Czech University of Life Sciences Prague

Faculty of Economics and Management

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Bachelor Thesis

Economic Analysis of Real Estate Market in Prague

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Declaration

I hereby declare that I have worked on my bachelor thesis titled "Economic Analysis of Real Estate Market in Prague" completely on my own and that I have marked all quotations in the text and I have also mentioned all sources I have used in the Literature at the end of the thesis.

In Prague on November 23rd, 2014

Signature……………………….

Maxim Zhulin

Acknowledgement

I would like to thank those who made this bachelor thesis possible. In particular to my supervisor Ing. Petr Procházka, MSc, Ph. D. for guidance and for valuable advices. Also I would like to thank my mother and my friends for supporting and believing in me during my studies.

Economic Analysis Real Estate Market in Prague

Ekonomická Analýza Trhu Nemovitostí v Praze

Summary

This bachelor thesis describes actual situation of real estate market in Czech Republic with the focus on capital city of Prague.

Thesis is divided in two major parts, theoretical and practical. Theoretical part explains principles of real estate knowledge from basic, economic, macroeconomic and financial view.

Practical part compares the prices of real estates in Prague with nation average, with other European cities and then evaluates availability of housing in Czech Republic. Through correlation analysis relationships between the real estate prices and selected indicators are found and then the major indicator is deeply examined through regression analysis.

Key words: real estates, prices, market, residential, development, Prague, analysis

Souhrn

V mé bakalářské práci chci popsat aktuální situaci nemovitostí v České republice se zaměřením na hlavní město Prahu.

Práce je rozdělena do dvou hlavních částí, teoretická a praktická. Teoretická část popisuje zásady znalostí nemovitostí ze základního, ekonomického, markoekonomického a finančního úhlu.

Praktická část porovnává ceny nemovitostí v Praze s celostáním průměrem, s jinými evropskými zeměmi a dále pak vyhodnocuje dostupnost bydlení v České republice. Přes korelační analýzy jsou nalezeny vztahy mezi cenami nemovitostí a vybranými ukazateli a pak je hlavní ukazatel hlouběji prozkoumán skrz regresní analýzu.

Klíčová slova: nemovitosti, ceny, trh, rezidenční, vývoj, Praha, analýza

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1. Introduction

The global financial crisis in 2008 caused extreme rise of real estate prices and consequences are still visible in 2014. Prices of residential real estate in Czech Republic are nowadays high, especially in Prague. Many properties are unoccupied because of those high prices. Owners need to reach the return, so they cannot go lower with the price and are beaten by developers that offer new properties for a relatively good price.

With low interest rates and willingness of banks to provide mortgage loans properties become more available, but real estate is a commodity, which is unlike anything else and it must be treated with caution. Since for most of the people it is the biggest investment that they made in their lifetime, it is for the best to reduce the price to minimum.

Real estate is a business, which relates to many aspects of life and sooner or later every person is forced to deal with. From a student who moves to the big city, to a businessman, that wants to gain a profit from buying a property. Anybody can get involved in real estate industry, with or without the needed knowledge. Basics can be learned in a few days, but experiences are essential to be successful.

There are some indexes that help to decide if now is the right time to buy or to sell a property. As every other goods, also real estate market is affected by supply and demand, but along with it by some macroeconomic indicators. GDP is a one of the most important factors to track, because real estate contributes to its formation. Price of construction work is on the other hand responsible for final price of newly build properties. Other factors as inflation, wage income, population and tax rate are involved. But how much these factors are affecting the price is a matter further research and analysis of correlation and regression, which was implemented this thesis.

2. Aims and methodology

Aims

The aim of this thesis is to evaluate the price of real estate market in Czech Republic with focus on Prague as the capital city. The goal of the research in practical part is to describe the situation on real estate market in recent years, compare the price with other European countries, show the availability of housing in Czech Republic and Prague and then evaluate the indicators that are affecting the price of real estates.

Methodology

- To provide the essential knowledge of the topic, data were implemented through data collection and elaboration of information from specialized books, scientific articles and Internet sources engaged with the topic of the thesis.

- Substantial part of the thesis is descriptive. Data collection, analysis and interpretation of the found data are included.

- Correlation analysis is repeatedly used to show the relations between the price and other selected indicators.

- Regression analysis is calculated for further investigation of the observed relations.

3. Theoretical Part

3.1. Basic definitions of real estate

To fully understand principles of real estate topic, it is important to know the basics. First of all, there are several types of properties.

Real estate has also seven basic characteristics that define its unique nature. These characteristics are categorized in two groups – economic characteristics and physical characteristics. Physical includes immobility; indestructibility and uniqueness. Four economic characteristics, which affect property value in the marketplace, are scarcity, improvements, permanence of investment and location.

Separate businesses as brokerage, appraisal, development, property management, counselling, financing and insurance, are important real estate fields. On the other side buyers and sellers of real estates, tenants and renters, investors, and developers create the market of real estate. Together they complete the components of real estate industry.

3.1.1. Types of properties

Residential property is the most common real estate used by families, individuals or couples to live.

Commercial property is a property used by business, e. g. shops, offices, hotels.

Industrial properties are factories, warehouses or power plants.

Agricultural properties are farms, timberlands, orchards, ranches.

Special purpose properties are schools, churches, cemeteries and government-held lands.

3.1.2. Physical Characteristics

Immobility

Real estate can be literally translated to Czech language as "something that does not move" or "immobility". And immobility is the one of the general and the most important physical characteristic of a real estate. Since land has this invariant feature, most important factor to consider when buying a property is location.

Durability

Physically land lasts forever and it can be improved in a long-term nature. Those factors tend to stabilize the investment, but moreover improvements on land depreciate, land can become obsolete and value can be destroyed.

Heterogeneity / Uniqueness

Neither one unit of real estate is the same. Parcels differ in size, shape, location, appearance and type of property.

3.1.3. Economic characteristics

Location

Due to fact, that location is related with immobility, it is the biggest impact on property's value. Buyer should decide whether to buy a property in urban, suburban or rural area and to determine proximity to important places like school, work and shops. Other factors to consider are safety, access to public services and other more individual factors as greenery or sport activities in the area.

Scarcity

Land is considered to be a limited supply. Even if this statement seems to be wrong, since there are large unused or uninhabited areas, desirable locations of certain quality are presently scarce.

Improvements

Building an improvement can affect value of the property as well as the living conditions of the neighbourhood. For example building a hospital or incinerator can drastically change value, and in this case even health of people in a large area.

Permanence of investment

Permanence of improvements with immobility of the land makes real estate market less flexible than other markets. As a result real estate investment returns tents to be long-term and relatively stable.

3.1.4.   Real Estate Professionals

Brokerage is the most common business involved in real estate industry. The main purpose is to bring people together in order to sale, to purchase or to rent a property. Broker negotiates a transaction between two or more people and receives a commission for the provided services. The difference between broker and **salesperson** is that broker is licensed by state and salesperson can operate only under authorization of licensed broker.

Appraisal is process of evaluating a property's value, based on an established methods and professional judgment of an appraiser. Even when experienced broker can provide truthful evaluation, lenders usually require certified appraisal.

Development can be defined as construction of improvements on the land. It is a field that requires many different disciplines and actions to successfully convert an idea into completed project. It required not only a lot of time, but also a large capital. The biggest one is construction work, followed by land, architecture, engineering, legal acts, financial acts, environmental acts, management, marketing and communications. All this disciplines require different knowledge, skills, staff and different approach. Developer needs to coordinate all the activities to finalize the project. But what is the most important thing that developer brings is to handle the finance in development process. Another process which is related is **subdivision**, which is partition of a single property into smaller parcels.

Property manager is a person who handles management and maintenance of a property. Whether it is the owner, professional manager or a company, the day-to-day decisions needs specialized skills, which investors often do not have. Property manager can be in charge for example in finding new tenants, negotiating the lease agreement, collecting rents, transferring energy bills to new tenants, coordinating property maintenance, bookkeeping, paying the utilities. In general the responsibility is to protect owner's investment and accelerate its return.

Counselling provide clients independent real estate advices by professional judgment and expertise. A counsellor make clients informed and notified in all the matters that are connected with property purchasing without representing them as an agent.

Financing deals with providing of collateral in form of either mortgage or trust deed for purchase and development of a real estate. Different entities as brokerage companies, mortgage banks, real estate investment trusts, saving associations and commercial banks are involved in the process of loaning money.

Insurance is a vast topic, which minimize risks associated with real estate ownership. Most common types of insurance are *Homeowner's insurance*, which covers fire, theft, windstorm damage as well as losses, *Renters' insurance*, which focuses on loss in the apartment, and *Income-property insurance*, which protects the owner from nature disasters.

3.2. Economic principles of real estate market

Real estate economics applies in real estate markets through economic techniques. It attempts to describe, explain and predict the mechanisms of prices, supply and demand.

