Selection of factors influencing the residential property prices in Slovakia

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Residential property prices have been one of the most discussed issues in recent years, because their inadequate acceleration in the USA and gradually also in other countries has caused the so-called real estate bubble to burst, which is considered the main reason of the current turmoil on the world financial markets. The attention of both real estate market experts and financial market experts focuses on more intensive examination of the individual factors having substantial influence on the development of residential property prices in recent years.

1 AN OUTLINE AND DESCRIPTION OF SELECTED FACTORS ON THE RESIDENTIAL MARKET

The prices of residential property are determined by a complex of demand and supply factors influencing the respective real estate market. On the demand side, the individual factors can be subdivided into several groups:

- social and demographic factors (size of the population or of individual age groups of the population, number of housekeeping households, birth rate, mortality rate, marriage rate, divorce rate, need of housing etc.)
- social and economic factors (performance of the economy, employment rate, income situation of the households, purchasing power of the population),
- social and political factors (housing policy of the State, grant and subsidy policy for housing support),
- credit and financial factors (savings rate, rate of credit availability, credit terms, interest rate level, loan burden rate, credit riskiness).

On the supply side, there are the following possible factor groups:

- territorial and legislative/legal factors (location of housing construction in the land-use plans of towns and municipalities, availability of building ground for housing construction, legislative availability and support of housing construction),
- economic and technological factors (rate of capital invested in housing construction, ratio of housing construction to building production, number of started flats, number of completed flats, number of flats under construction, disappearance of flats etc.).

## 1.1 Selected demand factors on the real estate market

In recent years, a minimal year-on-year growth of the population has been accompanied by a more variable and slightly more marked year-on-year growth of population aged 25 to 44[1], i.e. at age, at which individuals are most likely to found a family or simply become independent and create an economically active household with a subsequent effort to ensure a dwelling.

The present is characterized by a more dynamic growth of the number of housekeeping households than the size of the population mainly as a result of a growing number of single-person households[2]. This has been considerably fostered also by the growing divorce rate, in which, according to the current data, the 30 to 44 age groups participate the most (by more than 50 %).

1 Because official data on the development of the population in Slovakia in 2008, including by age, will be published by the Statistical Office of the Slovak Republic only approximately in the 2nd quarter of 2009, we have calculated the missing data for our needs by extrapolating data known so far.

2 A trend that was unambiguously confirmed in the last two Population and Housing Censuses. While 390 000 single-person households were recorded in the 1991 census, there were as many as more than 622 000 such households in the 2001 census. According to a projection of the Demographic Research Center, their number is currently growing year-on-year by about 3 000 households and currently there can be more than 640 000 single-person households in Slovakia in sum.
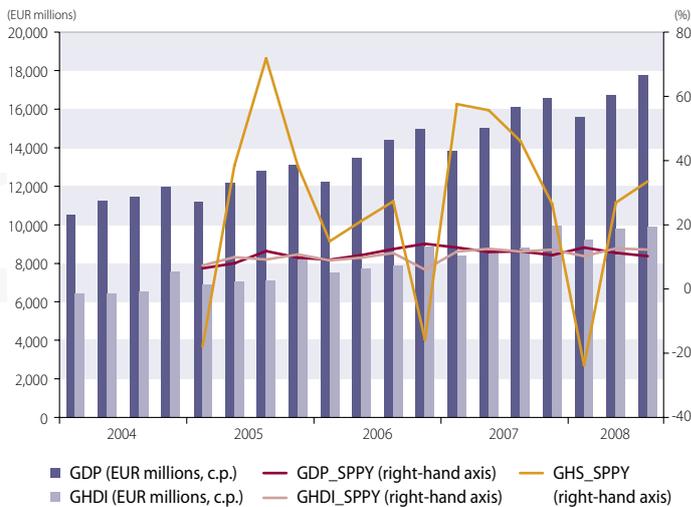
Chart 1 Development of Slovakia's population size
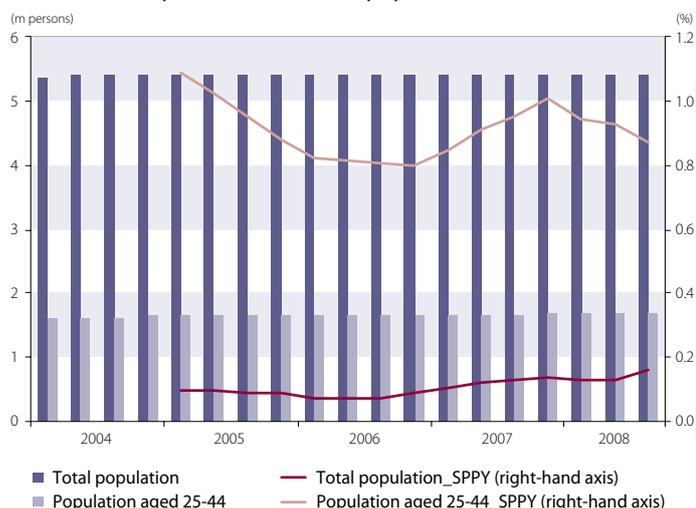
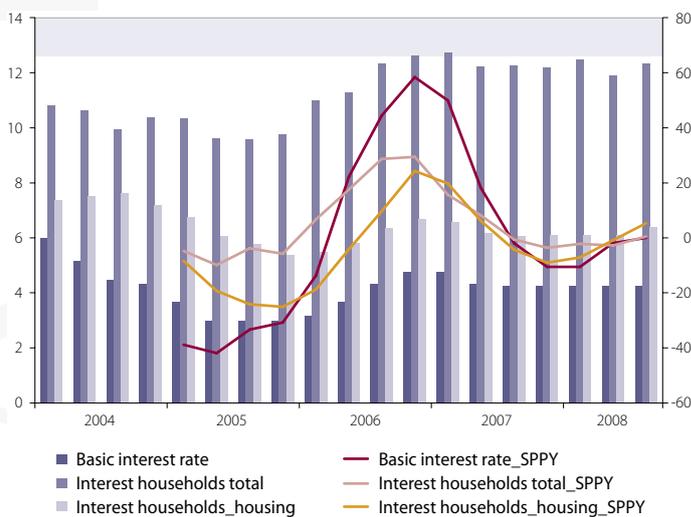Source: Statistical Office of the Slovak Republic, chart by the NBS.

