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The Evolution of Prague Real Estate Market after 1989

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Declaration of Authorship

The author hereby declares that he compiled this thesis independently, using only the listed resources and literature.

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Abstract

This thesis describes on one hand the evolution of the real estate market in The Czech Republic and more specifically in Prague after the Velvet revolution in 1989 - the creation of new institutional and legislative environment.

On the other hand this thesis focuses on the data of the first decade of the 21st century to try and detect the symptoms that should have alarmed the society, banks and investors of the upcoming burst of the bubble as a consequence of the global financial crisis in 2008.

Finally we are going to setup a simple econometric model which would partly describe the influence of some factors on the price of real estate.

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Abstrakt

Tato bakalářská práce zkoumá na jedné straně vývoj nemovitostního trhu v České republice a blíže v Praze od sametové revoluce - vznik nového institucionálně právního prostředí.

Z druhé strany se tato bakalářská práce, skrze pohled na data z posledního desetiletí, snaží odhalit znamení, která měla varovat společnost, banky a investory před kolapsem cenové bubliny v důsledku globální finanční krize.

Na konec sestavíme jednoduchý ekonometrický model, který popisuje vliv některých z faktorů na vývoj ceny nemovitostí.

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Contents

Chapter 1

Introduction

It has been 20 years now that the centralized Communist economy failed. Since then, from every aspect the different markets have been undergoing a transformation towards more capitalist market economies. The real estate market is no exception.

In chapter 2, we will more generally introduce real estate economics, defining the typical market structure and the specificities.

Then in chapter 3 we discuss the major institutional changes and new laws creating a new environment which is an important condition for the market to function.

Ownership of this kind of commodity is quite tricky to record. In section 3.1. we will go through most of the former methods of evidence of real estate ownership, rights and obligations to get to describe today's system.

When we talk about ownership we need to define the different forms of ownership, which we do in section 3.2.

Restitution and privatization processes were (and still are) a very important part of that economic transformation. In section 3.3. are defined all the laws that were meant to guide this process and the issues applying them.

After pointing out the problems with rent regulation and the creation of new financing possibilities at the end of chapter 3 we will present the actual market and its behavior since 1989. Describing the progressively steeper rise of the real estate prices we will finally get to summer of 2008 : the beginning of the end? In section 4.6. we analyze the most notable causes and consequences of the "crisis".

Last but not least we present a tentative model showing the different interactions between macroeconomic indicators and legislative changes and the price of real estate.

Chapter 2

Real estate economics

Real estate economics is an application of economic theories upon the real estate markets. We first give an overview of this cross-sectional science before describing the actual market in Prague, Czech Republic.

2.1 The actors

Any free real estate market is forged by supply and demand. Nevertheless the conditions on the market are created by legislation. The market with properties is quite slow in adjusting, because the "product" isn't quite as liquid as would other smaller goods or services be. On the other hand, the rental market is very well and fast adapting with the rents reflecting the preferences of location and time. Which provides us a useful tool, since the rent is the precise return on investment of the unit or building. Using a profit-based calculation of the value of the building we can precisely define the market value of the house or apartment. Other methods for value determination would require to take into consideration many different factors ranging from location and size, through quality up to the level of deterioration and individual preferences, making it almost impossible in such a heterogeneous market, since there aren't two same units on the whole market.

2.2 Definitions

First, lets define the environment and the goods we will be describing: As already stated above, this market can be considered from two points of view closely related to each other which we discuss in 2.2.1. and 2.2.2. .

2.2.1 Real estate as a durable good

One would be considering the purchase/sale prices of units, regarding the units as durable goods, value keepers. This is due to relatively high transaction costs (in the form of transfer taxes, legal fees and realtor's provisions or expenditures to find the product or the buyer) and also due to the actual time needed for the transaction. Buying an apartment simply takes longer than buying an apple or even than signing an insurance contract. Furthermore as the name of real estate (immobilier, nemovitost, Immobolie) indicates in certain languages, the main characteristic of real estate is that it cannot be moved, it is locally fixed. This implies some restrictions to this market. The consumer (or investor) cannot buy a house in the suburbs and move it to the center or acquire a countryside residence and move that to the shore. This sounds so obvious that most people don't take this into consideration, but this puts a lot of weight on the locality when choosing or pricing a property. Obviously individual preferences here play a strong role. A very trivial example could be that a young, working person would probably prefer living in the city center compromising the size of its unit; on the other hand a family with small children will be more willing to bear longer distances from the suburbs in exchange for a larger house with garden. It is not for nothing that in real estate they say Location! Location! Location! (just as Stalin used to say about learning).

2.2.2 Real estate as a consumption good

The other point of view would be from the rental-market side, considering the rent as a fee for the housing services provided by that unit. This market is way more vivid, quicker adjusting and therefore reflects better the market situation. Let's remind that high mobility; easy information exchanges and low transaction costs are the main condition for a market to be closer to the perfect competition model. This market is so fluid due to its basic characteristics: if a client is looking to rent an apartment (or commercial unit) he simply chooses one of many agencies and for a relatively small fee (usually the equivalent of one month rent) is introduced to the market (basically one could say he buys the necessary information for the equivalent of one month rent) and with no further transaction costs or delays can sign the lease contract and finalize the deal. Most contracts, even if fixed for a certain time span have an article that defines the tenant's right to resign the contract (with a usual 3 month notice period). So in some way if the tenant isn't satisfied or for whatever reason he

wants to move out then there is nothing that could stop him. On the other hand the landlord has the right to terminate the lease for objective reasons (non-paid rent, abuse of the unit, unauthorized sublet, etc.). One can state that this market shows perfectly its preferences, since a unit being offered for rent for a higher than acceptable fee will stay vacant, which will force the landlord to lower the rent to let the apartment. Therefore the market is always very close to the actual equilibrium.

2.2.3 Stock/Flow market

This second characteristic (discussed in 2.2.2.) defines it as a consumption good, one pays for taking advantage of the services (housing, commercial or production). In the case of ownership of real estate the buyer can either consider it as a pure investment (with a goal to earn some return on his investment) or combine both consumption and investment, by using (by living in it or using it as a base for his commerce or production) the acquired property. These two proprieties of the good define also the market. As we already said, real estate by nature is immobile and long lasting (most buildings will last for centuries and land is practically eternal). This leads to the fact that the amount of those units on the market deteriorates only very slowly, and so do come new units on the market, therefore we should consider it as a stock/flow market. The given stock represents a strong majority on the market whereas the flow is the outflow of the few abolished and the inflow of the few newly constructed buildings.

2.3 The Market

Now as any market the price is defined by the interaction between supply and demand. In more depth supply and demand reply to certain factors themselves. Consequently, let us consider which these might be in order to know what to expect in chapter 5 when building the tentative model.

2.3.1 Factors influencing demand

First, let's try to determine which factors will influence the demand for housing or commercial units.

Population   In housing the key factor is the population, or more precisely the growth rate of the local population (either from immigration or from more births). The more people come to work/live in a locality the higher the demand for housing will be.

Income   The demand will be similarly influenced by the available income of households. Naturally if the disposable income is higher then people are more able to satisfy their housing needs.

General economic growth   Analogically in commercial units the demand for units is strongly correlated with the general bloom of the economy, since a rise in consumption fuels commerce and the industry which will need to expand.

Price   The market price of the units obviously influences the demand. As most normal goods, real estate demand is negatively correlated to price.

Financing cost   The conditions (interest rates, readiness if financial institutions to grant loans or mortgages) affect the buying power of the population.

2.3.2   Factors influencing supply

Now let's define what implies changes in supply of real estate.

Construction   One of the two main sources of supply on the market is the construction of new units. One can either follow the number of engaged construction and expect their effect in the future when terminated (mostly one to three years later) or take in account the terminated constructions that will affect the market directly. This being very vague since most of the developers start selling even before beginning to build. Furthermore input prices like cost of land, labor, construction materials or cost of money (interest rates, subventions...) do influence the developer's motivation to build as well as the expected selling price.

Moving   The second source of supply on the market are the units that are being sold by the actual owners (or on the rental market those that come back on the market because the tenants move out). On the other hand, these people, when selling a unit they were using they appear on the demand side (as buyer

or looking for a new lease) if we omit those emigrating. Nevertheless, there is more to the motives of people moving out than pure changes in preferences or migration. Growing interest rates (making the mortgage unaffordable), rising rents or changes on the employment market influencing their income (up or down).

2.4   Chapter summary

In a nutshell it is important to retain that the real estate market is very much dependent on the legal and institutional structure of the environment. Transaction costs are naturally higher than when selling apples or bread, nevertheless the local fiscal policy does have a big effect on the final transaction costs. Another important part of the institutional setting is the lending policy of the local financial institutions and eventually state subsidiaries supporting the buyers. One must keep in mind that the number of factors influencing the preferences (thus prices) on this market are many more.