A market is where goods can be sold and bought. Market may be specified by places like village square, but also it may be a complex worldwide economic system for moving goods around the world. But in each case, main function of market is to create conditions, in which supply and demand specify the market value.

The real is defined estate market by set of submarkets. Submarkets may be divided by type of property or on geographic level (national, regional or neighbourhood). Real estate market may be also divided into sales market and rental market.

3.2.1. Sales market

In sales market transfer of titles and ownership rights are involved. Looking on the real estate as an investment, buying a property not only costs a lot, but it also takes a long time. It is highly recommended, even necessary to use brokerage, counselling, appraising and financing services. After thinking through all the options related with buying a property, it is important to include transfer taxes, legal fees and broker's provision in the calculations.

3.2.2. Rental market

Rental market involves rent and leasing of space. This market is more adaptive and reflects better situation of the real estate market. Client could simply choose the property offered by many brokerage agencies and pay provision or even try to find property alone and evade paying provisions (which is mainly one month's rent, but with initial costs and deposit it could be critical for students for example). The value of the market is very close to equilibrium (balance between supply and demand), because when price is too high, customer

will rather choose different, cheaper option. Tenant is forced to lower the price or the property will stay vacant and tenant's return of the investment will slows.

3.2.3. Stock/flow market

One of the characteristics, durability, makes real estate almost indestructible, building could withstand for centuries and land will remain forever. That is why majority of real estate market consists of existing stock of properties and the rest is a flow of the new development. Supply of stock is determined by existing stock from previous period and flow of a new development by current period.

3.2.4. Supply and demand in real estate market

Supply and demand are affected by two characteristics of real estate and it is uniqueness and immobility. When supply of a particular real estate is low it is impossible to relocate the property to satisfy demand. And since real estate is fixed by location, supply and demand are determined by specific conditions in the area.

Generally, the real estate market adjusts slowly to the changes of supply and demand, because of those natural characteristics.

3.2.4.1. Factors affecting supply

Construction and material costs and labour force

Leakage of professional labour force or construction material, same as high material costs could reduce quantity of new constructions. High taxes and fees may also discourage developers. All this costs will appear in a form of higher prices or rents.

Government control and financial policies

More or less any government's act has an impact on real estate market. As negative effects can be stated taxes, high interest rates, construction regulations, which deter developers. On the contrary, tax incentives may attract new industries or businesses. Local governments may also affect supply by land-use controls, building codes and zoning ordinances. Cautious planning helps to stabilize and even increase the value of real estate.

3.2.4.1. Factors affecting demand

Population

Because having a place to live is one of the basic necessities of life, demand for real estate grows with population (in some areas faster than in other). However, population rate may also fall due to economic reasons such as decrease of jobs in the area, social reasons such as safety, geographic preferences or political situations. Drop in demand in one area could cause grow elsewhere.

Demographics

Demographics is a study and description of the population. Particularly demographics of a community is a major factor that determine the quantity and type of housing needed. Family size (number of adults and children), family income, lifestyle etc. are demographic factors that are observed so amount and type of housing can be identified.

Employment and wage levels

People cannot buy or rent a property if they are not secured in their jobs. Low wage or few of job opportunities have a negative effect on demand. Even if one major employer goes bankrupt it could drastically affect the market.

3.3. Macroeconomics indicators

The share of construction on GDP in 2014 is 5.7%. Variations in housing production influence fluctuation of aggregate economic output and vice versa. The fluctuation was analysed and investigated, but the relationship between real estate market behaviour and cyclic behaviour of national economic was never accurately explained. In 50's and 60's view on counter-cyclical behaviour of housing construction was extended. This behaviour shows the period when construction of a new housing stagnates in phase of economical growth, wherewith in economical recession the number of started constructions increases. This behaviour is explained in two ways.

According to Petr Sunega (2002), it is caused by mortgage market. It is expected, that the total amount of all loans is constant through process of business cycle. If national economic grows, rises demand for loans. Banks provide both investment loans and mortgages. Investment loans are dealt first, thus mortgages are limited and thus is limited the housing construction. Second argument is based on analyses of costs, rather than mortgages. As was mentioned before, if national economic grows, rises demand for loans and that leads to high interest rates. Construction is more sensitive to interest rates than other sectors. It is due the fact that developers are mostly depended on external financial sources and returns on the investment are spread into very long period, so interest rates got a long term effects. Rising interest rates suppress the construction of real estate and contrary during the recession, the number of newly built apartments or houses grows. A certain exception is when recession is accompanied by rising inflation and stagnation. In this case interest rates of mortgage loans rises and construction amount decreases along with economic production. Nowadays, fluctuation in the housing market is neither cyclical nor counter-cyclical. Empirical data show rather trend of changes in evolution of aggregate economic output by up to several month. The reason is obvious, increased loan demand caused by economic expansion has an effect not only on loans, but also on other sectors of economy, which creates pressure on rising interest rates. Because the real estate market is so sensitive to these rates, the amount of construction starts to decrease earlier than economic growth reaches its peak. The rapid decrease in construction is caused also by monetary policy as reducing the money supply.

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By how interest rates affect the amount of newly built properties, it affects the demand for real estate. Low interest rates encourage growth in property prices in waves. This effect follows the increases and decreases in interest rates. Demand also affects the overall boom in the economy and consequent income growth. This phenomenon was observed especially among new entrants to EU (including Czech Republic), in which has been and still is a comparison on population income and real estate prices with other EU members.

As it shown in chart no. 1, 2T repo rate, which is the main monetary policy instrument used by Czech Nation Bank and which motivates commercial banks to lend their resources, is last two years at the historinal minimum. Low interest rates motivate developers to put in motion new construction projects, which are dominated in Prague by 50% (launched) and 60% (finished) compared to the whole Czech republic.

Chart no. 1 – Development of interest rates CNB: Jan 2007 – July 2014
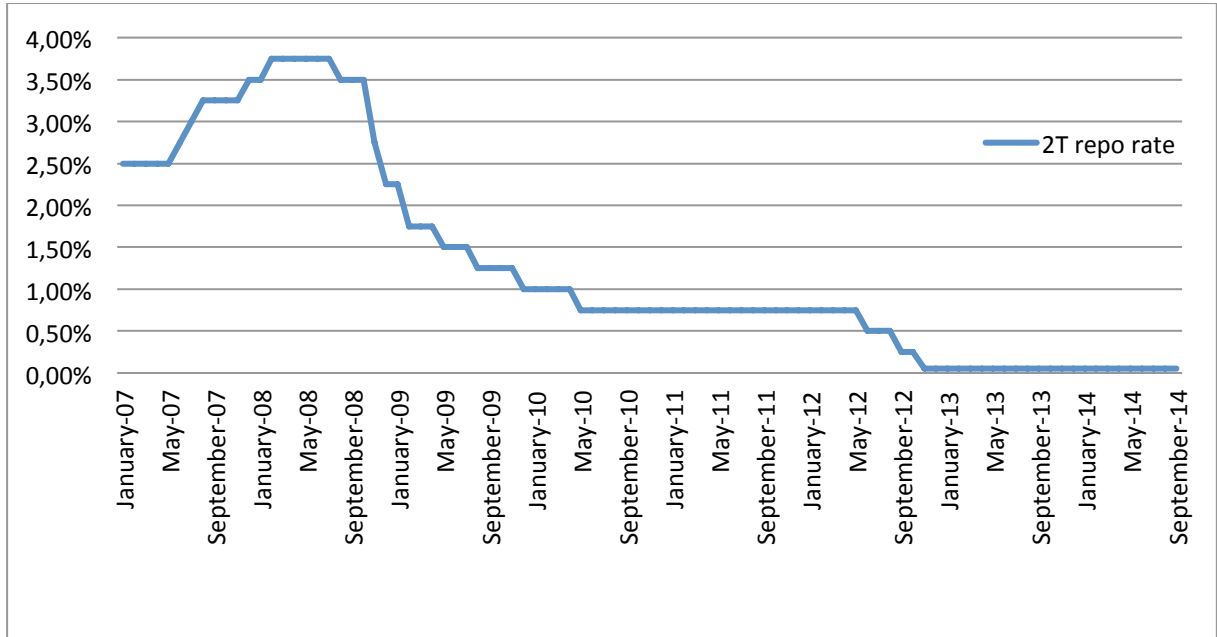
Source: CNB 2014, own calculations

Chart no. 2 shows that the number of mortgage loans and interest rates are in inverse proportion. In 2008, when the interest rates growth, number of mortgage loans shrink, but now with low interest rates, number of mortgage loans reaches its maximum.