Chart 2 Development of GDP, gross household disposable income (GHDI) and gross household saving

(EUR millions)   (%)

- GDP (EUR millions, c.p.)   — GDP_SPPY (right-hand axis)   — GHS_SPPY
- GHDI (EUR millions, c.p.)   — GHDI_SPPY (right-hand axis)   (right-hand axis)

Source:Statistical Office of the Slovak Republic, chart by the NBS.

Chart 3 Development of interest rates on loans (in %)

- Basic interest rate   — Basic interest rate_SPPY
- Interest households total   — Interest households total_SPPY
- Interest households_housing   — Interest households_housing_SPPY

Source: NBS.

Chart 4 Development of time deposits, loans and residential loans to households

(EUR millions)   (%)

- Household time deposits   — Residential loans to households_SPPY
- Residential loans to households   — Total loans to households_SPPY
- Total loans to households
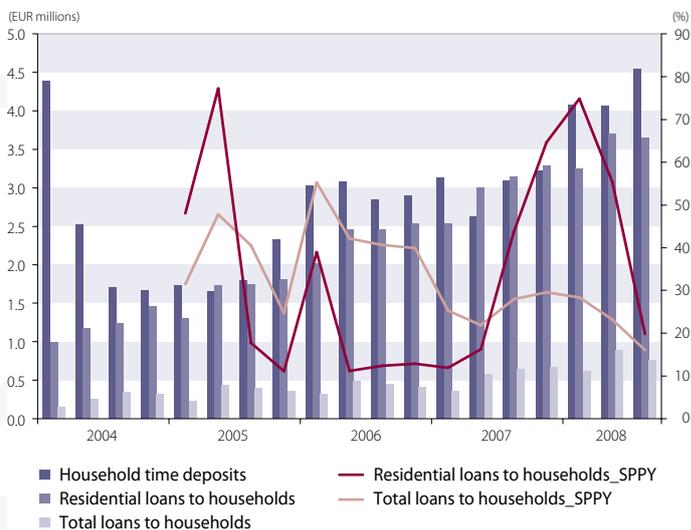
Source: Statistical Office of the Slovak Republic, NSB and chart by the NBS.

The above mentioned demographic factors lead to growing housing need satisfaction needs.

The rate of housing need satisfaction needs particularly depend on the state and expected trends of the development of the economy and the related current and expected income possibilities and purchasing power of the population. An important role in the procurement of housing is also played by credit sources or the general terms and conditions of the provision of loans and their real availability.

The currently revised GDP values[3] has shown an increasing trend in recent years and gross household disposable income, which represents more than 50% of the GDP, was in accordance with their development. The use of the gross household disposable income itself has been quite variable in recent years. According to marked year-on-year changes in gross household saving (which currently makes up some 3% of the GDP), it was rather possible to witness a trend of gradual reduction of the households' propensity to save. This was probably also associated with the households' propensity to spend more as a result of the growing performance of the economy. The positive economic development so far has also constituted the basis for relatively positive expectations of the population for the future and the related willingness and boldness to borrow more.

The consumption of households was also fostered by growing volumes of loans to households in recent years. The households' propensity to borrow is objectively triggered both by the absence of the necessary cash at a given time and the growing availability of the individual types of loans and overall credit terms and conditions of the credit grantors. Important information for a person interested in a loan is also the level of the interest rate on the loan at hand[4].

The basic NBS interest rate has undergone some development since early 2004 – starting from a level of 6.00%, it decreased to 3.00%, increased to 4.75% and gradually decreased to 4.25% in the 3rd quarter of 2008 (it had the value of 2.50% on 10 December 2008).

In the period under review from early 2004 to the 3rd quarter of 2008, the average commercial interest rates on loans to households were between 9.6% and 12.7% with a relatively low variability[5] (V_k = 11.97%) and the interest rates on residential loans were between 5.4% and 7.6% with a slightly higher variability (V_k = 15.66%). While the interest rates on loans as a whole tended to grow slightly (from 10.8% in the 1st quarter of 2004 to 12.3% in the 3rd quarter of 2008), the interest rates on residential loans were decreasing moderately (from 7.4% in the 1st quarter of 2004 to 6.4% in the 3rd quarter of 2008).

