Development of Socio-economic Condition of the Population and the Real Estate Market – Research in the Czech Republic

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Abstract. The paper deals with the development of socio-economic condition of the population and the real estate market in the Czech Republic. It explores the influence of annual net household income (in CZK), reflecting the socioeconomic situation of the population. Provided the housing market is stabilized, household income becomes the factor affecting real estate market variables such as a predictive value of residential buildings and the number of finished and started apartments, examined in this study. Both variables and relationships between them are assessed using standard statistical tools, namely the average growth coefficient and the annual growth rate. The aim of the study is to verify the methodology of the measurement of the real estate market financial stability and to find out whether the real estate market development depends on the net income of the population. If so, common assumptions about the housing market stability are confirmed. Authoritative sources listed in the literature review section prove the importance of research on this issue. In terms of the data analysed, the following results were achieved. The real estate market in the Czech Republic shows long-term stability. In the short run, however, residential dwellings are in short supply, the rate of housing construction being lower than demand which rises with the improving socio-economic situation of the population. This will nevertheless not necessarily lead to financial instability in the future.

Keywords: Real estate market. Socio-economic situation. Czech Republic.

1 Introduction

The current domestic debate on the real estate market goes beyond the context of the Czech Republic. In a more general sense, it includes the financial stability of this market segment, raising a problem of whether the so-called real estate bubble is about to, or may potentially arise. This phenomenon can be described as the real estate market "overheating" which results in financial instability and the so-called real estate bubble burst. There is a plunge in real estate prices due to previous purchases of properties at prices that exceeded the financial potential of households, the net income being the indicator of their economic standing. The present research is based on the assumption that a household buys the property to meet its housing needs, not taking into account

potentially speculative or investment intention of the buyer. The study focuses on apartment construction, which primarily serves for housing since the majority of residential buildings are purchased by end-users - households using mortgage loans, their own savings or the combination of both. The net household income is the basis of the real estate market, determining the amount of the loan (banks approve it based on the applicant's net income) and generating savings to fund housing, the latter also, alternatively, as a financial contribution along with a mortgage loan. Thus, it can be assumed that the health of the real estate market as well as real property prices should correspond to net disposable income of households. The development of the real estate market attributes (factors such as an approximate value of residential buildings and completed and started apartments) is supposed to unfold in a desirable way – the mean coefficient of growth of the above variables being the same or lower than that of net household income, signalling that housing market trends are in line with those of household net disposable income, and thus proportionally corresponding to the socioeconomic conditions of the population. Then, we might conclude that the real estate market would not "heat up". It would mean that a high growth rate of property and housing prices does not necessary lead to a real estate bubble, providing this growth rate is in line with living standards of the population. Likewise, the annual growth rate of the housing market should correspond to that of household net income.

The purpose of this study is to explore the key attributes of the real estate market (residential housing), verifying their dependence on the socio-economic condition of the population measured by the net disposable income of households in the Czech Republic.

2 Literature review

The importance of ongoing research in the financial stability of the real estate market is highlighted by [8] and [11] who note that "In recent years, real estate bubbles have been commonplace in housing markets all over the world". The same situation could be expected in China [13] who note that "We review recent major crises around the world from 1980 to 2014. We then discuss the ways real estate crises develop into financial crises (considering that most recent financial crises actually trace their origins to real estate bubbles)" Generally, the emergence of a real estate bubble is associated with the 2008 crisis triggered by subprime mortgage debts in the U.S. "The global economic crisis of 2008 has demonstrated the severity of financial shock that can be caused by inconsiderate investments in the real estate market [6]". There are obvious real estate market cycles, [11] describing their four - recession, recovery, expansion and oversupply - phases. The Czech mortgage market is, however, specific. Not being burdened by the above-mentioned U.S. lending practices, it does not indicate a "severe" recession characteristic. Recently, nevertheless, growing fears of real estate bubble and market meltdown have appeared even in the Czech Republic due to rising property prices. The reason for it could be caused by following reason "Owning a house has become one of the main objectives in people's life. Given the high prices of the houses, the majority of the families apply for a loan. The real estate market has become a very

important mechanism in the England economic infrastructure [11]". The same is confirmed by [1] "Owning a house is a key factor in the social wellbeing of the English people. Even if for the majority of the families a house is not affordable, the banking system and the government are trying to reduce the burden." It seems clear from the above that customers who are interested in purchasing a real estate property tend to accept such a price that might be too high, their income not allowing for mortgage repayment. (Let us note that the banking system of the Czech Republic checks the creditworthiness of mortgage applicants, excluding those who are not able to secure and repay the loan.)