Chapter 3

Institutional changes and legislative environment

In this chapter we analyze how the different new laws and acts, creating new institutions and methods, created a new environment for the new market.

3.1 Recording real estate ownership

In this section we shortly go through the different institutions and systems recording real estate transactions and ownership. Historically showing the evolution of the system, then pointing at the Communist who interrupted all further evolution for over 40 years and finally get to describe the actual working system.

3.1.1 Pre-WWII systems

The history of some evidence of land-ownership dates back to the 14th century. By then some aristocrats used to register their properties in the Land Rolls, which were originally meant to hold record of juristic conflicts. Later by 1650, mainly for tax reasons a new rustical cadastre was setup, which was the predecessor of the current one. In 1757 the Teresian cadastre was the first to record all properties. The Emperor's Patent n. 946 SB.z.s. from the 01.06.1811 defined that constructions were inseparable of the land it was built on: *superficies solo cedit*. From 23.12.1817 the Austrian Emperor Franz 1st defined a new way to record properties; new maps have been drawn in the 1:2880 scale which was specified by the requirement that 1Fathom was to be presented by 1 square inch. More that 70% of today's cadastral maps are based on those

maps. After WWI, from 16.12.1927 the new law 177/1927 Coll. put in place the land cadastre which was more and more an inseparable part of any transaction from a legal point of view and it's first tax vocation became secondary. From that moment on any change in ownership or nature of a parcel or building was neatly registered in the Cadastre. A obligation of mutual announcement between the cadastre and the local offices for construction was the guaranty that the books actually matched the real state. The same law also made the cadastre publicly accessible, and was crucial to any legal matters of real estate transactions. This cadastre was precise and up to date until 1938. After WWII the combination of war confiscations and the process of distribution started to seriously alter the content from the actual status. Nevertheless it was only in 1971 that this cadastre was abolished.

3.1.2 Communist destruction

The chaos started with the law 141/1950 Coll., which denied the centuries-old roman-law convention that construction and land are one, stating that ownership of the parcel and ownership of the building standing on it is separate. It became even worse when the Communist government decided to put more attention to who was using the property rather than the owner. By 1956 the old cadastre was systematically (based on the law No. 192 from the 25.01.1956) ignored and private ownership rights were practically lost.

In 1964 the Civil Code No. 40/1964 Coll. defined a new way of registering property transactions. For a contract to be legal it was necessary to register it at a public notary. Property transfer was complete with the registration of the contract. But there was no record where those transactions would be registered so the only way to prove your property was to present the original (or a certified copy) of the registered contract or the simple property sheet, which lead to fraud, since someone faking a property sheet could sell a property that didn't belong to him in the first place. This lax approach was profitable to the local politicians redistributing properties as they felt creating a disproportion in the distribution.

3.1.3 Situation in 1989

So "owning" an apartment or land was a very uncertain fact. Apartments were assigned following the needs of the citizens. The basically inexistent market created a distorted perception of the real value of real estate. Apartments

became tools to motivate young couples to found families (which often was a condition to have an apartment granted) or to get people to migrate to the unpopular borderlands. Furthermore, the Communist government protected some professions, which lead to construction of entire mining-settlements (as in Ostrava or Kladno). But since it was still people (mostly local politicians) who decided over those assignments there were notorious irregularities between the standard of the apartment people were living in and what they actually deserved. Obviously it was more of a political decision. Even after the velvet revolution the imperfect system setup by the Civil Code No. 40/1964 Coll. was in use for a short time, making any real estate investing a very risky affair.

3.1.4   Creation of a legally consistent cadastre

On January 1st 1993 the Civil Code No. 344/1992 Coll. became effective creating the new legally consistent cadastre, which has been in use since. It was meant to combine the function of the original "terrier" and the evidence of property. The transition from the old, imprecise and very often erroneous system to the new cadastre demanded a big effort in order to preserve the continuity of the system. Continuity was important, because the creation of a new system didn't mean that all former decisions and transactions would be lost. Information from pre-communist "terriers" and the numerous property transfers during the Communist era needed to be combined to try to define the original and legitimate owners of real estate. New offices representing the legally consistent cadastre were setup to emphasize the decentralization and accessibility of the new register. New laws (Act No. 265/1992 Coll. and No 359/1992 Coll.) defined new property rights and new geodetic principles and general guidelines for the new cadastre. Principles defining what should or should not be considered a single property. Guidelines on how to act in most common cases, whom to grant priority, which source to rely more on and finally whom to grant the property.

3.1.5   Acquisition process

The new cadastre became reliable and precise. Still at the beginning it wasn't easy to acquire real estate. For common people the process seemed complicated and confusing. On top of that, because of the cadastre still being in its preliminary stage with a tremendous backlog of information pending, the delays could be as long as twelve months. The process for the buying and selling party isn't

too complicated, once the purchase contract signed in front of a state notary, at least three copies of the contract (one to stay in the cadastral archive and one for each party of the contract) are submitted to the cadastre for the change in ownership. Once approved by the cadastre the parties receive their respective copies to confirm the transaction. Concerning the payment, usually once the contract signed, the buying party wires the money to an escrow account (often the notary's or a lawyer's one), where the money is held until the cadastre's approval or handed back in case the cadastre rejects the transaction. This step involves some transaction costs, which are not negligible since the deposit-fee can reach up to 5% of the purchase price. The cadastre's role in the transaction is to control whether the selling party is really the entitled owner or whether there isn't a third party concerned by that transaction. But, as the past has shown (as I have described in the restitution/privatization part) one can't always rely on the cadastre and the potential buyer must do it's own research as to the legitimacy of the selling party or the correctness of any past transaction. The delay for approval by the cadastre has rapidly shortened from twelve to two or three months.

Issues with errors in the restitution process   Unlike for example in Germany where the law about acquiring property is slightly different stating that if you purchased in good faith and the transfer is recorded in the cadastre, then nothing and no one can contest your owner's rights regarding the purchased property, in The Czech Republic the cadastre doesn't stand up for the absolute accuracy if its contents. For that reason, any potential buyer should investigate the history of that property, which for an experienced lawyer isn't too complicated since the cadastre archives (which are publicly accessible) all past contracts. Nevertheless for an uninformed party this can be quite tricky or at least involve some transaction costs for legal investigation.

3.2   Ownership

Ownership of real estate as is defined in the sections 123 to 151 of the civil code (No.40/1964 Coll.) states that the owner has the right to hold, use and enjoy the fruits and benefits of his property and make any use of it unless causing harm to a third party. Which in the case of real estate translates into the following rights : the owner can use the property (live in it, work in it, fabricate in it...), enjoy the benefits (lend the property for a reward, rent)

dispose with it (refine, divide, destroy, sell...) as long as he isn't creating any damage to third persons (neighbors, the state, other citizen in general).

3.2.1   Forms of ownership

At this point it's important to introduce the different forms of ownership as defined in the act No. 72/1994 Coll. :

Private ownership   The most common ownership would be personal or private ownership. This relates to any physical or corporate body owning a unit or a building, whether residential, commercial or industrial. In that case the buyer becomes the owner of the building or the unit (with corresponding shares in the common areas), and is recorded in the cadastre and on the property sheet as such. One of the owner's many rights is to divide the building into units (if this hasn't yet happened), or rent the units/building. In the case of purchasing a unit one of the many obligations is to pay real estate tax, as well as a certain sum into the building's own reparation fund (the last obviously doesn't apply in case the building hasn't been separated yet). Usually properties in this form of ownership have a relative highest value since they are clear of any obligations or conditions. This ownership form makes it the most liquid since the owner and the market are the only players. Transaction costs are reasonable but unavoidable : 3% (of the higher of either the realized price or the value of expert opinion) real estate transfer tax apply .Nevertheless one must not forget that profit from real estate sales is subject to income tax. But there is a exemption of that obligation, if the unit has been the main residence for at least two years after the acquisition date, or if the time between the purchase and the selling dates is longer than five years, then the profit made of the sale of the unit is exempt from the income tax. (Act No. 586/1992 Coll.).