The volume of loans to households increased considerably to about 990 EUR millions in the 1st quarter of 2004 to more than 3.6 bn. EUR in the 3rd quarter of 2008. A remarkable fact are the considerable increases in the volume of loans in the 2nd quarters in the individual years, which were

caused by a previous growth of residential loans. The volume of residential loans to households increased more then four times over the period under review (from about 155 EUR millions to 762 EUR millions). Although the total volumes of loans to households and residential loans were growing at a relatively equal average rate (of more than 32%) on a year-on-year basis from the beginning of 2004, the residential loans were growing with a much higher variability. The coefficient of variation for the year-on-year growth of the volume of loans to households reached a value of 8.2%, while it reached the value of 18.6% for the growth of the volume of residential loans.

In connection with the growing volume of loans to households, it is usual to point out the risk of an inadequate loan burden of households for the banking sector. A comparison of the volumes of time deposits of households[6] and the total volumes of loans to households in the individual quarters from 2004 implies that except for several exceptions (2nd quarter of 2005, 2nd to 4th quarter of 2007) the volume of time deposits of households was higher than the total volume of loans to households.

The ratio of the total volume of loans to households to the volume of gross household disposable income (GHDI) increased from 15.4% in the 1st quarter 2004 to 36.8% in the 3rd quarter 2008 at an average year-on-year growth of more than 20% in the individual quarters. The highest value of the ratio was reached in the second quarter of 2008 (37.7%).

The ratio of the total volume of loans to households to the volume of gross domestic product increased from 9.4% in the 1st quarter of 2004 to 20.5% in the 3rd quarter of 2008 at a slightly lower average year-on-year growth (19.6%) in the individual quarters than in the case of the growth of the ratio of loans to the gross disposable income of households. The most considerable year-on-year increases in the development of the ratios of the volumes of loans to households both to the volume of the gross domestic product and to the volume of gross household disposable income were achieved in the 1st quarter of 2006 (42.2% or 42.5%), since when there has been an evident trend towards a slowdown of the year-on-year growth of the above mentioned ratios.

The ratio of the volume of residential loans to the volume of the gross domestic product increased from 1.5% in the 1st quarter of 2004 to 4.5% in the 3rd quarter of 2008. In that period, it varied considerably both on a quarterly and on a year-on-year basis (the coefficient of variation of the year-on-year changes of the above mentioned ratio reached a value of 19.3%). The hitherto highest year-on-year changes in the ratio of the volume of residential loans to households to the volume of the gross domestic product were recorded in the 2nd quarter of 2005 (64.1%) and in the 1st quarter of 2008 (54.8%).
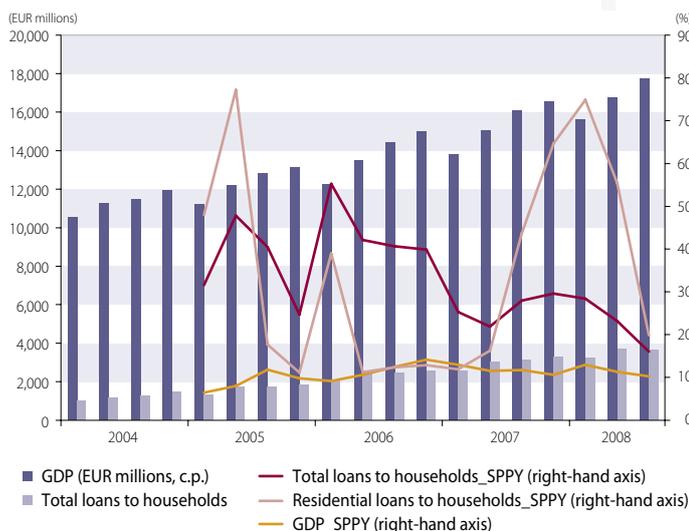
The growth of the volume of loans to households was quite dynamic and considerably vari-

Chart 5 Development of the ration of loans to households to GDP and GHDI (in %)
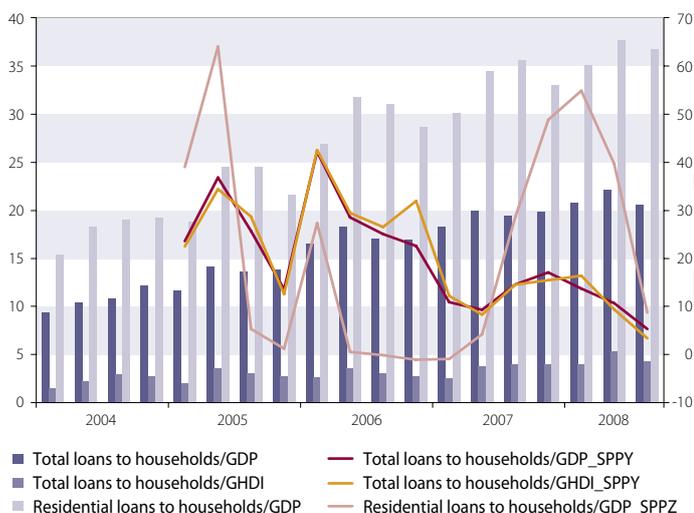
Source: Statistical Office of the Slovak Republic, NBS and chart by the NBS.