Chart no. 2 – Number of mortgage loans provided by mortgage banks to citizens, businesses and communities 2002-2013
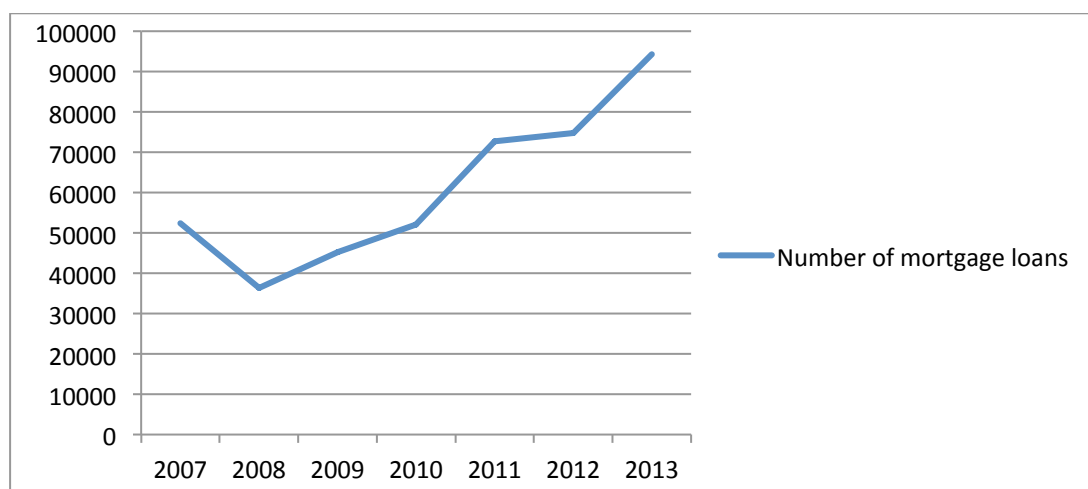
Source: MMR - Ministry for Regional Development 2013, own calculations

3.3.1. House Price Index

House Price Index (HIP) is a synthetic price index, which measures the price level of residential real estate in the Czech Republic according to the unified and harmonized EU standards. Its advantage is therefore large international comparability. Metadata for Czech HIP are collected by CZSO and they could be found on Eurostat website. HPI measures the movement of prices of flats and houses, including related land. It is a total household purchases, other sectors are excluded. It also includes both new and older (previously occupied) housing estates. Prices for index calculation are based on the actual realized prices and index is annually chained, which means that there is an internal weighing structure update. Weights reflects the relative proportions of actual market transaction, non-market prices are excluded. The current basis of the index is 2010 = 100.
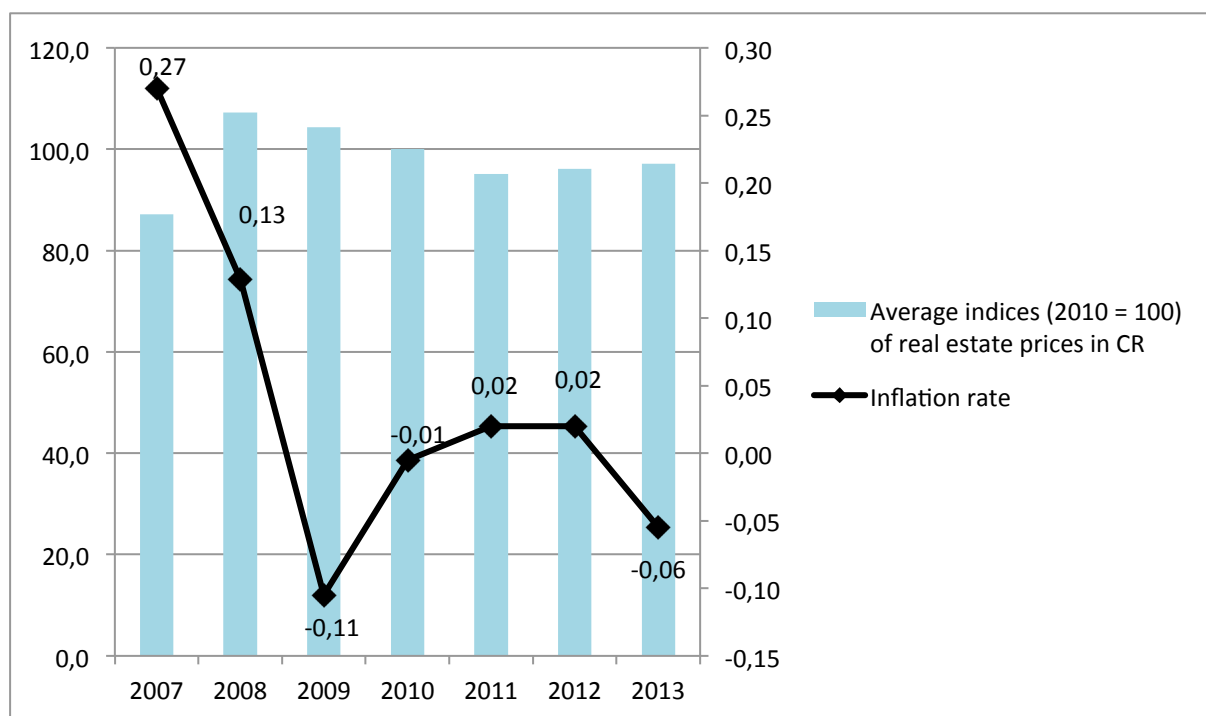
3.3.2.   The impact of inflation on real estate prices

One of the best known macroeconomics indicators is inflation. In the Czech Republic annual rate inflation has not reached more than 6% (2008) since 1999. Low inflation is good for a potential buyer of real estate, because lower inflation rate leads to lower prices. Higher inflation rates also increases return on property renting. Therefore it can be concluded that real estate are carried by the inflation.

Inflation may also become a major threat to the property market, even though many people think that buying a property is a hedge against inflation. It would be true if property prices grew at the same rate as inflation, but this is not the cause, because prices grew enormously when the crises in 2008 blew. Moreover people bought properties on the loan with circa 15% of their own funds and higher interest rates of those loans caused by high inflation probably made owners worried. The repayment of the loan was higher and money for expenses lower, which slowed the economy.

In chart no. 3 it is clear that inflation rate don't have a direct influence on prices of real estate. The reason is, that fluctuations are very low, since 2007 the inflation grew only once by 3% in January 2008 and at other periods fluctuations was maximum 1,5%. And other reason is that data are from recent years only.

Chart no. 3 – Compare of average annual percentage development of inflation rate with average price indices in Czech Republic 2007-2013

Source: CZSO – Czech Statistical Office 2014, own calculations

Good example of significant impact of inflation on real estate market is Ireland. With low taxes and skilled labour force, Ireland has experienced in the last decade, a strong inflow of foreign investment accompanying by sharp increase in GDP. Growth of a total product resulted as increase of money in the economy, which increase pressure on inflation growth. Irish economy is very open to import in foreign goods, thus prices of foreign goods didn't grow. Since real estate could not be imported, the prices reflected on them. At that time, it was around 30% up annually. The same situation happened in Czech Republic, but unlike Ireland, Czech National Bank can conduct monetary policy. Most common form against increasing of inflation used by CNB is raise of interest rates.

3.3.3. The impact of GDP

The Gross Domestic Product is a monetary expression of the total value of goods and services newly produced in a given period in a given territory (most often nation) used for the determination of the economic efficiency. It can be measured on a weekly, monthly, quarterly or yearly basis. GDP can be defined in three ways: production method, the expenditure method and pension approach.

Since property is usually the largest single purchase that an individual or couple will make in their lifetime, real estate plays a significant role in shaping the economy and the GDP. Additional types of real estate as commercial are part of the equation.

Real estate plays a part in the GDP in two ways: through money spent on residential investment and on housing services. Construction, including that of manufactured housing, improvements, and the fees charged by real estate brokers, are all components of residential investment. Money spent on rent and utilities are what make up the portion known as housing services. All of these components are connected and depend on each other. Declines in real estate sales and construction have a trickle down effect and impact a variety of factors, including the unemployment rate, home values, individual equity and consumer spending. A spin-off of reduced equity and jeopardized employment is a reduction in the amount of financing one is eligible for. All of the pieces of the housing market puzzle play a tremendous role in the nation's economic health and the construction of new housing is an integral component of the economy.

Chart no. 4 compare the housing construction with GDP and it can be observed that there is a partial mutual influence of these two factors. Whenever a construction is finished it results in a growth in economy. Drop in new constructions is probably caused by saving policy of the government, but it seems to have a little effect on GDP.