Housing associations   Another form, that had its origin in the privatization process in the cases when the tenants couldn't afford buying their apartment and financial institutions didn't propose mortgages yet. In that case a housing association was founded, that would be granted a state-helped loan to buy the house. Tenants or in some way co-owners would then pay "rent", actually paying of their proportion of the whole building. In most cases once the whole loan has been paid back and the tenant has paid down his part, the housing association is canceled, the building is divided into units (according to acts

No.42/1992 Coll. and No. 72/1994 Coll.) and a transfer into private ownership to each co-owner is possible (this transfer/donation is exempt from either real estate transfer tax or donation tax following Act No. 357/1992 Coll.). Nevertheless, this form is way less liquid, one can sell its share in the housing association related to the unit. But the price achieved in such a sale is lower mainly for two reasons: one the very obvious one is that the unit is bound with the debt of the housing association, the sales price would be reduced by the appropriate share of not-yet repaid debt. The other factor lowering the price is the uncertainty as to when or if at all the units will ever be transferred into private ownership (all co-owners/share holders must agree). In general these factors, on top of the debt, account for 10 to 20%. Other specificities of this form of ownership worth to be mentioned are the following. Since one buys a share of the housing association, and not a real estate unit, one cannot use a mortgage to finance the purchase. Which is limiting since other types of loans are more expensive. In the same problematic one must consider also the fact that for loans this high (often when over CZK 100.000,-) the bank asks for a security in form of a collateral on a real estate. In the case of the housing association ownership one cannot use this property (since one doesn't acquire the property but a share of the association) and needs to charge another property with the collateral. For the same reason, that one doesn't own the unit, one cannot rent the property to a third person without the consent of the housing association. Which isn't always easy. On the other hand, we should mention the fact that in case you want to sell that apartment (the share corresponding to your unit), it is quite simpler, since you only fill in a specially designed form to transfer your share. On top of that no real estate transfer tax is applied. The income tax exemptions are the same as for the before mentioned personal ownership.

State ownership State or municipalities have a private ownership form like in paragraph 3.2.1 but must follow very strict rules described in laws No. 211/2000 Coll. (State Housing Development Fund) and Government Decree No. 481/2000 Coll. (defining the use of the resources of the State Housing Development Fond).

3.2.2 Ownership, rights and obligations

In this paper we talk about the market, which by definition is a place (or environment) for trade. When we say trade we say exchanging property (in our case for money). It might sound trivial, but the state needs to define the rights and obligations of an owner and protect those. Obviously as in any democracy all those activities of the owner must respect certain rules, more generally speaking, laws.

Property transfer   (selling, donating or inheriting) is subject to the sections 588 to 630 of the civil code, as will be developed more in 3.4. for the selling/purchasing part.

Rental contracts   are subject to the sections 663 to 723 of the civil code. Let us state only a couple of the principles which will be of interest for defining the market situation.
- through the rental contract the owner lets to the tenant the right to use the property as defined in the contract.
- rights of the owner : step out of the contract if the tenant doesn't respect the conditions given in it, or if an objective damage is caused to the owner by the use/abuse of the property by the tenant, the right to withhold the belongings of the tenant in case he owes rent and to get back the unit in the original condition (if not defined differently in the contract).
- the owner's duties include giving the unit in the state and maintaining it in the condition as it was agreed on in the contract.
- the rights of the tenant : to re-lease the unit (if not prohibited by the contract), to ask the owner to maintain the unit in the condition defined in the contract, to ask for an adequate reduction of the contractual rent if he was unable to use the unit as defined in the contract or ask compensation for expenses for any changes made to the unit with the agreement of the landlord, to step out of the contract in case the unit changes owner.
- the tenant's duties are among others to pay the contractual rent on time, to use the unit without causing damage, ask for permission when making changes in the unit, hand the unit back as defined in the contract.
- the height of the rent is defined in the contract as landlord and tenant agree.
- lease termination happens after the date defined in the contract. The lease is prolonged automatically (usually for one year) unless the landlord explicitly

asks to clear the unit. The lease terminates with the destruction of the unit, with the unit becoming unusable or by a court decision (in case one of the two parties sues the other for not respecting the rights and duties defined in the contract).

- usual conditions: rents in residential units are signed for one year with eventual options to renew the contract, the landlord has the right to take a caution in the maximal amount of 3 month rent, and has the obligation to give it back if everything is in order after the lease is terminated; the tenant has usually a 3 month notice period to step out of the contract.

3.3   Restitutions and Privatization

Soon it was clear that the excessive nationalization of real estate by the Communist regime had damaged the original owners in an unparalleled way. Furthermore, the state owned most of the countries properties, which is a situation barely viable in this newly born market economy. It was absolutely necessary to cure that situation in a suitable manner to match the property situation of the former owners. Therefore the government decided to start a process of restitution and privatization. There was a need to setup a process that would return the properties confiscated after 1948 to their legitimate owners (mostly inheritors of the original owners) on one hand, and to privatize part of the national real estate fund on the other hand.

3.3.1   Historical expropriations

During the war period (1938 - 1945) some properties were subject to forced expropriations, which were documented quite accurately and are naturally subject to a restitution process during which the original owner (or his heirs) has the right to claim his property. Still, these properties were already returned or are barred or were directly confiscated by the government in exile of Edvard Beneš. After WWII, during the period 1945 to 1948, Edvard Beneš, the president of the Czechoslovak Republic, by the means of the presidential decrees on confiscation of enemy's property (decree No. 108/1945 Coll.) confiscated any properties (ranging from residential units to whole production facilities) belonging to Germans, Hungarians or any other subject having collaborated or were involved with the occupation during WWII. Unlike often mistaken, these properties are not subject to restitution and were never restituted. A

couple other decrees prescribed the nationalization of the key industries, the food industries, the mines, banks and film industries, where compensations were granted only to those who proved that they have not been involved with the occupational forces. And even among those who could prove that, only few actually got any compensation, because the occupation and war had ruined most of the firms and the state actually had to bail them out.

3.3.2 Restitutions

After 1948, the Communist party ruling the country, following their policy of commune ownership, expropriated many other properties. But as already mentioned, they didn't document those acts with much precision. Which leads to huge inaccuracies nowadays as to who the rightful owner should be. Two main issues are still actual today. Both come from frauds, once committed by the office in charge of restitutions and on the other side frauds committed by individuals.

Fraud committed by the state office In the case, where a local politician decides to sell a property (often to relatives or for a certain "fee") under the market price, which was designed to be restituted. When the legitimate inheritor comes to claim its property, he needs to sue the act of purchase. If backed by enough evidence the court will declare the original act of sale as null and void, making all succeeding transactions invalid and gaining the ownership of that property. In which case the previous owner will claim reparations on the owner that sold him that property, creating a chain that will go back up to the municipality that originally sold that property. The chances for some compensation are real, but it never covers all of the money invested and lost.

Fake restitutions The other case: an individual claims the right to restitute a property based on fake documents, and (often with the "help" of some corruption or a "friend" in the state office) gains the ownership of that real estate, often selling it to a third party immediately. Then again the legitimate restitutor claims his real rights for that property, sues the sales act, wins and again all past transactions are declared invalid. The last owner can claim some compensation on the owner before him and so on up to the first owner, the one who committed the original fraud. Which will be judged to pay back the price he received selling the property that he had gained fraudulently. But in most

cases that person hasn't enough money anymore to payback anything. So all those that bought and resold the property in question will find themselves with empty hands.

3.3.3   Privatization

As already mentioned, for liquidity purposes and for economically beneficial reasons the state decided to privatize a significant part of their real estate in the *stricto sensus* of the meaning, transferring it to municipalities. The municipalities, closer to the actual population then decided upon selling those buildings / apartments to tenants or other legal bodies.

Motivation   Municipalities decided, motivated on their side to raise funding to keep in shape those buildings planed to stay in municipal ownership, to sell part of the real estate that wasn't defined for restitution, on two different levels. The first, following a certain logic, was to sell the apartments to those residing in them. Which on the other hand showed to not be so easy, since most of the tenants weren't disposing of enough liquidity to afford the purchase of the flat, and financial institutions weren't too eager to finance. On the other level, often concerning buildings where the first phase wasn't successful, the whole building was put out for sale.

The determination of a fair market price   was often tricky. A few different methods were used. Some biased by the fact that some affiliates demonstrated an interest in acquiring one or the other property, which then was sold strongly under value. The other factor biasing the determination of the selling prices was local politics. Local politicians claimed, that for social reasons the tenants had the right to acquire their flat for a preferred price. Fair enough, but where is the border between the reasonable reduction, and the point where the politicians were basically buying votes by almost giving away apartments? One has to keep in mind that those apartments were transferred to the municipalities from the state for them to dispose of that property in the best interest of the city. Whereas, selling the apartments or building so strongly undervalued was in the only personal interest of the politician to be reelected, which was basically robbing the municipality. Once this became too obvious, most municipalities prescribed a precise process using public or silent auctions, which aren't completely transparent either. This habit not only cost the mu-

nicipalities a lot on lost profit but deformed the market in a significant way.

3.4   The regulated/market rent conflict

Because before 1989 most apartments were assigned on a political base not respecting any professional or educational status, most residents did not inhabit an apartment they could actually afford paying for. After the fall of Communism, to avoid strong social problems, the decree of the Ministry of Finance No. 176/1993 Coll. set up a system of regulated rents.