Chart 6 Development of the GDP and loans to households

Source: Statistical Office of the Slovak Republic, NBS and chart by the NBS.

able in recent years, also due to the growing volume of residential loans. The year-on-year growth of residential loans was considerably higher than the growth of total loans to households in the first two quarters of 2005 and in all quarters from the 3rd quarter of 2007 up to the present. The highest year-on-year growth of residential loans was reached in the 2nd quarter of 2005 (77.2%) and in the 1st quarter of 2008 (74.9%).

Despite an absolute growth of the volume of both total loans to households and of residential loans in the 2nd quarter of 2008, their growth slowed down on a year-on-year basis (by 5.2 percentage points to 23.3% or by 19.5% percentage points to 55.4%). In the 3rd quarter of 2008, there has been even a slowdown of the absolute growth of total loans granted (by 1.5 bn. SKK to 109.8 bn. SKK) and residential loans (by 2.4 bn. SKK to 23 bn. SKK), the consequence of which was a slowdown

3 The last major GDP revision was conducted by the Statistical Office of the Slovak Republic in mid-December 2008.
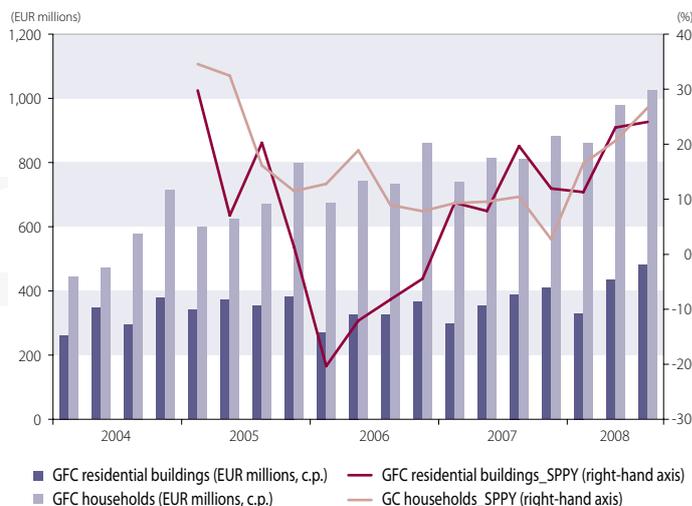4 Financial analysts advice persons interested in loans to pay much attention to the indicator „annual percentage rate of charge", which includes all fees providing information about the actual value of the loan. Under the law, the annual percentage rate of charge must be stated in any credit agreement.
5 The coefficient of variation is the ratio of the standard deviation to the mean of the values of the variable under review, expressed in percent.
6 We consider the volume of time deposits in this comparison more appropriate than the total volume of household deposits, which reached values that were several times higher (e.g. almost as much as 6.5 times in the 3rd quarter of 2008), but house-
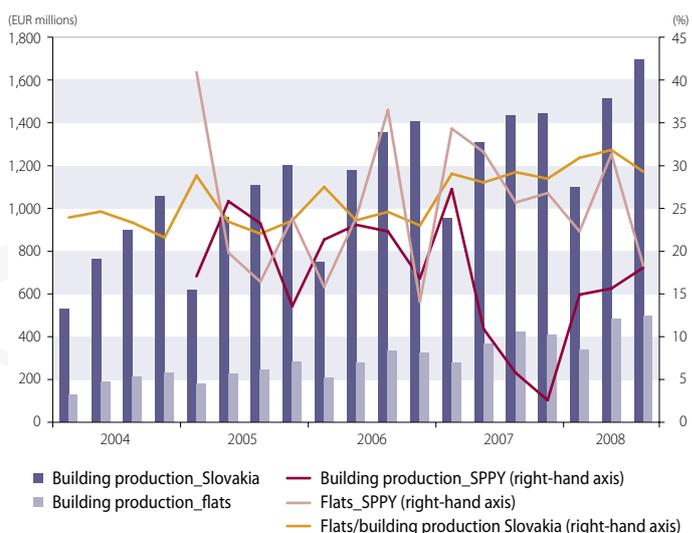
Chart 7 Development of the GFC related to the construction of flats and households

(EUR millions)   (%)

Legend:
- GFC residential buildings (EUR millions, c.p.)
- GFC households (EUR millions, c.p.)
- GFC residential buildings_SPPY (right-hand axis)
- GC households_SPPY (right-hand axis)

Source: Statistical Office of the Slovak Republic and chart by the NBS.
Note: GFC = gross fixed capital.

Chart 8 Development of building production and construction of flats

(EUR millions)   (%)

Legend:
- Building production_Slovakia
- Building production_flats
- Building production_SPPY (right-hand axis)
- Flats_SPPY (right-hand axis)
- Flats/building production Slovakia (right-hand axis)

Source: Statistical Office of the Slovak Republic and chart by the NBS.

hold deposits also include current account deposits, out of which the households withdraw considerable amounts in the course of the month or quarter. The volumes of time deposits this represent a more real coverage of loans.

of the year-on-year growth of loans by a total of 7.1 percentage points to 16.1% and of residential loans by 35.6 percentage points to 19.8%. Data for the 3rd quarter of 2008 unambiguously confirmed an end to the considerable year-on-year growths of loans to households and particularly of residential loans. Their year-on-year growth considerably approached the year-on-year growth of GDP at current prices (10.2%) in the 3rd quarter of 2008.