Chart no. 4 – Comparing housing construction with GDP 2007-2013
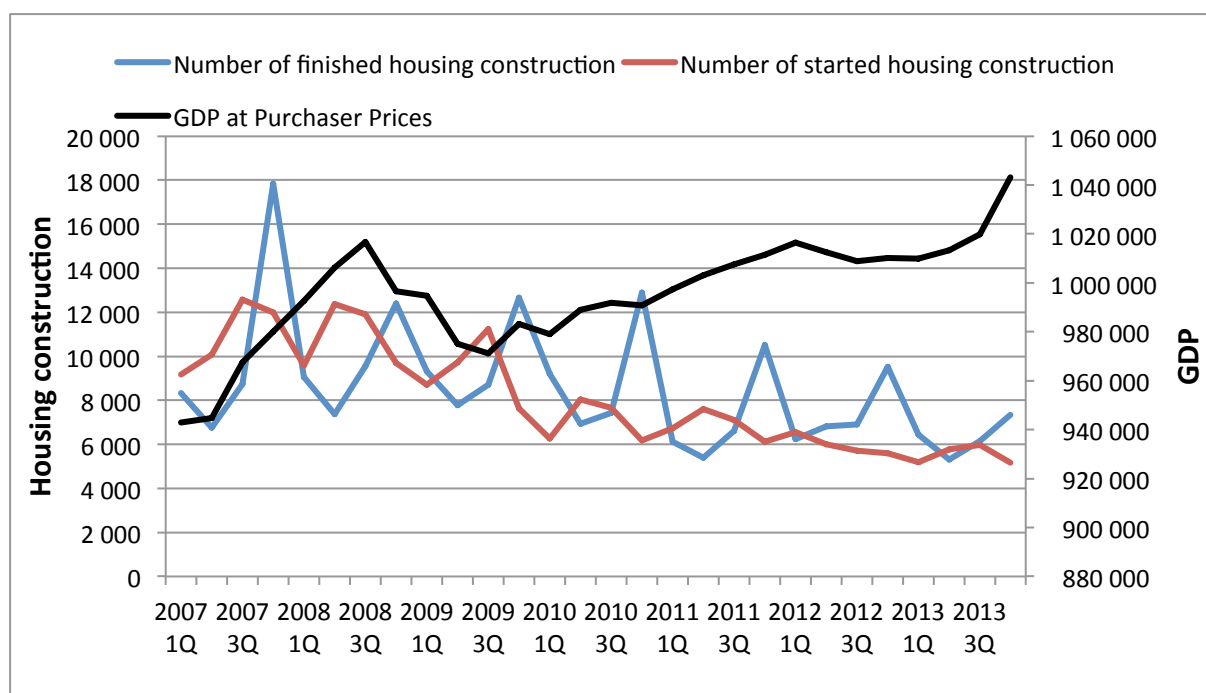
Source: CZSO 2014, own calculations

3.4. Financial scope

3.4.1. Price of construction work

One of the main drivers of the supply side of residential real estate market is the profitability of those who sell residential properties. Those who are selling residential properties in large are therefore very significant players in real estate market; these people are most often developers, because they build residential properties in order to make profit. The biggest cost item for residential developer is then the price of construction work. It consists of approximately three quarters of all costs associated with the new project.

An interesting fact seems to be that the selling price of residential real estate is mostly determined before it is known the cost of the most important item, construction work.

The selling price is determined on the basis of estimated qualified revenues and expenses in the very first phase of the project, which determines its viability.

While the sale of residential property is initiated almost immediately after the completion of the very first phase and at the price determined on the basis of estimates, the cost of the construction work are known approximately in year or two years after. It has to be expected one or two calendar years for design work, obtaining legislative authorizations needed to begin the construction and to conduct and evaluate the tender for general building contractor. Up to this moment it is determined how much the estimates in the beginning of the project were right. In other words, how big profit will developer have to give up, how much will have to raise the prices, or how much space he could create for discounts in case that estimation was higher than reality.

Space for discount is extremely important in case that there is further reduction of construction work. For example, at the end of 2010 the price of construction work was about 0.7 percent lower than the price of construction work in 2009. This fact had an impact on real estate market in two ways. First, it stimulated demand, as the price of newly build residential properties was lower than it was in the time of high prices of construction work. Second, it affected supply, the holders of unsold properties that were build in the pre-crisis prices, had to reduce the price and therefore cut their profit in order to sell those properties.

3.4.2.   Real estate and VAT in 2014

The new Civil Code, Law on Corporations and new Cadastral Act led in 2014 to changes in dealing with real estate. To new legislation responds the statutory measure of the Senate to amend the tax laws in connection with the recodification of private law no. 344/2013 Coll., which among the others things it amends the law on Value Added Tax (VAT) and the Law on Income Tax.

By the law, new definition of goods, term of assignment and transfer of the real estate, disappears. For the purposes of the law, goods are newly understood as tangible or as building right in concerns of real estate.

Probably the most extensive changes are related to § 56 – the exempt for reasons of delivery of selected real estate. Given the considerable confusions, the General Directorate of Finance published in December 2013 the comment, in which is expressed the implementation of VAT to the delivery and rent of the selected real estate. § 56 paragraph one defines a new concept – selected real estate. Delivery of selected real estate is meant delivery of land, construction right, underground constructions with a separate purpose specification, engineering structures, and units. Comment of GDF complements that VAT is harmonized within the EU, and therefore regardless of the new Civil Code, as interpreted by the European law, building means any structure fixed to the ground.

Tax exemptions refers to selected real estate, that meets this criteria: on the land there is not established building connected to ground with solid foundation, there is not network of any engineering on the land, and land, on which cannot be executed a construction by valid building permit or consent with the execution of the announced construction of a building.

This change will affect in particular land under new buildings, whose taxation grew from zero to 21 percent. But prices of new apartment won't grow up by 21 percent; increase will be equal to the price of land, which is 15 to 30 percent.

Introduction of VAT payment will even more significantly impact houses and building plots. It is expected that this could be a significant factor in the increase of sales.

4. Practical Part

4.1. Graphical analysis of real estate market
4.1.1. Prague and Czech Republic

From the second half of 2006 there was a rapid growth of real housing prices due to the accumulated positive impacts. Strong economic boom turned out beneficial for the financial situation of the Czech households and brought optimistic expectations, which was actually fulfilled. Eight percent nominal wage growth together with the favourable situation on the labour market and strong demand in the market increased gross disposable income of Czech households. Supply of banks, especially mortgage loans, was affected by product of Ceska Sporitelna, which forced other banks to radically decrease their interest rates of these loans. Mortgage loans of Building societies was also accessible for less creditworthy clients, that banks previously didn't accepted.

Because of these positive factors in housing finance, prices of residential real estate started to rush up. In the first and the second quarter of 2006 expected prices of the apartments (prices that are offered by brokerage agencies or prices that are requested in direct sells) increased by 4.2 %, respectively by 7.5 % and in the rest of a year it was double-digit rates. During the year 2007 expected prices of the apartments was up by 16.7 % in the first quarter and up by 23.2 % in the other three quarters, compared to the same periods of 2006. Prices peaked around September of 2008, when the annual level was even one quarter higher, +25.4 % in the second and +25.1 in the third quarter of 2008.

On average, from the third quarter of 2006 to the fourth quarter of 2008, annual growth of expected prices of real estate was one fifth (+20.1 %) every quarter. Where prices in non-Prague regions grew even faster (+22.4 %) and housing prices were significantly lower than in the capital city of Prague. Here, the average annual growth for the same period was +17.2 % every quarter.