3.4.1   Regulation of rents

That law froze the rent in apartments that were inhabited since the Communist time. This regulation was related both to the apartment and the tenant, but would lose action when the tenant would pass away or move out. The fact that this blocked rents in privately owned buildings basically meant that landlords were paying for the social policy of the new government by not having the right to claim their fair revenues. In a majority of cases the cost for keeping the building in shape (even in a very poor one) exceeded the rental income. Meaning that owning a building basically became a loss business. What looked like a temporary good solution, at least socially, turned out to be a nightmare from an economic point of view as well as from the social point of view. As market rents rose influenced by inflation and a general trend of prices rising to reach a European level, the gap between the rent paid in the same building in two similar apartments grew, reaching multiples. Not only did this devalue the building when estimated with a return based model, but it also created social tensions. Just imagine an elder women living alone (husband passed away, children moved out) in a 3-bedroom apartment in Prague 2, paying CZK 4 500,- /month. And on the same floor a 35 year old married man, hardworking, raising a child paying for an apartment of the same size CZK 35 000,- /month. Now, the behavior of the elder women is absolutely rational, for the rent she is paying now she wouldn't find even a studio, so she stays. Furthermore this distortion of the market strangled the offer on the rental market, artificially creating a high price, not only in the good locations but also in the closer suburbs.

3.4.2 Deregulation of rents

The Civil Code No. 107/2006 Coll. setting of the process of deregulation of residential rents, triggered a long expected loosening of the regulated rent, giving the right to landlords to rise the rent considerably every year following, nevertheless, strict rules. The plan to deregulate in four years has been changed to six years to end in 2012 instead of 2010. This being an interesting political move, because the popular speech explained that it would slow down the pace of increase but actually the outcome would be a completely free market after six years. This new law came into effect because of two pressures being applied upon the government. On one hand the residents of those regulated apartments not wanting to lose their privileges (and more than one deputy were residing in such apartments), and on the other hand the landowners suing the Czech government at the European court for lost profit. When the Polish won a similar lawsuit, the Czech government figured it was time to act. Truth is that it was late enough to settle that problem since the span between the regulated and market rents (that have been rising since the early 1990's) had grown huge. That law had two effects on the market. On one side it motivated investors to buy more real estate with the outlook of growing returns and therefore property values, but also tenants, who saw their rent rising considerably had at once a rational reason to buy the apartment they were living in (if it was offered for sale) or another apartment as the rent grew closer to the mortgage payment. On the other side people moving from expensive, high-end apartments in the city-center, to more affordable (smaller or in less exclusive locations) one, set those apartments free on the rental market, which fueled the supply and the market rents dropped slightly. So in the end the effect of deregulation was in both directions, not only did the regulated rent grow towards the market rent, but the market rent also dropped to find an average. In general this change is a step towards a market economy in good health. Two more years of deregulation are left now before completely abolishing this bias on the market by 2012.

3.5 Other specificities of the Czech market in the early 1990's

A very common use in established markets is the selling/purchase of a unit that is rented, and the rental contract is simply transferred or rewritten to the new owner. This fact doesn't influence the price. In fact if the unit is purchased as

an investment it might even have a positive effect on the value since the unit is yielding a return from the first month. Furthermore a unit which is occupied, as opposed to a unit vacant for a long time, doesn't age that fast because the tenant is taking care of it. In Prague on the other hand, for a long period of time buying a rented unit was unthinkable (even though it was legally possible). "The Mean Owner Sold The Flat With The Grandmother" or "Company Xxx Is Selling Apartments With People" were quite common headlines in serious newspapers not so long ago. Basically people didn't understand the difference between owning the unit and having the right (as a tenant) to use it. It was very common that people said they were "buying" an apartment when actually they were only signing a rental contract because there was a parallel market where tenants of regulated rent were selling their regulated contracts. Which, nevertheless wasn't how the laws defines it. Only in the case when a tenant is occupying the apartment in a building the selling party had obtained in a privatization or restitution process, a couple of restrictions apply: the current tenant has an option (lasting 6 months from the date he was offered the apartment) to buy the apartment before it is offered to a third person, so it's defined in act No. 72/1994 Coll. . After those 6 months the option is lost and the unit can be sold for market conditions to any qualified buyer for any price. The only true problem was that banks first didn't want to give mortgage loans on such type of acquisitions. For them if there was a tenant then they were unable to determine the value of the apartment and therefore to account for an appropriate collateral in case of need of a loan.

3.6 Financing real estate acquisitions

During the Communist times the philosophy was that nobody needed to buy anything since "everything belonged to everybody". In consequence it is not surprising that loans and credit were only little developed. People didn't know them. But it was essential to create at least the most basic instruments for people to be able to afford their own housing.

3.6.1 New financial products

Mortgages were new to Czech citizens as were most loans and credits. They were setup by the new banking law No. 84/1995 Coll. . At first, people disregarded those as a "capitalist evil" as they were taught by the former

Communist propaganda. With time the wide public came to accept this form of financing as they got to know it better. They were the first loans with the possibility to use the unit or building as collateral. The height of the collateral is estimated following act No. 150/1997 Coll. and is also the maximal possible loan. Today the environment for mortgages if defined by the law No. 190/2004 Coll. As any other credit, the applicant must prove the ability to pay the mortgage installment. Mortgages are available for residential purposes as well as for commercial or production spaces. Thanks to this new way to finance the purchase of real estate, the market even started to be functional. Until then, for most people it was impossible to afford buying an apartment or commercial real estate.

Building societies The acts No. 21/1992 Coll., No. 96/1993 Coll. and acts No. 586/1993 Coll., No. 83/1993 Coll. changed the banking law creating the possibility to found new financial institutions called building societies. The model is inspired by building societies from the Unite Kingdom, which date back to the 18th century. The principle is quite simple but clever. The main idea is similar to any savings bank with one main difference making them so interesting, the state would contribute 15% of your yearly savings (not exceeding CZK 3 000,- (or, before 2004, 25% not exceeding CZK 4 500,-)). After fulfilling a list of conditions, the member (the saver) could apply for a purpose loan (for obtaining your own housing) under very interesting circumstances. The most common conditions to fulfill were: being a member for at least two years (saving for at least two years), having saved at least 40% of the demanded loan and common credibility. By law the maximum margin of these societies would be 3 percentage points between the credit interest and the deposit interest guaranteeing that the society wouldn't take advantage of the state's subventions. What was new with this form of financing was that one could give as collateral a building (or unit) under construction. If the loan is not requested, then after the sum defined at the beginning of the saving is reached it can be paid out without any restrictions about the use of the money. This is another institution brining the purchase of property to a larger specter of public.

3.6.2 Subsidized mortgages

In 2001 and 2002 new laws No. 80/2001 Coll. And No. 249/2002 Coll. came into action financially supporting young (less than 36 years old) mortgage appli-

cants by paying part of the interest of the mortgage, reducing the interest rate by one percent point to very interesting 4% at one time. (Figure 3.1). Which made the own housing more affordable, Ministerstvo pro místní rozvoj ČR, (2008). This law was controversial in its writing because the subventions were limited to 10 years (which then put the creditor in front of higher cost) and wasn't flexible for changing financial institutions (one would lose that grant when changing the financial institution or refinancing the mortgage). Even though, it has definitely triggered demand on the housing market. Therefore, one would expect this to be an influence in the upwards trend on prices.

Figure 3.1: Interest rates 2004-2009
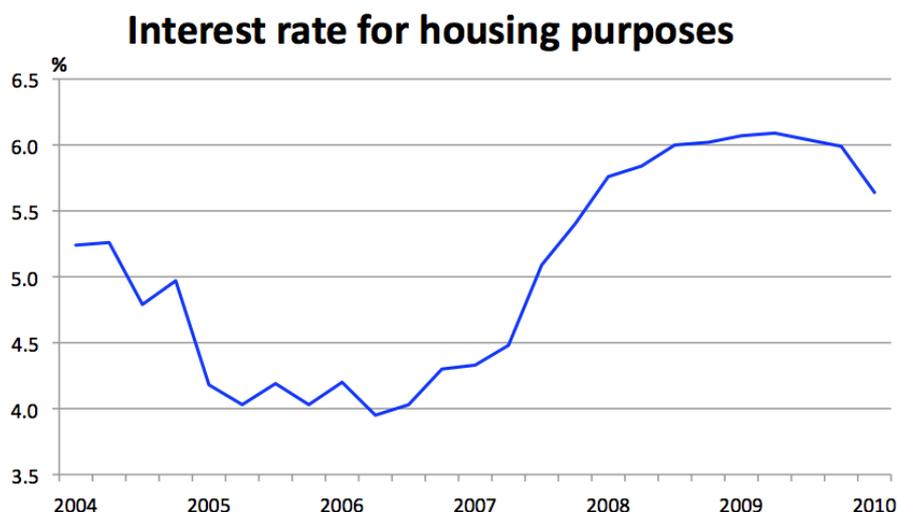
Chapter 4

The market situation from 1995 to 2008

4.1 First real transactions on the new market

When the first properties were restituted most of the owners tried to sell them. The question was the price to ask for such a property. Most of those who found themselves owning a property had no idea of the real value, or even what to base it on. So most landlords tried to compare their property to similar properties in "comparable" cities, like Vienna or Munich leading to very high expectations. Based on those expectations we are going to call these the expected prices. Obviously in this new economy with still very poor legal backing and a quite uncertain and young political situation the risks related to investing into real estate were considerable. In the same time the demand wasn't booming either. For two reasons, most of the Czech residents had lost most of their wealth during the last four decades and foreign investors were afraid to invest in this new economy. The combination of these facts pushed the prices down in a significant way.