Overall, it can be said that from the beginning of 2005 the trend of the loan burden on the disposable income of households was in line with the trend of the loan burden on the total GDP and from the beginning of 2006 it has had a tendency to decrease. In the 3rd quarter of 2008, the ratio of the volume of loans to households to the volume of GDP grew only by 5.3% on a year-on-year basis (representing a slowdown by 5.4 per-

centage points as compared to the 2nd quarter of 2008) and the ratio of the volume of total loans to households to the volume of gross household disposable income by 3.3% (representing a slowdown by 6 percentage points as compared to the 2nd quarter of 2008).

1.2 Selected supply factors on the real estate market

Some factors on the supply side of the real estate market are quite difficult to quantify (for example the legislative availability and degree of support of housing construction on the part of the competent institutions etc.). Easier to quantify and thereby also more available in reality are several economic and technological indicators of the real estate market.

The volume of funds, which are destined for the construction of residential buildings and for the household sector as a whole within gross fixed capital, constitutes a quite low ratio to the GDP (around 3% or around 6%) and it developed in a quite differing way in recent years. We will consider the actual degree of the possible impact of that volume on residential property prices in the following part of our analysis.

The building production in Slovakia, which includes the construction of residential buildings, represents more than 95% of the total building production. The ratio of the construction of residential buildings to the building production in Slovakia gradually increased from 24% in the 1st quarter of 2004 to 29.3% in the 3rd quarter of 2008, reaching its maximum in the 2nd quarter of 2008.

Until now, the volume of building production in Slovakia has been growing in the individual quarters by 17% on average on a year-on-year basis, while the construction of residential buildings has been growing by 25.7% on average. In the course of 2007, the year-on-year growth of the volume of building production in Slovakia showed a trend representing a more considerable slowdown than in the case of the construction of residential buildings. The year-on-year growth of the volume of building production slowed down by 24.7 percentage points to a level of 2.6% from the first to the fourth quarter of 2007, while in the case of the construction of residential buildings the slowdown was only of 7.5 percentage points to 26.8%. From the beginning of 2008, the year-on-year development of building production in Slovakia has been characterized by a stabilized growth of about 15%, while the year-on-year growth of the construction of residential buildings accelerated by 8 percentage points in the 2nd quarter of 2008 to a level of 31.3%, but it slowed down by 13 percentage points to a level of 18.3% in the 3rd quarter of 2008.

Housing construction in Slovakia is dominated by flats under construction, whose number has been growing in recent years at a relatively constant rate (8.9% average year-on-year growth) and exceeds the number of completed flats 15 times on average. This is also due to the fact that,

between the 1st quarter of 2004 and the present, the number of completed flats was higher than the number of started flats only in four quarters (4Q04, 4Q06, 3Q07 and 4Q07).

In the same period, the number of completed flats grew on average at the same average rate as the number of flats under construction, but with a much higher variability (V_k=12.12% compared to V_k=3.81%).The growth of the number of started flats recorded a faster average year-on-year growth (12.5%), but also a substantially higher variability (V_k = 30.14%) from the 1st quarter of 2004 to the present.

The number of started flats increased considerably mainly in the last year and in the 3rd quarter of 2008 the year-on-year growth was almost 90%. The total number of completed flats was slightly higher in 2008 than in 2007, but their completion in the individual quarters was quite variable.

The stock of housing is gradually increasing, but housing at least at the EU average level of around 450 flats per thousand inhabitants still has not been sufficiently satisfied. According to the last Population and Housing Census in Slovakia, there were some 350 flats per thousand inhabitants. Taking into account the hitherto increases and decreases in the number of flats, where the net annual increase of the number of flats was some 14 thousand flats, the current number of flats per thousand inhabitants can be around 370[7].

## 2 SELECTION OF THE CRUCIAL INDICATORS INFLUENCING RESIDENTIAL PRICES

Residential property prices recorded a high growth in Slovakia over the last years. The growth is due to, on the one hand, a relatively late coming of the housing market into existence[8] and, on the other hand, a relatively favorable economic development of the country after 2000.

The average price of a square meter of residential property doubled from the average nominal value of 592 EUR/m^{2} in 2002 to about 1.500 EUR/m^{2} today. The average year-on-year growth so far in individual quarters has been about 13% and has varied approximately by 15% around the average.

