of offer prices of flats for rent in selected cities of the Czech Republic, January 2019 to January 2022, medians
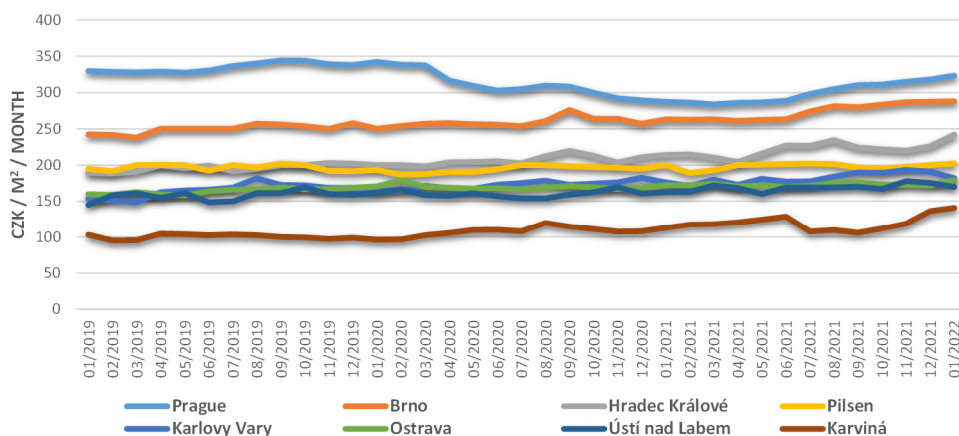
Tab. 3. Comparison of the price level of apartments for sale and rent between January 2019 and January 2022

| City	Price of flats for sale [CZK/m^2]		Price of flats for rent [CZK/m^2/month]		Change of price [%]	
	Jan 2019	Jan 2022	Jan 2019	Jan 2022	Flats for sale	Flats for rent
Prague	88 462	131 869	330	323	+49 %	-2 %
Brno	59 778	104 043	242	288	+74 %	+19 %
Hradec Králové	43 590	79 412	189	242	+82 %	+28 %
Pilsen	41 892	69 048	195	202	+65 %	+4 %
Karlovy Vary	36 452	57 430	154	182	+58 %	+18 %
Ostrava	20 998	49 215	160	179	+134 %	+12 %
Ústí nad Labem	16 463	39 600	145	170	+141 %	+17 %
Karviná	11 000	28 773	103	141	+162 %	+37 %

As a result of the covid pandemic, there was a significant increase in the acquisition prices of real estate, while the same increase did not follow this growth in apartment rental prices. We justify this fact by the fact that investors were looking for safe investments in uncertain times, which the residential market offered them. The largest increase in the prices of flats for sale was recorded in cities with a low price level in 2019. These cities include, in particular, cities where there is a coal industry. As there is a correlation between the acquisition prices of flats and the rental prices of flats, an increase in rental prices in all presented cities can be expected in the next period.

The following 2 graphs show the change in the size of the offer of flats for sale in selected cities in the Czech Republic. Input data is based on EVAL software. In Prague and Brno and in general, in all developing and rich cities with minimal unemployment, there was a significant decline in the supply of apartments for sale. In cities with structural problems, which also include cities with a coal industry, there is also a decline in supply, but this decline is smaller. It is obvious that investors are focusing mainly on the rich regions of the Czech Republic, where they expect further development and growth in the prices of apartments.