Chart no. 5 – Comparison of expected prices of residential real estate in Prague with Czech Republic from 2006 to third quarter of 2014 (HPI)
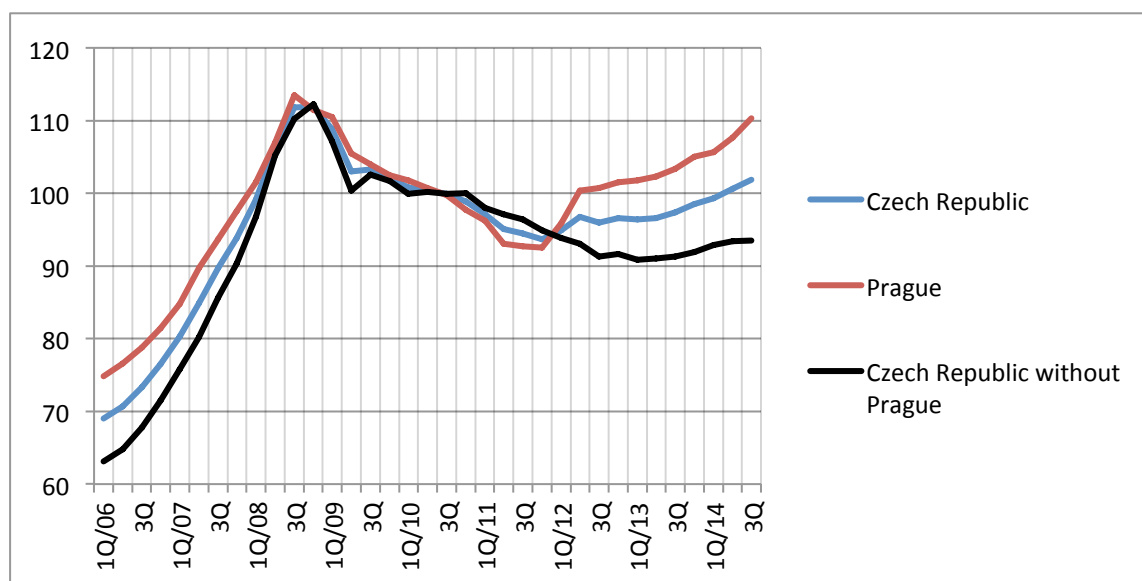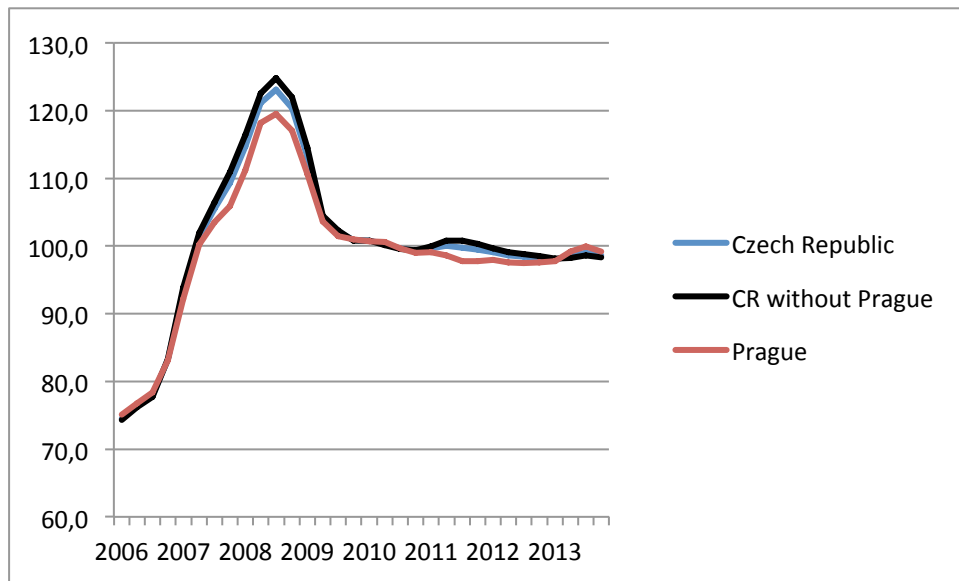

Source: CZSO 2014, own calculations

The development of expected prices was also reflected in their realized prices, which is real price of the property in purchase transaction. And these transactions are between individuals (citizens). That means the apartments that sell developers (new housing) and properties acquired in privatisation (sales from municipalities) are not included. This is because the legal person is not obligated to submit tax return in transfer of the property. In summary, the realized price does not include all sales.

Realized prices of apartment in Czech Republic increased in the period 2006-2008 even faster than expected prices. Initially, in the first three quarters of the year 2006 was their dynamics only single digit, however following development was even more aggressive. In the first quarter of 2007 according to the actual house price index, homebuyers paid one quarter more than the year before. In other quarters until the end of 2007 annual price increase was higher by about one third (+32.7 %; +35.4 %; +31.4 %).

These enormous price increases rushed up the high demand for own housing along with demographic impact and marketing activities of banks highlighting the advantages of own housing.

Chart no. 6 – Comparison of realized prices of residential real estate in Prague with Czech Republic from 2006 to 2013 (HPI)

Source: CZSO 2014, own calculations

Ironically, along with the increase of real estate prices in sales grew interest rates (see chart no. 1), so purchasing was not that convenient as institutions offering mortgages promoted.

Chart no. 7 – Comparison of realized prices and expected prices of residential real estate in Prague from 2006 to 2013 (HPI)
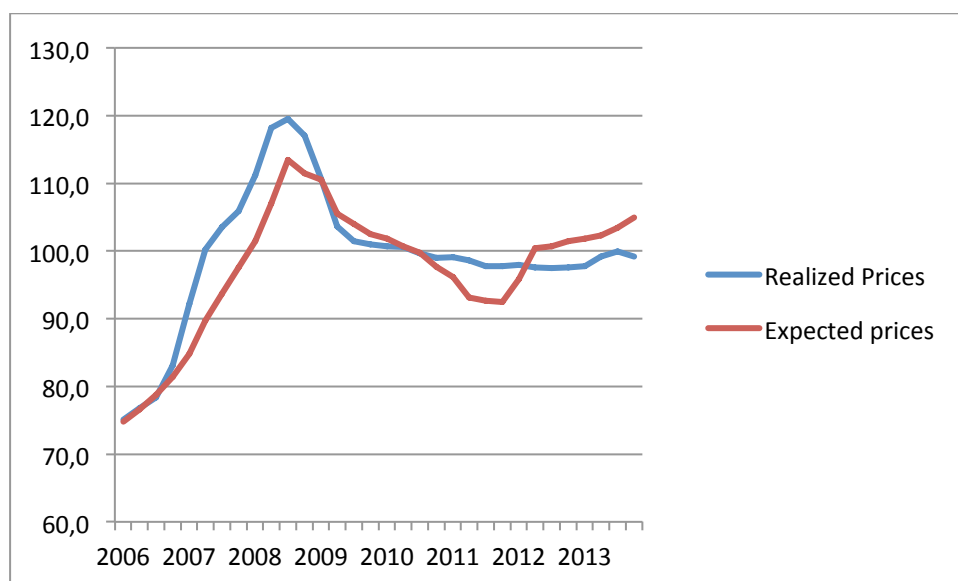
Source: CZSO 2014, own calculations

Advance of expected prices before the dynamics of realized prices in Prague is noticeable until the end of 2009 in chart no.7 (increase of expected prices is followed by increase of realized prices, although with different intensity). Thereafter this dependence considerably freed up, which was caused partly by dropdown situation on real estate market and partly due to uncertainties of investors or buyers associated with future development of economy and their own financial situation.

During the year 2011, when expected prices was still responding to fading post-crisis recovery of the Czech economy and were still annually below the realized prices, those realized prices have developed fairly well. On the contrary recession in 2012 realized prices pulled down, while expected prices were already higher. From the business perspective it was absurd, because real estate agencies could not reach those expected levels especially in Prague and sellers had to go with the price below the required level.

From second to fourth quarter of 2012, real estate agencies set prices on average 8.7 % higher than in the same time in 2011 and in the fourth quarter nearly by ten percent (+9.7 %). However, the required prices were not realized. Conversely in the same period realized prices

of Prague flats decreased, although the pace of decline was still moderate (-1 %, -0.3 % and -0.2 %).

It was only in 2013 when market of real estate in Prague awakened, realized prices grew by 0.2 % in the first and by 3 % in the second quarter. Thanks to development in Prague, realized prices grew by 0.5% for the whole country by +0.5 and it was in the second quarter of 2013.

4.1.2.   Prague and other European cities

Situation in 2014 is that there are big differences between prices in Prague and the rest of Czech Republic. It is caused by location; most expensive apartments are in metropolises and large agglomerations. In Prague prices are sometimes two times greater than the national average, same as in Hamburg, London and Paris. Actually new apartments in Czech Republic are most expensive in the middle Europe. According to research of Deloitte one square meter cost on average CZK 32.556,-. That is seven times more than in Hungary. In Prague prices of new residential properties exceed those in Warsaw by about EUR 750 per square meter and are comparable for example with Madrid, where in recent years the residential market was cooled. Wherewith in Prague demand for apartments grow since last year. Differences in some other cities are even bigger. For example, in Munich, which is the most expensive German city in terms of acquisition of residential property, the last new apartments was sold at average of EUR 5.600 (CZK 153.720,-) per square meter. And together with Moscow, where the price of new housing varies at EUR 4.200 (CZK 115.290,-) per square meter exceed the national average three times.

The most expensive cities in Europe are London and Paris. The average price for the purchase of the apartment in the centre of London is more than EUR 10.000 (CZK 274.500,-) per square meter. In Paris the average market prices of older apartments reached EUR 8.140 (CZK 223.443,-) per square meter. On the contrary, Budapest (EUR 1140 = CZK 31.293,-), Lisbon (EUR 1640 = CZK 45.018,-) and Warsaw (EUR 1.704 = 46.775,-) became the cheapest capital cities in 2013.