Ignoring the above controversial and difficult-to-quantify aspect, we can focus on crucial real estate factors such as market capacity, which is examined in terms of started and completed dwellings in the following sections of the paper. On the real estate marker capacity, [1] argue that "It is tempting to think of market capacity simply in volume terms, in the sense of a finite number of new homes that can be absorbed annually in each housing market area. While most debate about market capacity at planning inquiries takes place at this level, it ignores the crucial impact of price on capacity. Since speculative house-builders operate simultaneously in the housing and land markets, the way in which housing prices and land prices interrelate is central to unpacking the concept market capacity".

Other key real estate market factors are to be taken into account as well. As [3] point out, "at the local government level, there is a need to use reliable methods for the identification of similar real estate, which arises from many practical issues, especially from land management and land administration, e.g.:

- municipal development strategy planning or zoning plans
- decision-making by local authorities in the field of housing policy
- assessment of the condition of local real estate markets in the region
- strategic management of territorial entities
- forecasting the development of various areas [and]
- developing analyses and better decision-making by analysts, developers and investors".

The above references suggest that the situation on the real estate market is to be assessed through the prism of specific conditions of different countries. The issue of the Czech mortgage market is addressed by [9], who study the reasons for buying a property. Their findings imply that most buyers do not purchase a real estate property to do business, i.e. to make money from the asset. We can thus conclude that the key determinant of residential housing demand is the buyer's actual need for housing. This is also supported by the conditions of apartment ownership, the residents of Central and Eastern Europe, contrary to those of western countries, preferring privately owned housing to rental contracts see [10].

3 Methodology and Goals

The aim of the study is to verify the methodology of the measurement of the real estate market financial stability and to find out whether the real estate market development depends on the net income of the population. If so, common assumptions about the housing market stability are confirmed.

Statistical analysis tools, namely the average growth coefficient and annual growth rate, have been applied in the present study.

3.1 Average Growth Coefficient

The average growth coefficient indicates the dynamics of time series. [2] note that "if this coefficient is multiplied by 100, it indicates to how many percent of the time t-1 value has the time t value increased. Sometimes the term *growth rate* is used instead of coefficient of growth. *Average growth coefficient* (mean growth rate) is calculated as the geometric mean of individual growth coefficients." A standard calculation is done as follows:

$$\bar{k} = \sqrt[r-1]{\frac{y_2}{y_1} * \frac{y_3}{y_2} * \dots * \frac{y_r}{y_{r-1}}} = \sqrt[r-1]{\frac{y_r}{y_1}},$$
(1)

Source: [2]

Where:

y = the variable analysed in a given year

r = the number of growth coefficients

3.2 Annual Growth Rate

The annual growth rate can be expressed in percentage or absolute terms, indicating a percentage or absolute change in the variable compared to the previous year. A general fraction to calculate the growth rate is

$$\frac{(y_t - y_{t-1})}{y_t},\tag{2}$$

Source: [2] its absolute increase being written as: $y_t - y_{t-1}$,

$$y_t - y_{t-1}, \tag{3}$$

Where: y_t = the variable in a given year y_{t-1} = the variable in the previous year

4 Results

In the next chapter will be solved net household income (average growth coefficient), residential building value (average growth coefficient), annual growth rate of net household income and residential building value, completed apartments (average growth coefficient), annual growth rate of net household income and completed apartments, started apartments (average growth coefficient) and annual growth rate of net household income and started apartments.

4.1 Data Sources

The research was carried out using 2005–2016 data obtained from [5] and [7], 2017 data not being available at the time of conducting the research. Summarized below are the results of the variables analysed over the period between 2005 and 2016.

Year	Net cash income	Absolute increase	Growth rate	Growth coefficient
2005	108,676	N/A	N/A	N/A
2006	116,549	7,873	7.244 %	1.072
2007	125,817	9,268	7.952 %	1.080
2008	137,497	11,680	9.283 %	1.093
2009	142,402	4,905	3.567 %	1.036
2010	145,437	3,035	2.131 %	1.021
2011	145,081	-356	-0.245 %	0.998
2012	152,125	7,044	4.855 %	1.049
2013	150,488	-1,637	-1.076 %	0.989
2014	153,269	2,781	1.848 %	1.018
2015	157,623	4,354	2.841 %	1.028
2016	164,852	7,229	4.586%	1.046

Table 1. Net household income (in CZK) – average growth coefficient (2005–2016) [5].