In this part, we are going to focus on the assessment of the degree of closeness of the dependence of the development of residential property prices on the following factors from the 1st quarter of 2004 to the 3rd quarter of 2008:
- the average population size (pop)
- the average number of inhabitants aged 25 to 44 (pop_25-44),
- the GDP volume (GDP),
- the volume of gross household disposable income (GHDI)
- the volume of gross household saving (GHS)
- the total volume of household deposits (deposits),
- the volume of household time deposits (depositsTime),
- the total volume of loans to households (loans),

Chart 9 Development of housing construction
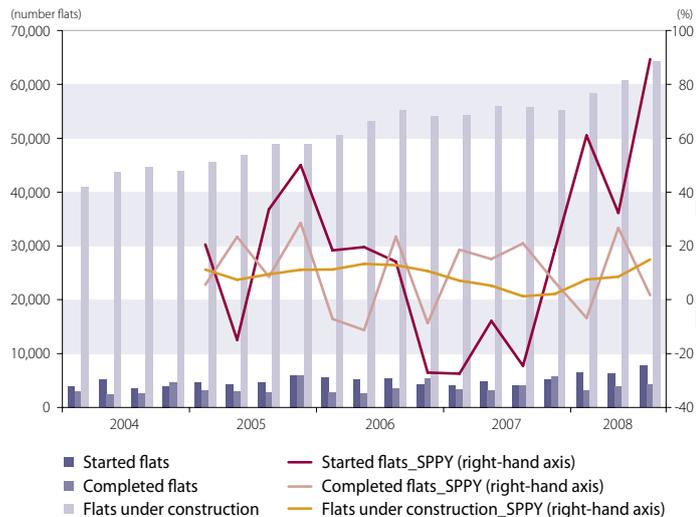
Source: Statistical Office of the Slovak Republic and chart by the NBS.

Chart 10 Development of residential property prices
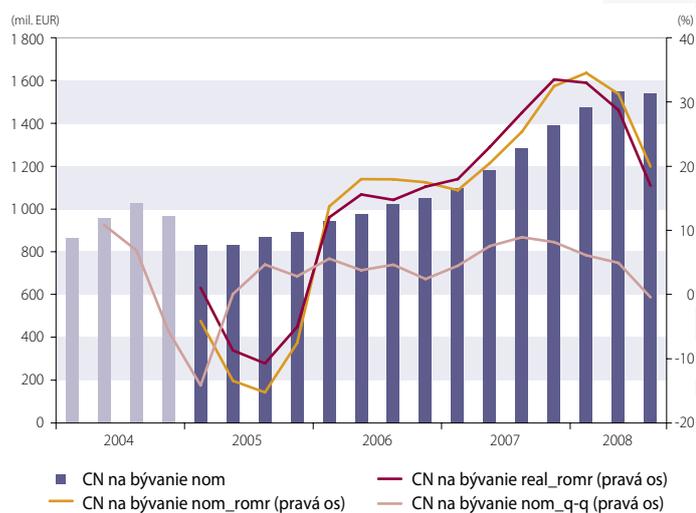
Source: NBS.
Note: The NBS has quarterly data on residential property prices from the 1st quarter of 2005. The quarterly values for 2004 have been estimated from the average annual value as a function of the development of the volume of residential loans to households.

- the volume of residential loans to households (loansRes),
- the average level of interest rate on loans to households (interestRate),
- the average level of interest rate on residential loans to households (interestRateR)
- the volume of gross fixed capital destined for the construction of residential buildings (GFC_residential),
- the volume of gross fixed capital destined for households (GFC_househ),
- the volume of building production in Slovakia (buildingProd),
- the volume of building production related to the construction of residential buildings (residBuilding),
- the number of started flats (fStarted),

7 The number of flats increased by more than 116 thousand from 1.769 m flats in 1991 to 1.885 flats in 2001, i.e. between the previous Population and Housing Censuses. That meant an increase by 6.6%, which represented an average growth of almost 12 thousand flats per year. Since the last census, the number of completed flats has increased by some 14.5 thousand flats on average per year.
8 A systematic monitoring of residential property prices started only in 2002. Annual data is available until 2004 and quarterly data from the beginning of 2005.

Table 1 The correlation matrix of selected factors influencing the residential property prices

	RPP	pop	pop_25-44	GDP	GHDI	GHS	deposits	depositsTime	loans	loansRes	interestRate	interestRateR	GFC_residential	GFC_househ	buildingProd	residBuildings	fStarted	fCompleted	fUnderconstruction	fDisappearances
RPP	1.00																			
pop	0.91	1.00																		
pop_25-44	0.87	0.99	1.00																	
GDP	0.89	0.97	0.97	1.00																
GHDI	0.86	0.95	0.95	0.96	1.00															
GHS	0.37	0.43	0.45	0.50	0.68	1.00														
deposits	0.90	0.96	0.95	0.93	0.90	0.37	1.00													
depositsTime	0.68	0.62	0.57	0.57	0.57	0.19	0.80	1.00												
loans	0.89	0.98	0.99	0.98	0.95	0.45	0.96	0.60	1.00											
loansRes	0.89	0.92	0.90	0.92	0.87	0.41	0.87	0.49	0.93	1.00										
interestRate	0.70	0.74	0.76	0.75	0.73	0.29	0.78	0.67	0.78	0.55	1.00									
interestRateR	-0.15	-0.46	-0.53	-0.42	-0.45	-0.29	-0.44	-0.10	-0.48	-0.42	-0.09	1.00								
GFC_residential	0.59	0.63	0.58	0.69	0.67	0.54	0.51	0.17	0.59	0.73	0.19	-0.22	1.00							
GFC_househ	0.80	0.92	0.93	0.93	0.96	0.62	0.85	0.45	0.92	0.87	0.61	-0.50	0.72	1.00						
buildingProd	0.71	0.80	0.81	0.91	0.84	0.55	0.73	0.33	0.84	0.85	0.55	-0.39	0.78	0.90	1.00					
residBuildings	0.88	0.94	0.93	0.98	0.93	0.50	0.88	0.51	0.95	0.95	0.67	-0.39	0.76	0.93	0.94	1.00				
fStarted	0.59	0.65	0.61	0.58	0.59	0.23	0.68	0.56	0.59	0.59	0.29	-0.46	0.53	0.62	0.48	0.58	1.00			
fCompleted	0.29	0.37	0.40	0.48	0.62	0.88	0.30	0.11	0.36	0.30	0.25	-0.25	0.56	0.59	0.56	0.47	0.17	1.00		
fUnderconstruction	0.84	0.97	0.97	0.95	0.90	0.35	0.95	0.59	0.97	0.88	0.76	-0.49	0.57	0.91	0.83	0.92	0.67	0.30	1.00	
fDisappearances	0.54	0.47	0.47	0.42	0.42	0.09	0.52	0.44	0.51	0.49	0.43	-0.20	0.09	0.35	0.25	0.34	0.37	-0.08	0.43	1.00