Chart no. 6 – Average prices of residential real estate in selected countries and their capitals in EUR/square meter (2013)
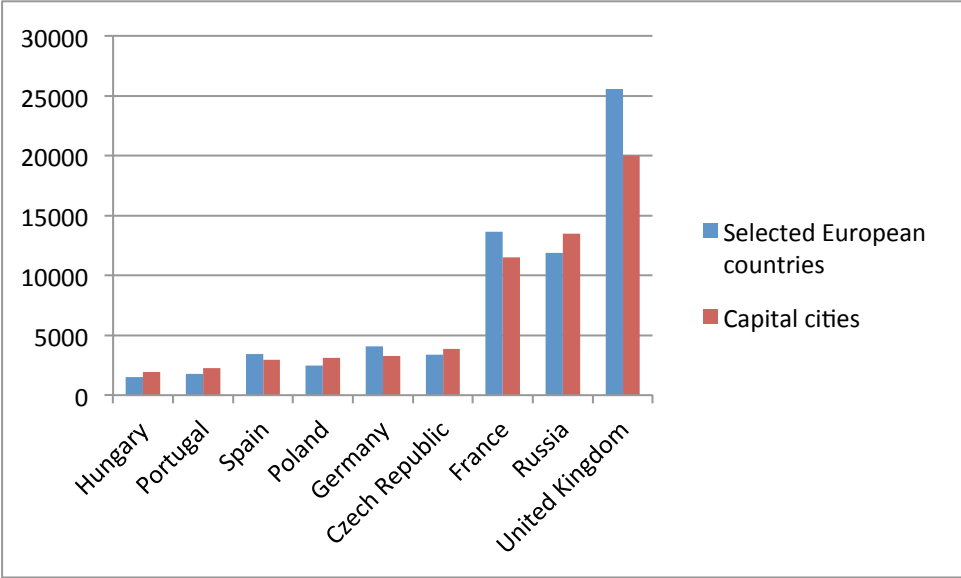
Source: Global Property Guide 2013, own calculations

Chart no. 7 – Difference between average prices of residential real estate in capital cities and national average in EUR/square meter (2013)
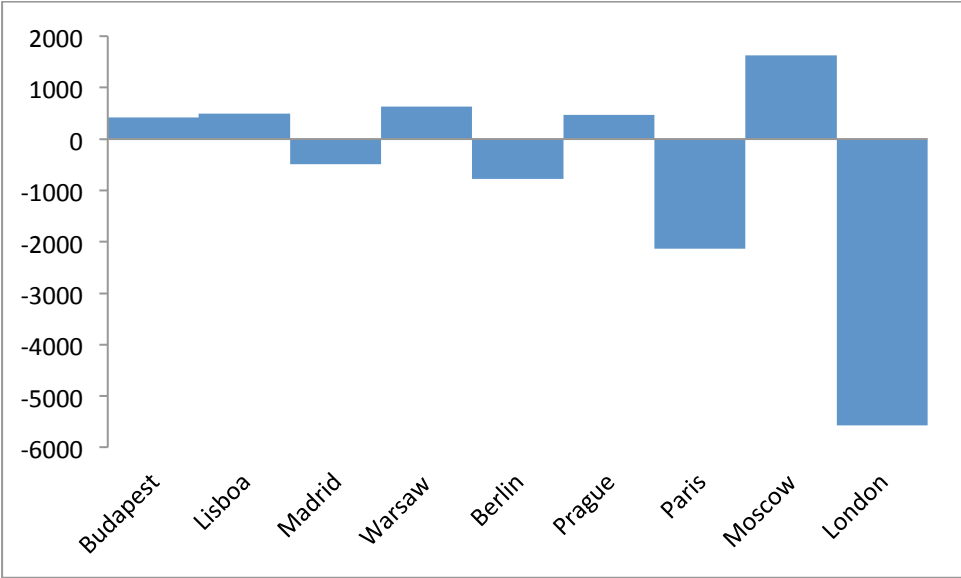
Source: Global Property Guide 2013, own calculations

4.1.3.   Availability of housing

Purchasing power of the population is different in various regions of the Czech Republic. Through the comparison of average price of the apartments and average wage can be obtained the approximate estimate of how long it would be necessary to "wait" for buying an apartment. This consideration is of course a very rough, because over the years, housing prices will change and it is also practically impossible to put off the whole monthly salary, because of living reasons. Therefore, the calculated ratio has really only technical character without significant economical and analytical implementation.

The table below shows the number of years that would have to incur at an annual average nominal wage (as twelve times the average monthly nominal wage according to data of CZSO for the year 2013) for the apartment at 60 square meters (price was calculated by the average price for square meter multiplied by 60).

Table no. 1 – Number of years necessary to purchase an apartment in CR and Prague

Region	Number of years necessary to purchase an apartment
Czech Republic	7.7
Prague	12.8

Source: CZSO 2014, own calculations

According the above assumptions, the households in the Czech Republic take about 7.7 years to save enough money to buy an apartment at average price in condition that they would be able to put off the amount that corresponds with average gross monthly wage multiplied by twelve every year.

Due to enormous differences of prices in Prague with the national average, households would wait 12.8 years to buy an apartment in the capital city. Even through average salary in Prague is higher (CZK 31 956,- in first quarter of 2013), the average price of CZK 54.300,- per square meter is extreme.

4.2. Correlation analysis

As a method to determine the relationships between the two variables was chosen correlation analysis. Correlation coefficients are used to express the closeness of relationships. The rate of direct linear relationship is expressed by a coefficient of correlation with the values raging in the interval <-1;1>. Value 1 represents the highest dependency of compared sets of values. Wherewith indirect dependency coefficients are closer to -1 and value -1 corresponds to a completely indirect linear dependence of two variables. The following table describes intervals of correlation coefficients in detail.

Table no. 2 – Correlation coefficients dependency

| The absolute value of r	Tightness of dependence	Type of dependence
-1	Perfect Negative	Fixed negative dependence
-0.99 – -0.9	Very High Negative	Indirect dependence
-0.9 – -0.7	High Negative	
-0.7 – -0.5	Great Negative	
-0.5 – -0.3	Moderate Negative	
-0.3 – 0	Low Negative	
0	Zero	Independence
0 – 0.3	Low Positive	Free dependence
0.3 – 0.5	Moderate Positive	
0.5 – 0.7	Great Positive	
0.7 – 0.9	High Positive	
0.9 – 0.99	Very High Positive	
1	Perfect Positive	Fixed positive dependence

Source: Own calculations

With the use of Microsoft Excel (function CORREL) are calculated values of correlation coefficients of individual indicators with real estate price.

4.2.1.   Inflation

Theories in chapter 3.3.2 (The impact of inflation on real estate prices) suggested that there is no direct dependence of inflation on real estate prices. Now, it can be demonstrated by correlation analysis.

Through data collection from CZSO, average annual inflation rate was calculated and correlated with annual HPI of Prague real estates. Correlation outcome came at -0.023776555, which is very close to zero dependence and therefore inflation rate has no effect on real estate prices.

Chart no. 8 – Relationship between inflation rate and HPI of residential real estate (data collected from 2005 to 2013)
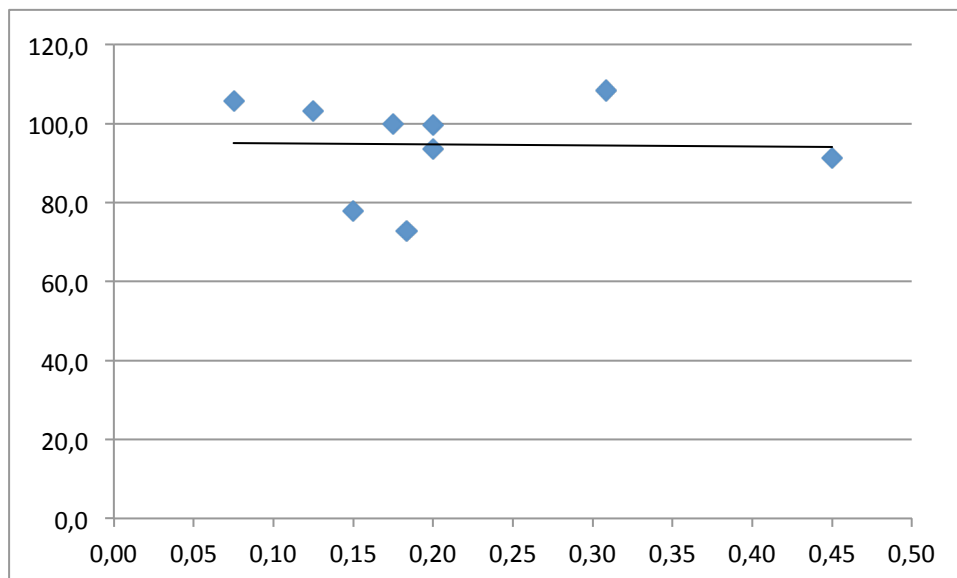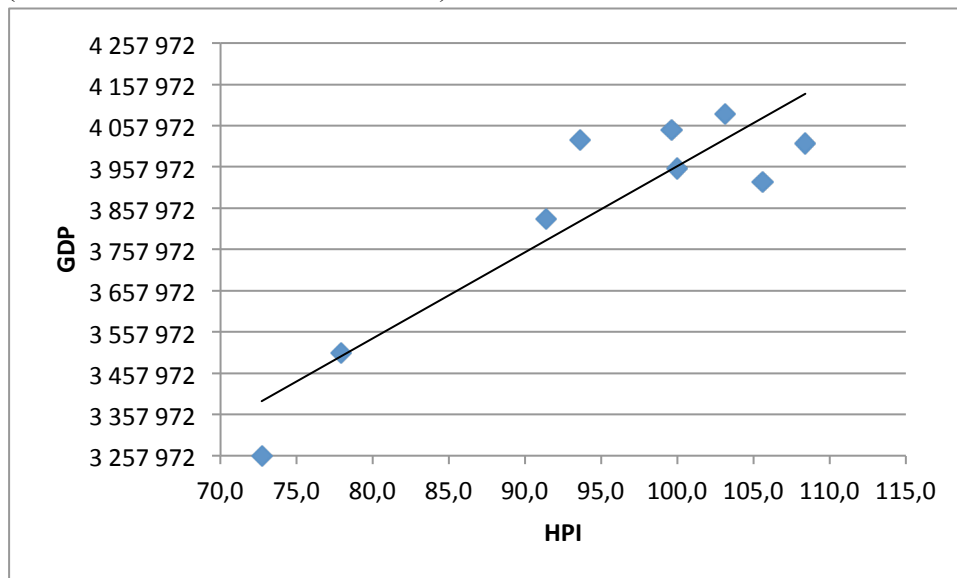

Source: CZSO 2014, own calculations

4.2.2. GDP

As mentioned many times before GDP should affect the real estate prices and backwards. Correlation between the GDP at purchaser prices and HPI of residential estate came out at 0.90938116, which is very hight dependence. Evidence of this relationship is shown in chart no. 8. Trend line of scatter plot confirms high positive correlation.