Graph. 3. Development of the number of offered flats for sale in Prague, January 2019 to January 2022
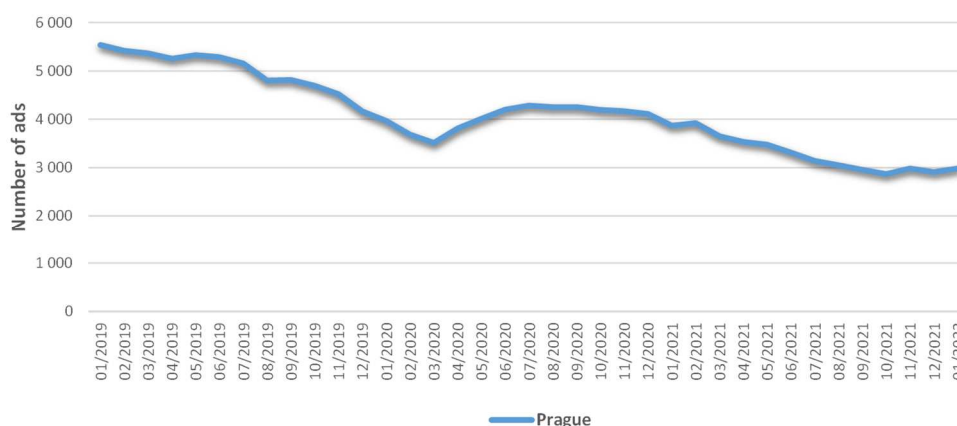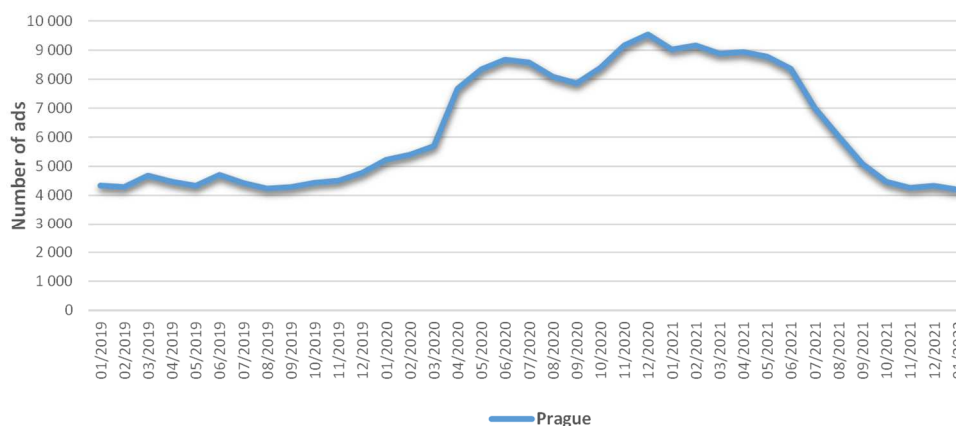

Graph. 4. Development of the number of offered flats for sale in selected cities, January 2019 to January 2022
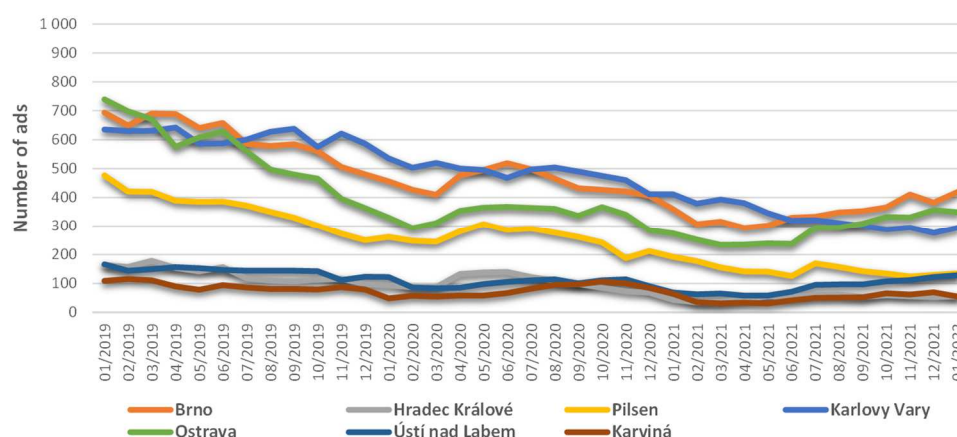
The following two graphs show the development of the offer of flats for rent in selected cities. Input data is based on EVAL software. As a result of the covid-19 pandemic, there has been a dynamic evolution of supply. Prague was the most affected by the pandemic as an important tourist centre in Central Europe. At the beginning of 2022, however, the size of the supply was compared with the period before the pandemic. With the exception of Brno, other cities in the Czech Republic have been affected by the pandemic only to a limited extent.