Chart 11 Correlations of selected factors with the development of residential property prices
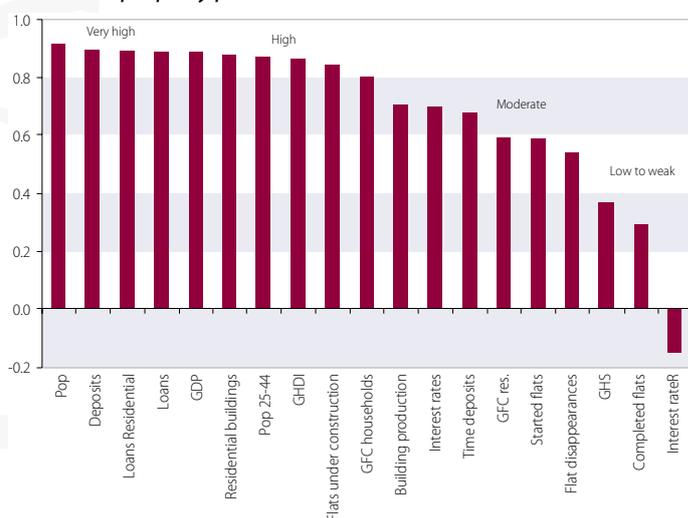
Source: Statistical Office of the Slovak Republic and chart by the NBS.

9 If the correlation coefficient (r) is in the interval: 0.9 to 1.0 the correlation is a very high positive correlation, 0.7 to 0.9: a high positive correlation, 0.5 to 0.7 a moderate positive correlation, 0.3 to 0.5 a low positive correlation, 0.0 to 0.3 a weak or no correlation. In the case of negative values of (r) the correlation is called negative or indirectly proportional.

- the number of completed flats (fCompleted),
- the number of flats under construction (fUnderconstruction),
- the number of flat disappearances (fDisappearances).

Among the above mentioned demand and supply factors, we will try to select the factors that influence the development of residential property prices the most. We will use correlation analysis to select those factors by evaluating – based on the values of the calculated correlation coefficients – which factors have exhibited the closest link to the development of the residential property prices in the development so far. We will arrange the values of the individual factor pairs in a clearly laid out correlation matrix (Table 1).

The calculated correlation coefficients for the individual factors, which influence residential property prices, can be subdivided by their values into the following groups[9]:

- from 0.90 to 0.99, to which the average population size (pop) and the total volume of household deposits (deposits) have turned out to belong,
- from 0.70 to 0.89, to which the following factors have turned out to belong: total volume of loans to households (loans), the volume of residential loans to households (loansRes), the volume of GDP (GDP), the volume of building production related to the construction of residential buildings (residBuilding), the average number of inhabitants aged 25 to 44 (pop_22-- 45), the volume of gross household disposable income (GHDI), the number of flats under construction (bUnderconstruction), the volume of gross fixed capital destined for households (GFC_househ), the volume of building production in Slovakia (building Prod), the average level of interest rate on loans to households (interestRate)
- from 0.50 to 0.69, to which the following factors have turned out to belong: the volume of household time deposits (depositsTime), the

volume of gross fixed capital destined for the construction of residential buildings (GFC_residential), the number of started flats (fStarted), the number of flat disappearances (fDisappearances),

- from 0.30 to 0.49, to which the volume of gross household saving turned out to belong (GHS),
- from 0.00 to 0.29, to which the number of completed flats turned out to belong (fCompleted).

The indicator average level of interest rate on residential loans to households (interestRateR) is in a weak indirectly proportional relationship to residential property prices (r=-0.15).

When gradually eliminating the number of variables, which can influence residential property prices to a lesser degree or whose influence is only indirect, it is necessary to also use pair correlation coefficients of materially related variables.[10] For example, a comparison of the pair correlation coefficients of the total population size and the number of inhabitants aged 25 to 44 with the set of other selected variables implies a relative similarity of the closenesses of the dependence of the pair of compared variables with other variables, with their mutual correlation being very high (r=0.99).