4.2 Initial growth

Together with new laws establishing a more reliable background for owning property and an increase in trust into the local government grew also the confidence of investors (local and foreign) in buying property in Prague. After the first exaggerated price expectations have calmed down the demand and offer on the market soon stabilized and a slowly growing attention in acquiring build-

ings, apartments and land triggered a reasonably steep but constant growth of property prices. As we can see in Figure 4.1. The two different periods of rise from 2001 to 2003 and from 2004 to 2008 were respectively caused by an expected rise in prices with the entrance to the EU and by a general economical growth. The small period of slower growth after 2003 was an adjustment from the excessive expectations of the entrance to the UE. As we can notice in this graph the prices have been rising since 1999 until 2005 in a pretty constant way. What is noticeable too is the fact that the seller's expected prices are above the realized prices but not excessively; one could say that the market was established.

Figure 4.1: Realized vs. Expected Prices after 1999
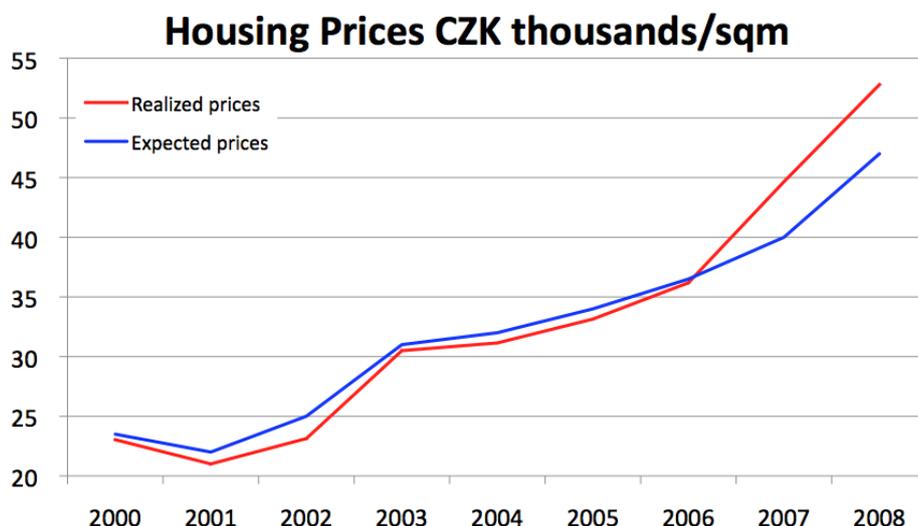
4.3   Speculations

Those effects combined set an environment of fast growing property prices. Which attracted speculative investors expecting high profits on a short run. In Figure 4.2 we can notice that around that period the realized buying prices start to exceed the seller's demanded price, which is a sign of buyers overpaying each other to acquire real estate believing in an even steeper climb of prices.

Figure 4.2: Realized vs. Expected Prices before crisis

Expected and realized prices on the market
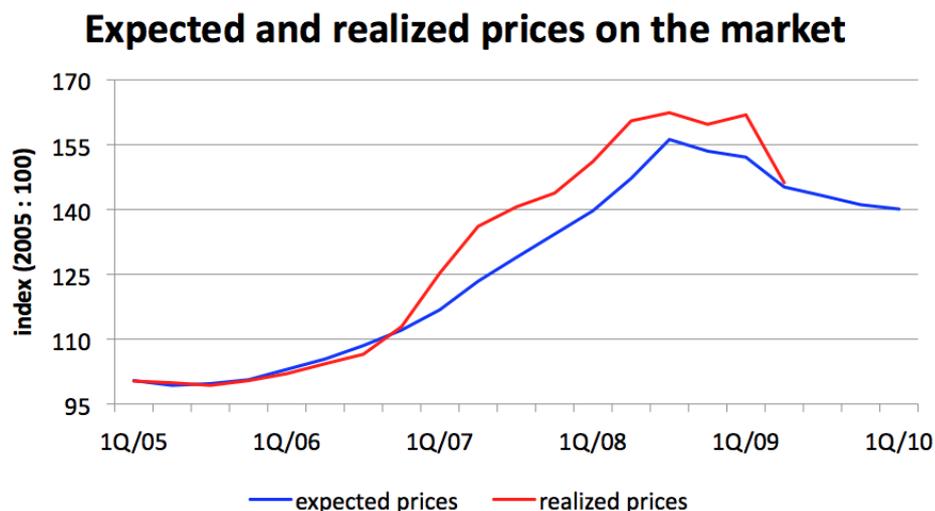
Speculative buyers weren't the only ones interested in that rapid growth. Developers started to build tremendous amounts of residential buildings, in the city-center or the outskirts, average priced or luxury standards. We can state that based upon the graph (Figure 4.6) showing the number of completed units per year later in this paper and in Figure 4.3, a graph depicting the rise in the construction business revenues.

Figure 4.3: Construction business revenue

Annual gross revenue of construction sector in Czech Republic
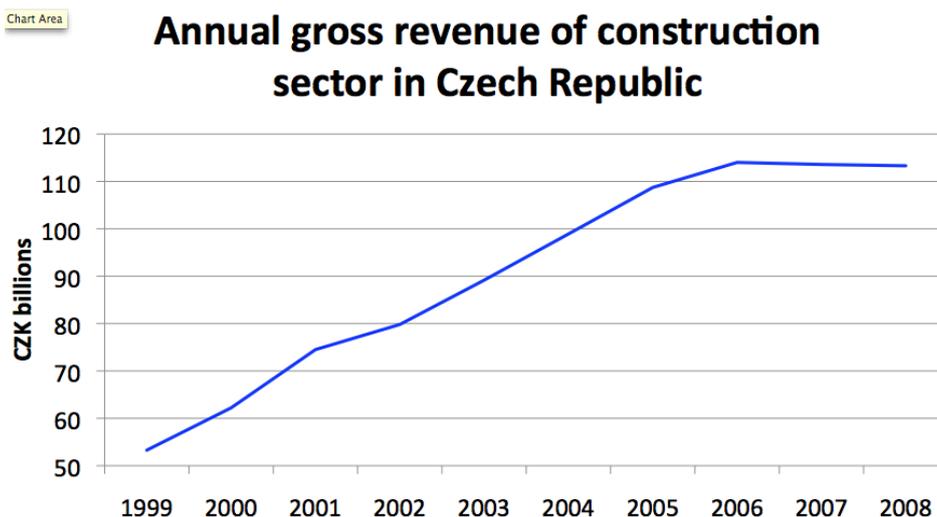
4.4   Impact on the economy

All those effects above had an impact on all industries. Construction business bloomed; banks gave out more mortgages to individual buyers (Figure 4.4) and more loans to developers than ever before.

Figure 4.4: Mortgage boom

Cumulated credits to residents for housing
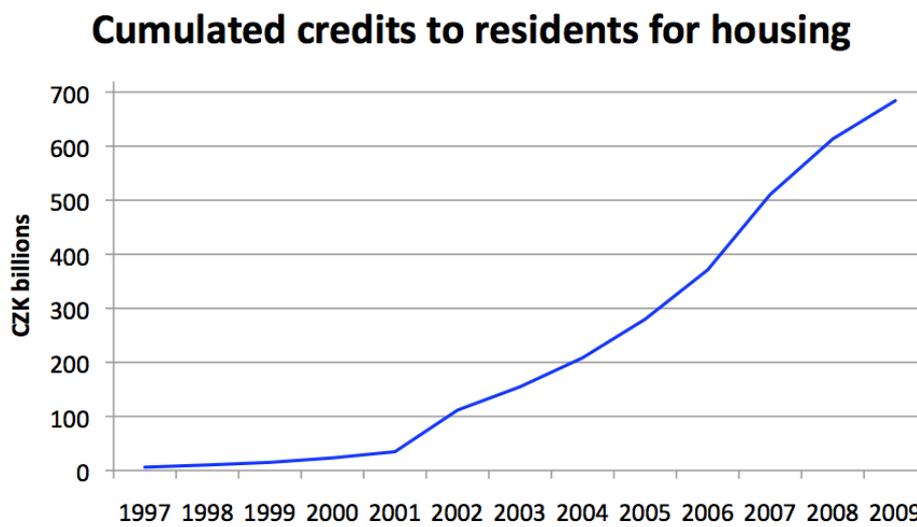
The general economy growth made Prague an even more interesting city to work in, and attracted workers from all over the country and even some from abroad. All those "immigrants" (Figure4.5), who have traditionally converged to the capital and were coming in even bigger numbers now, had obviously to live somewhere, to rent or buy an apartment, which nourished even more the demand against the fast growing offer and maintained the pace of the property price growth.