Chart no. 9 – Relationship between GDP at purchaser prices and HPI of residential real estate (data collected from 2005 to 2013)
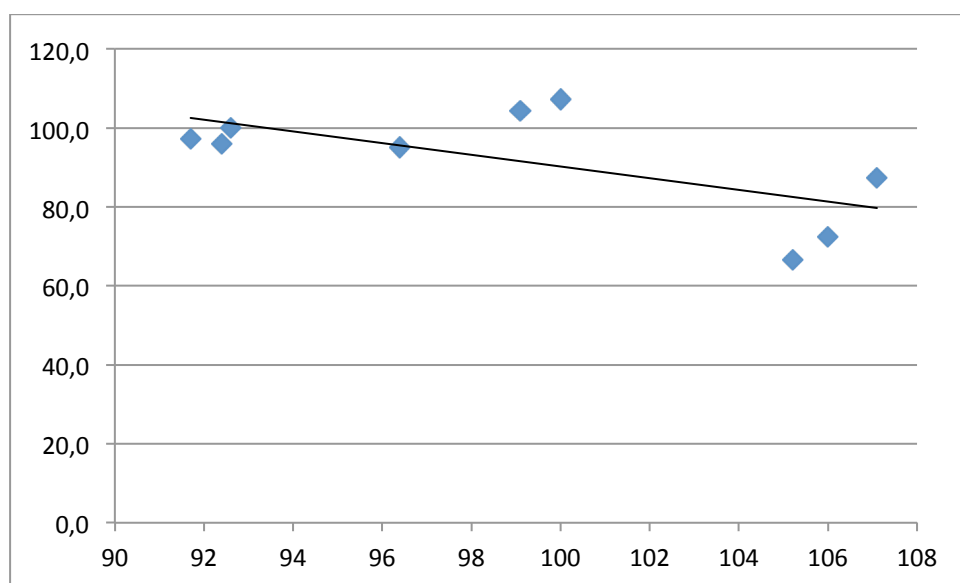

Source: CZSO 2014, own calculations

4.2.3. Construction work

Construction output ratio correlated with HPI of residential real estate prices came out at - 0,64848, that shows great indirect dependence. This should be true, because as mentioned in chapter 3.4.1 price of the construction work influences newly build housing, that influences demand and demand influences price.

Chart no. 10 - Relationship between construction production (in %) and HPI of residential real estate (data collected from 2005 to 2013)
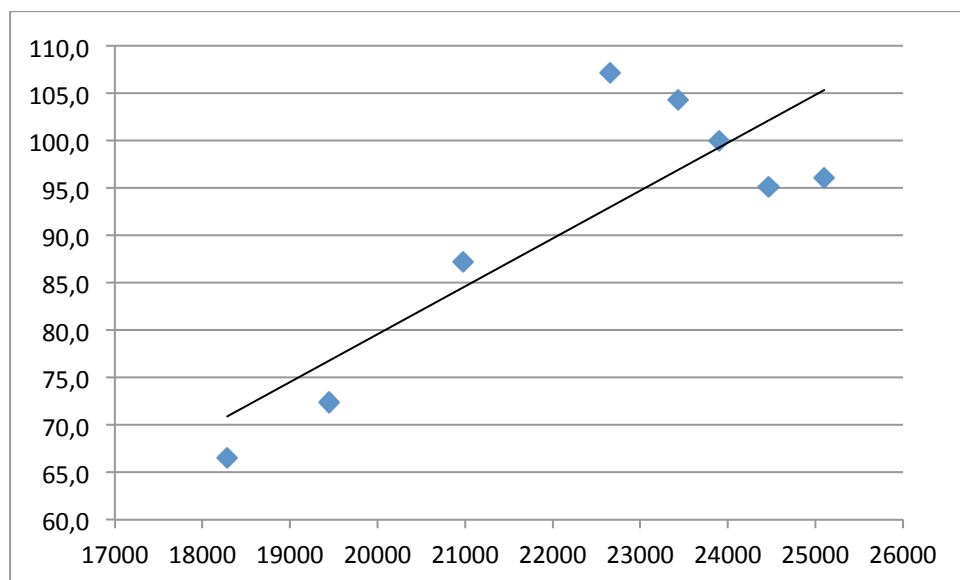

Source: CZSO 2014, own calculations

4.2.4.　　Wage income

Wage income is an important factor affecting demand for real estate (see chapter 3.2.4.2.). Correlation between average gross monthly wage per one employee in CZK and price of residential real estate in Czech Republic came out at 0.843857915 – high dependence.

Chart no. 11 – Relationship of average gross monthly wage per employee (CZK) and HPI of residential real estate (data collected from 2005 to 2012)
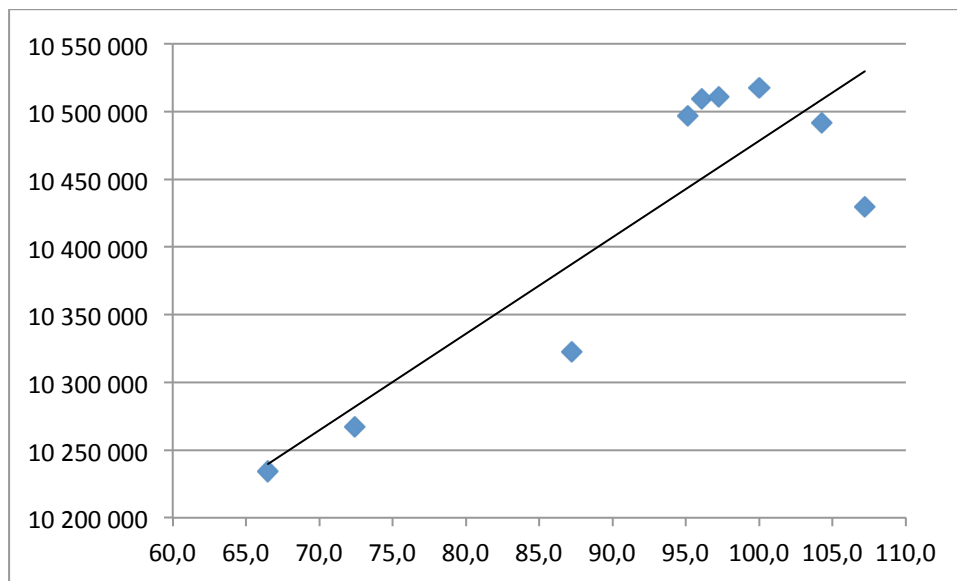

Source: CZSO 2014, own calculations

4.2.5.   Population

Another factor influencing demand for real estates is population. High dependence of 0,87060594 is shown on a scatter plot and it is very similar to wage income, so it can be assumed that population and wage income have very high dependence.