Graph. 5. Development of the number of offered flats for rent in Prague, January 2019 to January 2022

Graph. 6. Development of the number of offered flats for rent in selected cities, January 2019 to January 2022
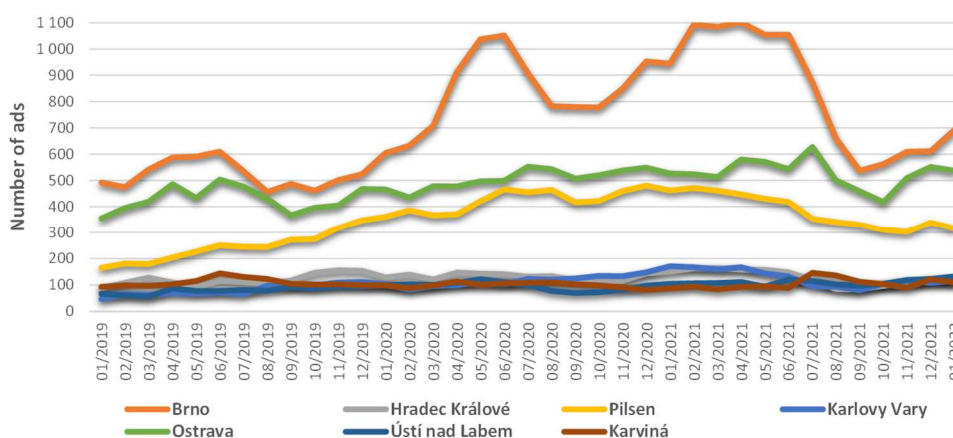
Conclusion

The real estate market represents a very complex area for the company, which brings with it problems of an economic, social, legal and political nature. Over the last few years, property prices themselves have seen a truly dynamic development. In particular, the economic and financial crisis has affected real estate price changes, and its consequences are still evident today. Real estate prices are often addressed in the context of the global Covid-19 pandemic. The real estate market has long shown a number of specifics, and from an economic point of view, real estate prices copy the growth of real household incomes. However, other factors play a significant role in the process of creating real estate prices. The state of the environment and its impact on real estate prices offer an interesting hypothesis. It is generally believed that where there is a good environment, property prices are higher.

There is a significant relationship between the size of the offer of flats for sale and the prices of real estate intended for sale. Furthermore, a significant relationship was observed between the average interest rate on a mortgage loan and real estate prices. Recently, there was a further significant reduction in the supply of vacant flats for sale, which resulted in a significant increase in sales prices. At the same time, rising real estate prices were supported by very low-interest rates on mortgage loans and expectations of high inflation.

The Czech National Bank is currently trying to cool the real estate market by significantly raising its key interest rates. This increase in interest rates will not cause significant cooling of the real estate market. A decline in housing prices cannot also be expected. Currently, around 50% of all properties sold are realised without needing a mortgage loan. However, the remaining 50% of mortgage transactions need to be further divided into two groups. The first group represents investors who only use cheap credit financing and at the same time have their own free funds at their disposal. The increase in mortgage interest rates will not significantly affect this group. The rise in interest rates will mainly affect the second group of people who are actually buying their own

housing. It can be expected that part of this group will move to the rental market. Currently, many developers, construction companies, real estate funds and other investors expect significant growth in demand for rental housing, which will also increase rental housing prices, especially in large cities. This complies with Roulac's (1996) conclusion that stable equilibrium is hardly achievable in property markets.

As for the new construction of rental housing, the state and municipalities in this area are completely failing. The need for rental housing is thus provided only by the private sector, which is, however, driven mainly by the need to generate profit. From the point of view of reducing tensions in society, it should be developed cooperation between the public and private sectors in the field of rental housing construction (PPP projects, cooperative construction, etc.).