Tab. 1. presents net household income in CZK and average growth coefficient. The highest growth rate was recorded in 2008 with 9.283% increase. The decline to minus was recorded in 2011 and 2013. The average coefficient of net income growth is 1.039.

Tab. 2 presents residential building value, absolute increase, growth rate and growth coefficient. There were big changes in 12 monitored years. The approximate value of residential buildings has an average growth coefficient of 0.989.

Year	Residential building value (approx., in CZKm)	Absolute increase	Growth rate	Growth coefficient
2005	97,259	N/A	N/A	N/A
2006	111,444	14,185	14.585 %	1.146
2007	116,032	4,588	4.117 %	1.041
2008	121,822	5,790	4.990%	1.050
2009	112,000	-9,822	-8.063%	0.919
2010	95,473	-16,527	- 14.756%	0.852
2011	97,222	1,749	1.832 %	1.018
2012	81,462	-15,760	-16.210 %	0.838
2013	72,348	-9,114	-11.188%	0.888
2014	76,704	4,356	6.021 %	1.060
2015	81,568	4,864	6.341 %	1.063
2016	85,951	4,383	5.373 %	1.054

Table 2. Residential building value - average growth coefficient (2005-2016) [5].

Tab. 3 compare growth rate of net cash income with growth rate of residential building value. Five times were not recorded growth rate of net cash income in the connection to growth rate of residential building value.

Year	Growth rate of net cash income	Growth rate of residential building value	Growth rate of net cash income \geq growth rate of residential building value
2005	N/A	N/A	N/A
2006	7.244 %	14.585 %	NO
2007	7.952 %	4.117 %	YES
2008	9.283 %	4.990%	YES
2009	3.567 %	-8.063%	YES
2010	2.131 %	- 14.756%	YES
2011	-0.245 %	1.832 %	NO
2012	4.855 %	-16.210 %	YES
2013	-1.076 %	-11.188%	YES
2014	1.848 %	6.021 %	NO
2015	2.841 %	6.341 %	NO
2016	4.586%	5.373 %	NO

Table 3. Annual growth rate of net household income and residential building value [5].

The average growth coefficient of household net disposable income is higher than the growth rate of the number of dwellings (the value for the builder), the former amounting to 1.039, the latter reaching 0.989. Thus, in terms of the value of residential buildings examined in the given period, the real estate market has proven stable.

Tab. 4 presents completed apartments, absolute increase/decrease, growth rate and growth coefficient. The biggest growth rate was recorded in 2007 and the biggest decline in 2011. The average coefficient of growth of completed apartments is 0.983.

Year	Completed	Absolute	Growth rate	Growth
	apartments	increase		coefficient
2005	32,863	N/A	N/A	N/A
2006	30,190	-2,673	-8.134%	0.919
2007	41,649	11,459	37.956 %	1.380
2008	38,380	-3,269	-7.849%	0.922
2009	38,473	93	0.242 %	1.002
2010	36,442	-2,031	-5.279 %	0.947
2011	28,630	-7,812	-21.437 %	0.786
2012	29,467	837	2.924%	1.029
2013	25,238	-4,229	-14.352%	0.856
2014	23,954	-1,284	-5.088%	0.949
2015	25,095	1,141	4.763%	1.048
2016	27,333	2,238	8.918 %	1.089

Table 4. Completed apartments - average growth coefficient (2005-2016) [7].

Tab. 5 presents comparison of annual growth rate of net household income and completed apartments. Only in three monitored years was not growth rate of net cash income bigger than growth rate of completed apartments.

Year	Growth rate of	Growth rate of	Growth rate of net cash
	net cash	completed	income \geq growth rate of
	income	apartments	completed apartments
2005	N/A	N/A	N/A
2006	7.244 %	-8.134%	YES
2007	7.952 %	37.956 %	NO
2008	9.283 %	-7.849%	YES
2009	3.567 %	0.242 %	YES
2010	2.131 %	-5.279 %	YES
2011	-0.245 %	-21.437 %	YES
2012	4.855 %	2.924%	YES
2013	-1.076 %	-14.352%	YES
2014	1.848 %	-5.088%	YES
2015	2.841 %	4.763%	NO
2016	4.586%	8.918 %	NO

Table 5. Annual growth rate of net household income and completed apartments [5, 7].