Figure 4.5: Prague's change in population and migration

Prague population and migration
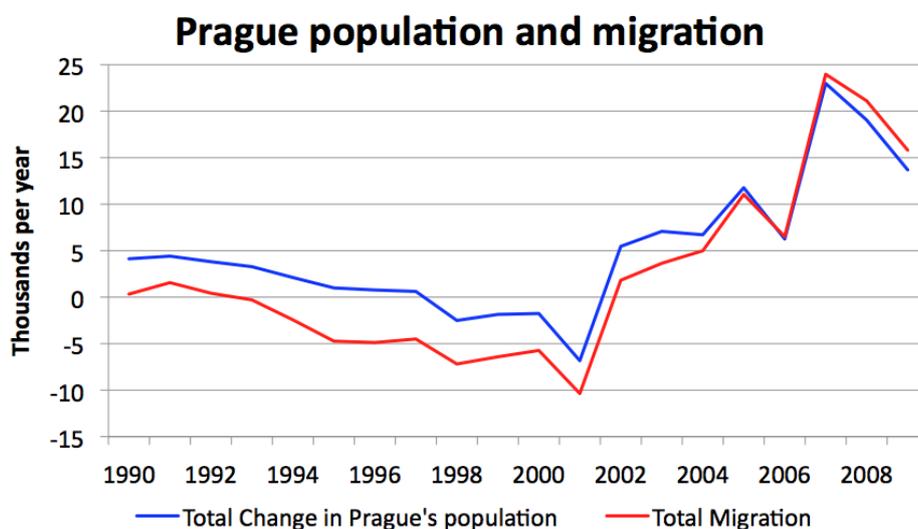
4.5   Signs of the overheating market: a real estate bubble?

In a healthy setting of a market the realized price is slightly lower than the seller's expectation. The main reason for such a behavior is the everlasting practice of bargaining. Unless the buying party is somehow personally interested in the object. But when it becomes a rule that the realized price is higher than expected, then it shows buyers overpaying each other to acquire a piece of real estate. This has a main reason that the supply is significantly lower than the demand. If the demand is real, the expected prices will adjust quickly upwards. On the other hand if the demand is triggered by some speculative motivation the high purchase price is fictively higher and this situation on a time span of a few years only, is rarely sustainable. That is what analytics call a bubble or an overheating market. Whether this happens on real estate, commodity or stock markets (as we have seen during the .com bubble on the verge of the 21st century). If this speculative interest in that local market keeps rising then even the investor who overpaid the property will be able to realize some profit when selling it fast enough. But at some point, the run for investments slows down; speculators don't manage to rent out the units for the expected price, fall into credit deficit and must sell. Others, realizing they soon won't be able to sell as they expected, want to sell as soon as possible. And at that precise moment, which can occur from month to month, the supply

on the market shoots up, and prices collapse. Most developers and investors strongly leveraged will default and will need to introduce saving plans, others will even declare bankruptcy. This will inevitably affect the economy and the employment market, touch through a chain reaction all other sectors and worsen the situation even further. This is an oversimplified view of such a situation, but are we able to define, regarding objective factors, the point where it all starts? Could one see the burst coming or is it only easy to state now, what has happened?

4.6   Summer 2008

In this section we will try, regarding events from as soon as 2005, to identify those events that should have given away the bubble beforehand. In the data analysis part we will try to prove our assumptions.

4.6.1   Overheating supply

On the supply side, developers motivated by the former strong demand and the bank's confidence in this market created a combination of easy financing for the construction of huge amounts of new apartments four years ago (Figure 4.6), so the number of new units coming on the market in 2008 was outrageous.

Figure 4.6: Numbers of finished apartments
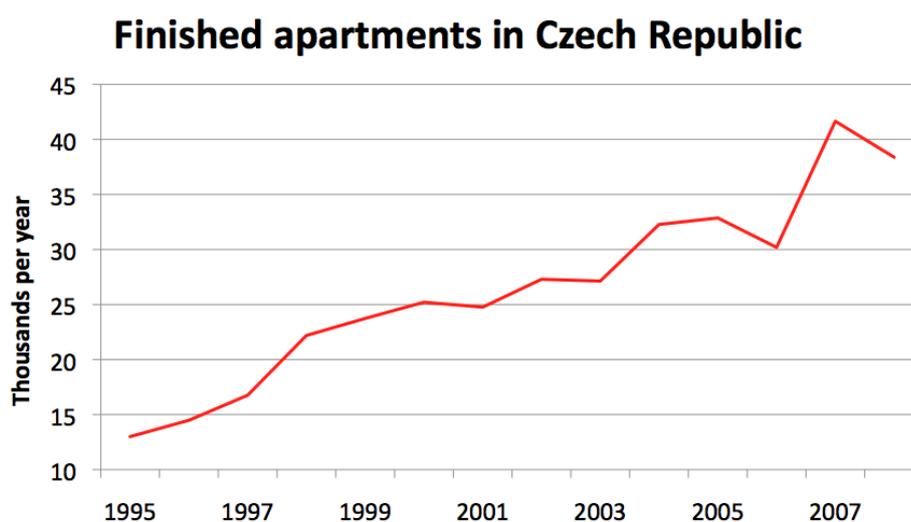
This should have been a sign for other developers that the market was about to saturate. They should have seen that if they started building a new

project, that would come on the market one to two years from then, would come into a completely over-supplied market and should have reflected that in their financing / profit calculations. Truth is, that most of them wouldn't even have started to build had they seen it. Developers, hungry for even more profits, pushed their analysts to find new project opportunities and often used personal connections to get banks to finance more and more risky projects. The same reproach goes to banks and financial institutions that could have detected that future risk if they had followed the market more carefully. They would have reflected this into a rise in the interest rates, which again, would have told developers off initiating new residential or commercial projects. But no, CEOs motivated to create "good numbers" in that moment and not bothering much about the following periods, pushed on the risk tolerance to make mortgages and loans in general even more accessible to the wide public.

4.6.2   Cooling demand

On the demand side, most people are still very dependent on mortgages, only very few have the savings to buy a flat. So when the financial institutions, beginning of 2008, scared by the situation on the US market, became more prudent and rose interests it made buying a housing more inaccessible. Combined with stricter lending policies, the proportion of Prague's population that would buy an apartment shrunk, which had a direct impact on the demand for housing. On top of that the index of general trust into the economy dropped drastically, making the people rethink their decision upon buying a flat in the situation of unstable employment.

4.6.3   Deregulation of rents

What impact does the loosening of regulated rent have on the average realized prices on the real estate market? If using a return on investment analysis, the fact that the rents (if we speak of the average of the building) rise by 25%, naturally the value of the house should rise by 25% to. But we shouldn't forget about the expectations. Since the law about deregulation was passed four years ago, most investors (and sellers) will calculate the value upon the expected rent in 2012 (end of deregulation) meaning that the prices should approach the price of the "empty" or freely rented building. We are now in mid process, which allows us to gain some certitude as to the behavior of investors.

Deregulation freeing the market   What is interesting is to focus on the period before the deregulation law was passed. Then, the difference between what a potential buyer would be ready to pay for a regulated building and the "free" building was more significant. The incertitude of the future political evolution in that matter had a heavy impact on the price of that piece of real estate. Now, if we consider this issue from a broader, more global point of view, we should start with the situation before 2004. By then the possibility of a possible deregulation was out of view. Over 1/5 of the rental market in Prague was regulated. This reality had a severe influence on the "free" rental market. How? Basically by reducing the supply on that market by a fifth. Now lets transport our selves to the situation in 2012. The regulated rent has risen to 90% of what was the market rent in 2006. Most tenants cannot afford these high rents anymore (this process, as described in the deregulation part, was progressive and so was also the whole social adjustment process) and decide to move to cheaper, less central locations or to move to smaller apartments. At once the apartments they were occupying are thrown on the "free" market, which broadens the supply. If we pretend that the demand hasn't risen, then the "free" rent must drop. So the process of deregulation has a two-sided impact on the rental prices. Prices of the 20% that were regulated have significantly risen. On the "free" market the rents have fallen to meet somewhere half way. The question is, if considering the market as a whole, has the market gained or lost on this transition?