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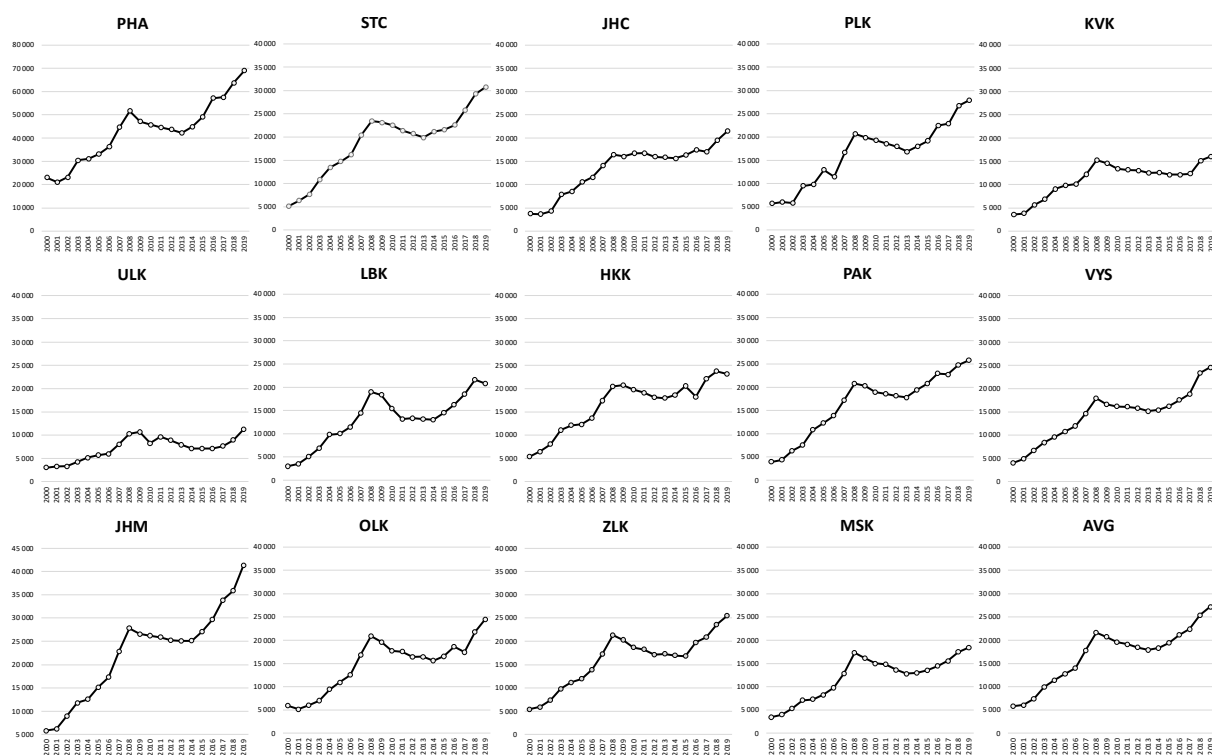
Appendix

Fig. 1. Development of housing prices in the regions of the Czech Republic between 2000-2019

Note:

PHA - Prague

STC - Central Bohemian Region

JHC - South Bohemian Region

PLK - Pilsen Region

KVK - Karlovy Vary Region

ULK - Usti Region

LBK - Liberec region

HKK - Hradec Kralove region

PAK - Pardubice region

VYS - Highlands region

JHM - South Bohemian Region

OLK - Olomouc region

ZLK - Zlin Region

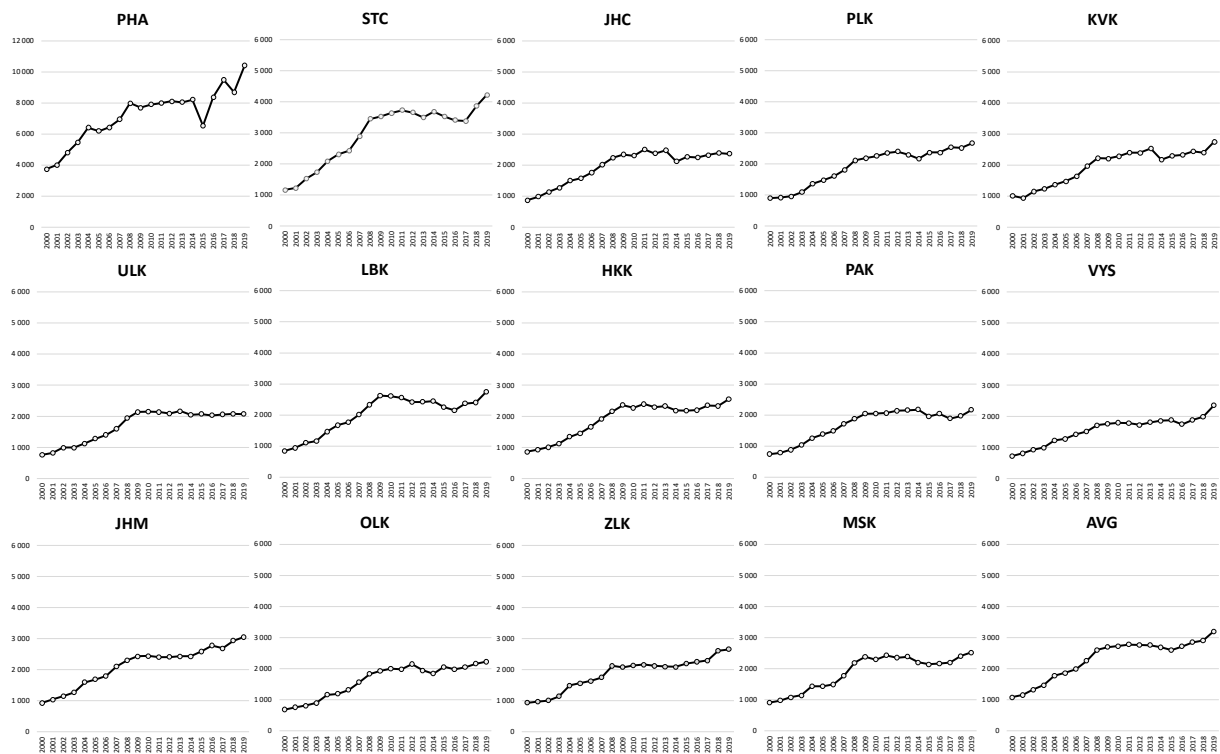MSK - Moravian-Silesian Region

AVG - Average values

Fig. 2. Development of house prices in the regions of the Czech Republic between 2000-2019
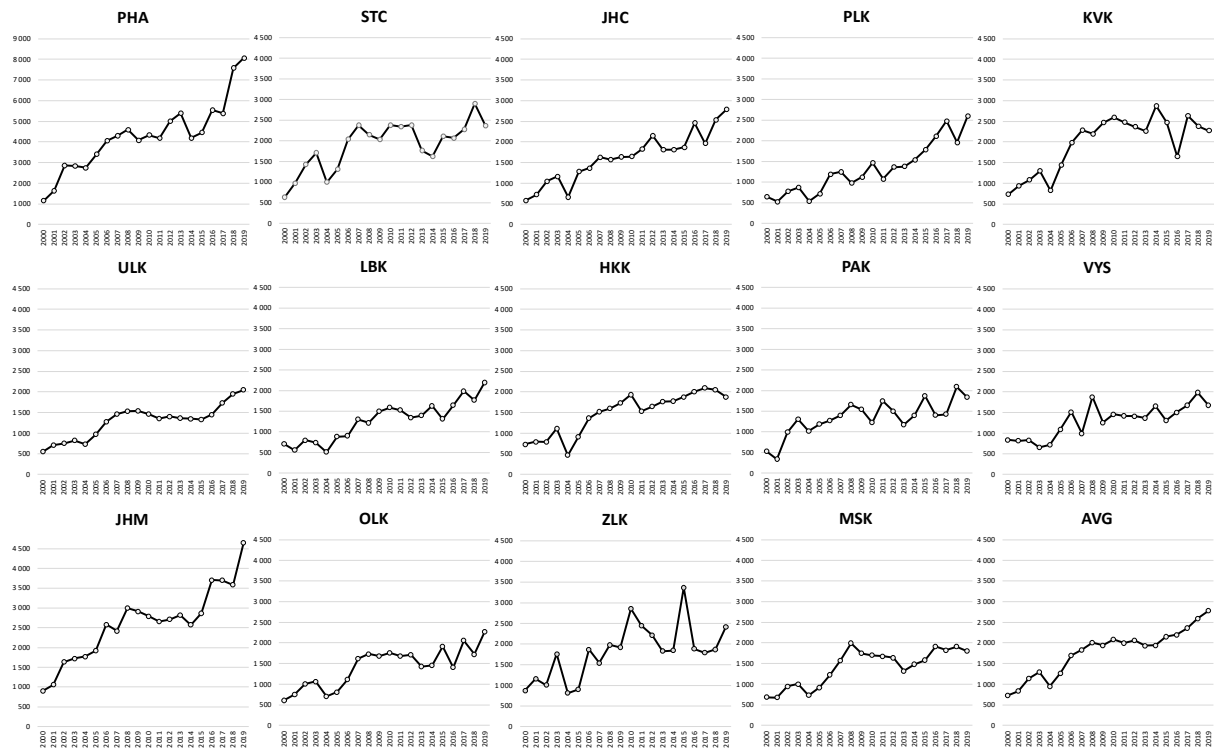

Fig. 3. Development of apartment house prices in the regions of the Czech Republic between 2000-2019