The result of the graphical analysis in the first part of the paper has been that the development of the population age group aged 25 to 44 is more variable and can influence the development of residential property prices in time more significantly. We therefore recommend to view the number of inhabitants aged 25 to 44 as the representative indicator for the group of social and demographic factors in further deliberations.

For the group of social and economic factors, we have analyzed information on the gross domestic product, the gross household disposable income and gross household saving. According to the correlation and graphical analysis, the indicator GDP seems to be the most appropriate representative of this group for the examination of the influence on the development of residential property prices.

Out of the credit and financial indicators (household deposits, time deposits of households, total loans to households, residential loans to households, interest rates on total loans to households, interest rates on residential loans) for the needs of examining the influence on the development of residential property prices, we think that the indicator total volume of loans to households (loans) or volume of residential loans to households (loansRes) comes into question.

In the wide group of supply factors, the indicator volume of building production related to the construction of residential buildings correlates most with residential property prices (r=0.88), but the indicator volume of gross fixed capital destined for households also exhibits very high correlation (r=0.80).

In connection with the contemplated application of regression analysis to estimate for the estimate elasticities of selected independent variables' elasticities of the development of residential property prices in Slovakia so far and of possible estimates of further development, we consider the selected approach one of the possible approaches[11] to the selection of appropriate indicators, which reflect the current development on the Slovak estate market as realistically as possible.

A certain limiting factor for a wider application of the model approach for the analysis of the Slovak real estate market and particularly the development of residential property prices is the relative shortness of the time series of available data and the – for the time being only gradual – formation and standardization of the Slovak real estate market, which associated with a considerable volatility of the potential analyzed indicators.

CONCLUSION

The real estate market is influenced by a variety of factors, whose intensity can change over time. It is important to know the degree of influence of the factors also in general, but a higher interest of individual real estate market agents is apparent in periods, in which it accelerates or stagnates more.

The Slovak real estate market recorded a relative boom in recent years, which is particularly related to its relatively late coming into existence only at the beginning of the new millennium, when a global dynamic growth of real property prices started as well. The favorable development of the Slovak economy, which constituted the basis for positive expectations of the population and a growing willingness to procure housing also by means of relatively easily available credit sources, has been the main factor to contribute substantially to a considerable increase in the prices of houses and flats. The growing housing demand was not saturated by an adequate supply, which led to a relatively dynamic growth of residential property prices in recent years. The situation changed in the 2nd quarter of 2008, when the real estate market gradually stagnated and residential property prices decreased between the individual quarters as a result of external and internal influences.

The paper characterizes a wider set of factors and selects factors that have substantially influenced the development of residential property prices in Slovakia from the 1st quarter of 2004. Based on a correlation and graphical analysis, the following indicators have been selected among the contemplated variables covering several areas:

- for the area of social and demographic factors, the indicator size of the population aged 25 to 44 years,
- for the area of social and economic factors, the indicator GDP,
- for the area of credit and financial factors, the indicator total volume of loans to households or the indicator volume of residential loans to households,

10 In the case of a multiple regression, it is necessary that the explanatory variables be correlated as much as possible with the explained variable and have a low mutual correlation.

11 Information on several approaches chosen in recent past to estimate the elasticities of the relationship between selected variables and residential property prices:
• The annex What drives house prices in the Slovak Republic of the OECD report: 2008 ECONOMIC REVIEW – THE SLOVAK REPUBLIC presents a model approach to the estimation of the parameters of the regression equation, in which the independent variables are: the real interest rate, real income per capita, the number of flats per capita and the ratio of inhabitants aged 25 to 44 years to the total number of inhabitants. Multivariate parameter estimates have been carried out, but the annex does not contain a model prediction of residential property prices in Slovakia for the coming periods of time.
• Box 5 of the annex of the Financial Stability Report for the first half of 2008 presents a model relationship between the prices of flats in EUR/m2 and the economic level in Slovakia. The following indicators were used as independent variables: GDP per capita measured in purchasing power parity with respect to the euro and Slovakia's price level with respect to the euro area. A comparison of the actual and forecast prices of flats implies conformity between their development from 2002 to the 1st quarter of 2008. In the 2nd quarter of 2008, however, the actual prices of flats were about 8% higher than the model prices.
• The article Flats Under Close Scrutiny of Scientists (see Trend – extra-reality, winter 2008, p. 26 and 27 for details) contains an econometric analysis of the factors that influence the prices of flats in the capital the most. The following indicators were examined as independent variables: area of the flat in m², degree of renovation of the flat, distance of the seat of the flat from the center, construction of the flat and age of the flat. The authors of the article say that the chosen model has to be understood rather as a proposed methodology for the calculation of a fair price of a flat than a system with long-term validity.

- for the area of supply factors, the indicator volume of building production related to the construction of residential buildings.

The paper provides a highly descriptive picture of the development of the set of indicators that have significantly influenced the development of residential property prices in Slovakia in recent years. At the same time, it represents an important step towards a subsequent regression analysis, which will enable to estimate the regression coefficients or elasticities for the individual explanatory variables with respect to the explained variable – the residential property price. The selection of an appropriate model can also set the stage for deliberations on the prediction of the development of residential property prices in the following quarters. A considerably limiting factor in forecasting the development of residential property prices in Slovakia is the relative shortness of the time series of available data, which considerably determines also the reliability of possible model estimates.

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