The average growth coefficient of household net monetary income (1.039) also exceeds that of the number of finished apartments, the latter being 0.983. It can therefore be

concluded that, regarding a long-term trend of completed dwellings traced in the study, the real estate market has been stabilized.

Tab. 6 presents started apartments, absolute increase, growth rate and growth coefficient. The biggest decline in started apartments according to absolute decrease and growth rate was recorded in 2010. The biggest increase was recorded in 2014 with growth rate 10.146%. Absolute increase was the biggest in 2006 with 3,366 new apartments.

Year	Started apartments	Absolute increase	Growth rate	Growth coefficient
2005	40,381	N/A	N/A	N/A
2006	43,747	3,366	8.336 %	1.083
2007	43,796	49	0.112%	1.001
2008	43,531	-265	-0.605%	0.994
2009	37,319	-6,212	-14.270%	0.857
2010	28,135	-9,184	-24.609%	0.754
2011	27,535	-600	-2.133%	0.979
2012	23,853	-3682	-13.372 %	0.866
2013	22,108	-1 745	-7.316%	0.927
2014	24,351	2 243	10.146 %	1.101
2015	26,378	2 027	8.324%	1.083
2016	27,224	846	3.207 %	1.032

Table 6. Started apartments – average growth coefficient (2005–2016) [7].

The average coefficient of growth of started apartments is 0.965.

Tab. 7 presents comparison of growth rate of net income and growth rate of started apartments. In 8 years was growth rate of net income bigger than growth rate of started apartments.

Also, the average growth coefficient of net cash income is higher than that of the number of started apartments which has the value of 0.965. As regards dwellings under construction observed in the long-run perspective, we can again summarize that the real estate market keeps stable.

Year	Growth rate of net income	Growth rate of started apartments	Growth rate of net income ≥ growth rate of started apartments
2005	N/A	N/A	N/A
2006	7.244 %	8.336 %	NO
2007	7.952 %	0.112%	YES
2008	9.283 %	-0.605%	YES
2009	3.567 %	-14.270%	YES
2010	2.131 %	-24.609%	YES
2011	-0.245 %	-2.133%	YES
2012	4.855 %	-13.372 %	YES
2013	-1.076 %	-7.316%	YES
2014	1.848 %	10.146 %	NO
2015	2.841 %	8.324%	NO
2016	4.586%	3.207 %	YES

Table 7. Annual growth rate of net household income and started apartments [5, 7].

Summarized below are the results of the variables analysed over the period between 2005 and 2016.

Table 8. Annual growth rate [5, 7].

The average growth coefficie	ent of	1,039
household net disposable income		
The average growth coefficie	ent of	0,989
dwellings (the value for the builded	er)	
The average growth coefficie	ent of	0,983
completed apartments		
The average growth coefficie	ent of	0,965
started apartments		

5 Conclusion and Discussion

Analysis of long-term factors (net income growth rate, residential building value, the number of completed and started dwellings) over the 2005–2016 period has shown that the real estate market is stabilized, its development being driven by net disposable income trends.

Growth rate comparison	Relationship confirmed	Relationship not confirmed
Growth rate of net income \geq growth rate of residential building value	54.54 %	45.45 %
Growth rate of net income \geq growth rate of completed	72.72 %	27.27 %
Growth rate of net income \geq growth rate of started apartments	72.72 %	27.27 %

Table 9. Comparison of annual growth rates of individual variables.

In terms of the annual growth rate of particular variables, we can conclude that the increase in net cash income is in most cases greater than that of completed and started apartments. This, however, is reflected in the growth rate of the value of residential buildings (see above). Short-term (year-on-year) analysis indicates the possibility of overheating the market, demand for dwellings outstripping supply (of finished and started ones) due to an increase in net household income. Such a development does not necessarily lead to a real estate bubble signalling market instability. This is not the case if the amount of loans (the value of residential buildings) corresponds to net income value, i.e. banks provide mortgage credits based on clients' current and future earnings. Housing supply meeting demand in the long-run is another prerequisite to be fulfilled. Since average growth rate values in the Czech Republic throughout the period 2005–2016 are in line with the above conditions, the country enjoys a stable real estate market. In spite of the fact given below, it is necessary to control the situation with the procedure given by [12].

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