Abstract play on numbers   To answer this question for the actual market, one would need very precise data. However we can try and construct a fictive market that will behave similarly to the real market:

Let's define our fictive market as follows, all figures are in CZK/m^2.
We will work with average demanded rate of return of 5% p.a.
This rate implies the buying price or value (V) to be the the sum of 20 years of rent:

$$V = R \cdot 12 \cdot 20$$

Now, let's calculate the value of an apartment with a regulated (VR) rent of CZK 37.07/m^2:

$$VR = 37.07 \cdot 12 \cdot 20 = 8,896.80$$

Contrary to this let's calculate the value (MV) of a rented apartment based on a market rent of CZK 180.00/m^2:

$$MV = 180,00 \cdot 12 \cdot 20 = 43,200.00$$

Now assuming that 20% of the market is regulated, and assuming perfect price elasticity of demand we can calculate a weighted average to estimate both the target rent (TR) and the target squared meter value (TV) after deregulation. *Ceteris Paribus* of course.

$$TR = 0.2 \cdot 37.07 + 0.8 \cdot 180.00 = 151.41$$

$$TV = 0.2 \cdot 8,896.80 + 0.8 \cdot 43,200.00 = 36,339.36 = 151.41 \cdot 240$$

As we can see, the Target value (CZK $36,339.36/m^2$) is $\sim$ 15% lower than the former market price (CZK $43,200.00/m^2$) but also 4 times higher than the former value of the regulated apartment (CZK $8,896.80/m^2$).

4.6.4 The projection of recession, crisis or economical growth into the demand behavior

Like some other markets, the general feeling about the situation influences probably more the market than the actual figures. People do not care about the indexes or the GDP changes. They start to feel threatened when they see they could lose their job, when they see the company they are working for could go bankrupt. They start worrying about their future income only once their actual income starts to suffer. Because the decision of acquiring a real estate (whether residential or for business) occurs to most people so rarely that one could count them on the fingers of one hand. This decision needs time, time for choosing the property, time for calculating and hesitating whether it is the right apartment/office/sales place, and finally time to arrange financing (which is necessary in a strong majority of individual buyers). When we consider all of those decisions to make, the fastest among us will take 6 months, those not in hurry will easily take two years. So, when the economy starts to slow down, eventually to fall, most people don't consider it as alarming, and, anyway, they have made the decision to spend so and so much money on real estate, most of them actually will. On the other hand, even after the economy starts recovering, and analytically they aren't taking big risks signing a mortgage now,

it takes most people to gain confidence in their job-stability and the market over a year. So if we look at the most trivial indicator of the wellbeing of the economy, the GDP, and we overlay a graph showing the volume of traded real estate, then we can easily detect a shift in time of one to two years.

Chapter 5

Data analysis

The situation described in 4.6.1 pushed prices to unreal heights, absolutely destabilizing any true values on the market. Then, with the first signs of the problems in USA and the effects as indicated in 4.6.2 the market has collapsed. We will now try to figure out whether the market in Prague does act on some basic principles.

5.1   Data

Because the Prague real estate market is so young; we have only limited amount of data. The Czech Statistical Office (CZSO) publishes a reliable real estate price index only since 2005.

5.1.1   Ideal

It would be interesting to base our model upon the following variables:

Migrational data   in year-to-year changes from the Czech Statistical Office: People migrating to Prague for a new, often better employment are one of the strongest buying powers on the residential market, since they come to earn more money, and they often do.

Quarterly numbers from the construction   business: numbers of beginning construction units and number of newly terminated units: On the contrary of the migrational data, these numbers are direct indicators of the supply on the market.

Mortgage default   Another figured that would be interesting for the supply is the number of households that defaulted in mortgage payments and therefore have to put their apartment on the market (supply).

Construction bankruptcies   The figures from the Czech National Bank of companies exiting the construction and development sector: if there is a rise in the number of companies declaring bankruptcy it must be a sign for the market going down. But this variable might be more dependent on the housing price index than explaining it.

Mortgage information   Figures concerning the mortgage market : total numbers of new mortgages and interest rates : again, if interest rates rise, less people will be able to afford to buy, and at the same time, people will default and more properties will be on the market.

The price   A real estate price index that has unfortunately been available only in the last few years (from 2005) : the most important figure (since we want to model the behavior of the price as a dependent variable). There is a certain index for Prague housing published either by the CZSO or the Ministry for Local Development. As a consequence we have numbers only since 2005.

5.1.2   Real

Because the market is so new, so is the statistical database of useful indexes. Therefore we will have to limit our model to the following variables:

Prague housing index   which is a quarterly index based on the previous period of prices of housing units. We will depict this index as "P". It will be the explained variable in our model.

GDP   Those are quarterly averages of the GDP of the Czech Republic. Let us depict this variable as "G", the first of our three explaining variables.

Interest rate   given by financial institutions to Czech citizen for purposes of acquiring housing. We will mark the interest rate as "I", the second explaining variable.

Wage index   We will use a self build quarterly average wage index for Prague on a Y-t-Y basis to avoid distortions caused by bonuses paid out in the 4th quarter of each year. Let's call it "W", our last explaining variable.

5.2   Methodology

We are going to use a classical linear regression model with the estimation method of ordinary least squares.

5.2.1   Classical linear regression

First, lets introduce that model on a more theoretical basis:

$$P = C + \alpha G + \beta I + \gamma W + \epsilon$$

Where C is the constant in our model. α, β and γ are the coefficients that we are looking for. ϵ is the error term, which is a random variable. In our concrete case we have 18 observations (from 2005 to mid 2009) and 3 factors. Now we could write a system of 18 equations to try to determine the coefficients that are the closest to reality, or we can define a matrix equation:

$$P = X\beta + \epsilon$$

or:

$$\begin{pmatrix} P_1 \\ P_2 \\ \vdots \\ P_{18} \end{pmatrix} = \begin{pmatrix} 1 & G_1 & I_1 & W_1 \\ 1 & G_2 & I_2 & W_2 \\ \vdots & \vdots & \vdots & \vdots \\ 1 & G_{18} & I_{18} & W_{18} \end{pmatrix} \begin{pmatrix} C \\ \alpha \\ \beta \\ \gamma \end{pmatrix} + \begin{pmatrix} \epsilon_1 \\ \epsilon_2 \\ \vdots \\ \epsilon_{18} \end{pmatrix}$$

Now before we continue it is important to define the requirements for the classical linear regression model to be correct.

Zero mean value   of all the random variables ϵ.

Homoscedasticity   or in other words a constant and equal variance for all the error terms ϵ

Deterministic   nature of the observed data (G, I, W), which in our case is true by definition.

Full column rank of the observed data matrix is necessary not to loose observations.

5.2.2   Ordinary least squares method

Let's define $\hat{P}$ as the estimate of our model depending on the estimator matrix $\hat{\beta}$. The matrix equation would be :

$$\hat{P} = X\hat{\beta}$$

or

$$P = X\hat{\beta} + e$$

where

$$e = P - X\hat{\beta} = P - \hat{P}$$

e is the error term, except now it is concrete, no more a random variable. It is when minimizing square e that we get the best estimate $\hat{\beta}$ of our factors. That also explains the name of the method. For that we will derivate the squares of e and search the β for when it is equal zero. In matrix notation the square can be written as follows:

$$S = (P - X\hat{\beta})^T(P - X\hat{\beta})$$

This being a quadratic form we can derivate as follows:

$$\frac{\partial S}{\partial \hat{\beta}} = -2X^T P + X^T X \hat{\beta}$$

Because of the condition of X being of full rank we can invert $X^T X$ and find the estimate :

$$\hat{\beta} = (X^T X)^{-1} X^T P$$

Furthermore we can show that our estimate of β is unbiased if $E(\hat{\beta}) = \beta$:

$$
\begin{aligned}
E(\hat{\beta}) &= E\left((X^T X)^{-1} X^T P\right) \\
&= E\left((X^T X)^{-1} X^T (X\beta + e)\right) \\
&= E(\beta) + E\left((X^T X)^{-1} X^T e)\right) \\
&= \beta + 0
\end{aligned}
$$

5.3 Model construction

In this part we will apply the ordinary least square method onto the data we have collected to estimate the influence of our explaining variables on the price of housing in Prague.

5.3.1 Preparing the data

Price index of housing is our explained variable, we will use this one as such since it depicts quarterly changes of average price of housing. Which is exactly the subject we are trying to prove.

GDP We are going to use the GDP as a measure of the general well being of the economy which does certainly influence the housing market in a significant way.

Interest rates we will use these quarterly numbers on loans granted to czech residents with a fixation of maximally one year, because they adapt the fastest to the actual market situation, unlike long fixations like 5 or ten years.

Wages we calculated a simple year to year index on the changes of the average changes, since the size of increase will certainly have a more visible effect on the housing prices than the absolute value.

The collected data from the ARAD system of the Czech National Bank and the described arrangements are in the annex.