Chart no. 12 – Relationship of mid-year population in Czech Republic and HPI of residential real estate (data collected from 2005 to 2013)
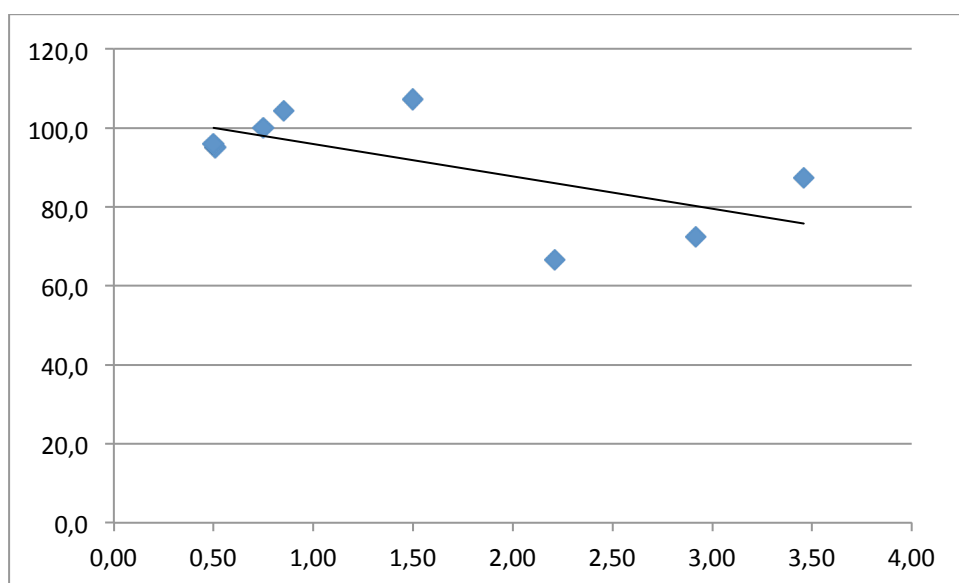

Source: CZSO 2014, own calculations

4.2.6.   Interest rates

Correlation output of -0,63819 shows that there is great indirect dependence of interest rates on real estate price. But at the same time, correlation coefficient shows the same values as construction work. Thus it can be confirmed that new constructions depends on those rates, it is due the fact that developers are using side recources as banks and fund to gather money.

Chart no. 13 – Relationship of average annual interest rates (in %) established by CNB and HPI of residential real estate (data collected from 2005 to 2013)
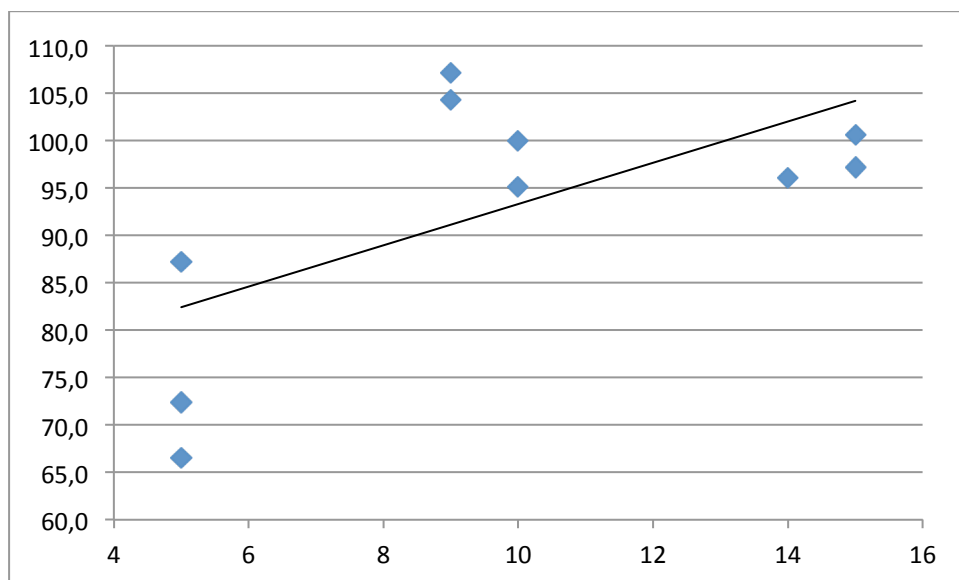

Source: kurzy.cz 2014, own calculations

4.2.7.   VAT

The last of the selected factors that is affecting the real estate price is VAT. Great dependence of 0,643461 was calculated at reduced VAT rate and moderate dependence of 0,383264 at standart VAT rate.

Chart no. 14 – Relationship of reduced VAT rate (in %) and HPI of residential real estate (data collected from 2005 to 2014)

Source: kurzy.cz 2014, own calculations

Chart no. 15 – Relationship of standard VAT rate (in %) and HPI of residential real estate (data collected from 2005 to 2014)

Source: kurzy.cz 2014, own calculations

4.2.8.   Correlation summary
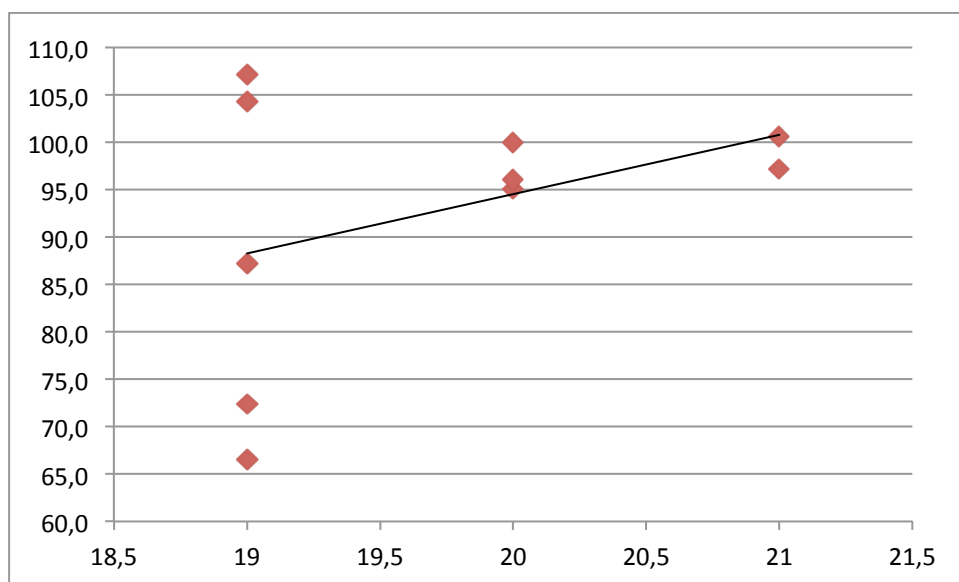
Correlation analysis confirmed some of the previous theories, but also conducted the relationships between real estate prices and other indicators. GDP is the first factor that has very high dependence with calculated prices followed by population and gross wage income and VAT. Although construction work and interest rates influences price of real estate market indirectly, an interesting relation between those two factors appeared. Disappointing result of correlation between inflation and real estate prices occur. Even that inflation should affect any goods same as GDP, the data were collected only in recent years and the changes were so small that they were not expressed in real estate prices. Another interesting relation was suggested, population and wage income should depend on each other in some matter.

4.3.   Regression analysis

Further investigation of the relationship between GDP and real estate prices is accomplished by the use of data analysis function in EXCEL "Regression". Table below shows the summary output.

Table no. 2 – Regression analysis of GDP and real estate prices in Czech Republic from 2005 to 2013

OUTPUT

Regression Statistics					
Multiple R	0,90938116				
R Square	0,826974094				
Adjusted R Square	0,802256107				
Standard Error	5,463237947				
Observations	9				
ANOVA					
	df	SS	MS	F	Significance F
Regression	1	998,571218	998,571218	33,45636948	0,000674382
Residual	7	208,928782	29,84696886		
Total	8	1207,5			
	Coefficients	Standard Error	t Stat	P-value	
Intercept	- 57,79802654	26,42763868	- 2,187029543	0,064963023	
GDP Variable	3,96166E-05	6,84917E-06	5,78414812	0,000674382	

Source: CZSO 2014, own calculation

R Square equals 0,827, which is high dependence. 83% of the variation in real estate price is explained by GDP variable. Significance F is less than 0.05, which means that the results are reliable. All P-values should be below 0.05, but 0.06 is also accessible.

The regression line is:

$$Y \text{ (Price)} = -57.798 + 3.962 * GDP$$

The equation above indicates that for each unit of price, GDP grows by 3.962.

5. Conclusion

The theoretical framework based on the research of specialized books, scientific magazines and Internet sources listed in Literature chapter describes the basics of real estate topic and examines the market from economic, macroeconomics and financial scope.

In the first chapter of theoretical part main characters of real estate are described to understand the concept of real estate. Economic principles show different approaches on real estate market and describe influences of supply and demand under specific factors.

Macroeconomics chapter deals with selected indicators and explains them. Charts are added for better understanding. House Price Index is explained in order to apply this index in practical part. GDP and inflation as the most known macroeconomic indicators are evaluated.

Financial scope include price of the construction work and VAT in 2014. Price of the construction work is another important index allied with the price of real estate and is explained in the chapter. As the following chapter was chosen VAT in 2014, because of how the changes in 2014 affect the price of real estate.

Practical part graphically compares average prices of residential real estates in Prague with national average. Then it describes development of realized and expected prices of real estates in recent years and results are compared with selected European countries and their capital cities.

Referring to the theoretical part inflation rate, GDP, price of the construction work, population, wage income, interest rate and VAT indicators are selected and correlation analysis is performed between those indicators and the price of real estates. Results are explained and charts are included for the better vision.

Regression analyse is used within the GDP as a major indicator depended on price of real estate and results are described in detail.

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