5.3.2 Calculating the coefficients

Using the statistical program GRETL we calculated the following outcome when applying the ordinary least squares method on our data :

OLS, using observations 2005:1-2009:2 (T = 18)					
	coefficient	std. error	t-ratio	p-value	
const	-60.2272	37.9109	-1.589	0.1345	
GDP	3.20347e-05	1.54683e-05	2.071	0.0573	*
Interest	-4.21012	1.28940	-3.265	0.0056	***
Wage Index	1.46398	0.380175	3.851	0.0018	***
R-squared	0.712276				
Adjusted R^2	0.650621				

The significance   of the model can be graded upon two different levels. First, judging by the p-values of the explaining variables, on a significance level of 90%, we can see that the Interest rate, Wage index and GDP are significant. Nevertheless we have to take this statement with caution before verifying the requirements. The second indicator, the adjusted R^2, tells us that the data we have used explain the Housing price index on 65%, which is quite high, regarding the small sample of data we are working with.

5.3.3   Verifying the requirements

Now that we have analyzed the statistical significance, let us verify the conditions necessary for the model to be taken seriously before explaining the results on an economic level.

Homoscedaticity   to test the presence of heteroscedasticity we can use White's test for heteroscedasticity. This feature is available in GRETL as well :

White's test for heteroskedasticity
Null hypothesis: heteroskedasticity not present
Test statistic: LM = 12.4812
with p-value = P(Chi-Square(9) > 12.4812) = 0.187519

The relatively high p-value indicates that we can't reject the null hypothesis that heteroscedasticity is not present or in other words, we can't reject homoscedasticity. This verifies one of the key requirements, showing that our model should be unbiased.

Normality of residuals   To judge upon the normality of the distribution of the residuals we can look at the density chart of our residuals since we don't have a very large sample.

Figure 5.1: Density chart of Residuals
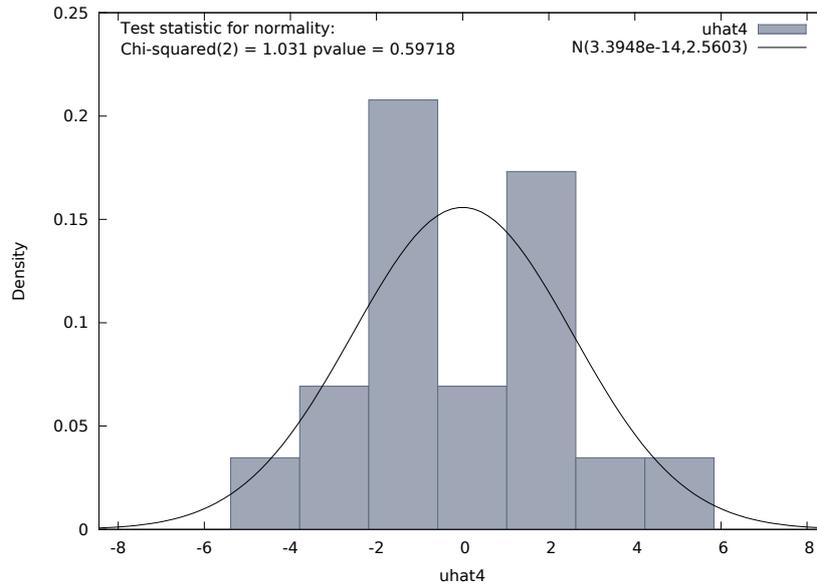
The chart (Figure 5.1) doesn't clearly show that the condition of normality of residuals is respected. But the high p-value of the χ^2-test indicates that we can not reject the null hypothesis of normality. This verifies another requirement.

Figure 5.2: Actual vs. Fitted chart

The actual vs. fitted graph (Figure 5.2) shows very subjectively how well the model follows the explained variable. This is not a strong conclusion but with the two former tests fulfilling the conditions we can rate the model as acceptable. It is interesting to notice that model holds even for the end of our time series where the crisis starts to show.

5.4   Interpretation

As the tests have shown, the model we have produced is acceptable. Which is quite unexpected as in chapter 2 we have noticed the large number of potential factors and our limited dataset. We can base on the signs of our estimates and interpret their effect on the changes of housing prices. Each separately, *Ceteris Paribus.*

GDP As expected a higher GDP, indicating the global well being of the economy, implies a slight rise in the housing prices. The fact that our "G" came out so small is of no importance, for two reasons, the units used in our data for GDP are millions of CZK, whereas the Housing Price Index is in percentage change. The second reason, again (and we will not stop repeating it), is that our model is a tentative one.

Interest rates The negative correlation to the height of interest rates shows even two economical effects. First, lower interest rates on mortgages make own housing more affordable to a larger specter of the population. Implying a higher demand for housing and thus rising prices. Knowing that credit and deposit rates move quasi-parallely we can see the second effect. The globally accepted event that when deposit interest rates fall, people start looking for better investment opportunities, such as, among others, real estate. It would have been interesting to include a deposit interest rate into the model to see which of those the effects has a greater weight, but limited by the number of observations we had to choose.

Wage index Here again we see that with rising wages the prices rise. We can explain that by the fact that with higher wages real estate becomes not only more available but also the housing preference shift to a higher level. Fueling demand not only in general but also for a higher quality (thus more expensive)

kind of housing. Then the logical consequence must be a rising average of the housing prices.

In general we can learn two things from this model. On this model it is good to see that the basic predicted reactions in chapter 2 are present, showing that the market is growing closer to a normal, open economy from the centrally planed market only 20 years ago. And because of the limited structure of information available about the market and the huge amount of intrinsic factors influencing the market we can expect the model to improve with more detailed data becoming available.

Chapter 6

Conclusion

The main goal of this bachelor thesis was to evaluate and describe the evolution of the newly created real estate market after 1989 until almost nowadays when it is facing its first big crisis.

First we have defined, based on foreign "standards" what is specific for such a market. Shortly explaining what the basic behavior should look like, and what interactions to expect from a free market economy point of view. In doing this we can sense the complexity of this money intensive, yet very locally delimited market.

The goods on this market, either housing or commercial (offices or factories) units are of big unit value, are immobile, and one can only hardly imagine how the owner could lock up his newly purchased land in a safe or store it in a bank physically. Therefore it is crucial to have a precisely defined process for recording the property rights to all real estate and all the particular owners. Thus the creation of a legally consistent cadastre.

Further institutional changes made the real estate transaction more and more easy and safe. New laws protecting the tenant as well as the landlord were set up creating a safer environment for this market.

Some transformation process like privatizations, restitutions or rent deregulations are coming to an end erasing all those market deformations from the times of the Communist government. Slowly but certainly setting the market free to help it find an optimal equilibrium by itself.

Nevertheless came the time of speculative investors, sub-prime mortgages, over motivated developers combined with a more and more liberal banking policy and the market started overheating as shown in 4.6. Eventually the bubble did burst in summer 2008 yet little official data is available so early to be able to

make clear statements. And even if the market doesn't seem to recover yet so early, inspired by all the previous recessions and crisis, if the framework (the state itself) survives, the real estate market will soon recover.

An example is the actual situation on the real estate market in Germany right now. There the crisis having struck a little earlier the people start now getting the feeling that the economy has reached the bottom. And Germans having lived in a market economy for a long time and having experienced a couple of those "crisis" or recessions, have a sober point of view. If the government wants the economy to recover quickly it will probably not break the eventual inflation, so most people start already buying real estate, anything from a studio, through houses up to whole apartment or office buildings, hoping to ride on the coming wave of potential economic growth; or at least to protect their savings against inflation or currency devaluation.

In the last chapter, I have finally put in use the model which I created for the purpose of this study. The model seems accurate and the results it provides satisfactory. Based on the limited available dataset concerning the real estate sector, we tried and managed to identify a couple of basic market behaviors, as they are clearly defined by economic theories.

The Czech real estate market has evolved in the last 20 years in a positive way, coming close to a open, free market, soon answering only to rational behavior of the actors on the market and aiming at a certain equilibrium.

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All used data is provided and accessible at the public databases of the following institutions : Czech National Bank, Czech Statistical Office and Eurostat, 2010.

Appendix A

Data

Data for model in 5.1.2						
quarter	year	HPI	GDP	Interest	Wage	Wage Index
1	2005	100.1	695,181	4.2	17,067	105.2
2		99.6	759,356	4.0	18,112	105.2
3		99.4	753,526	4.2	18,203	105.9
4		101.1	775,799	4.0	19,963	104.1
1	2006	101.6	749,678	4.2	18,270	107.0
2		102.3	812,182	4.0	19,300	106.6
3		102.1	819,685	4.0	19,305	106.1
4		106.0	840,824	4.3	21,269	106.5
1	2007	111.0	832,489	4.3	19,687	107.8
2		108.6	890,063	4.5	20,740	107.5
3		103.3	895,632	5.1	20,721	107.3
4		102.3	917,276	5.4	22,641	106.5
1	2008	105.1	876,887	5.8	21,647	110.0
2		106.2	935,922	5.8	22,370	107.9
3		101.2	935,137	6.0	22,282	107.5
4		98.3	941,048	6.0	24,484	108.1
1	2009	95.0	873,596	6.1	22,321	103.1
2		93.7	917,863	6.1	23,067	103.1
			CZK 10^6	%	CZK	