



## REALISTIC EVALUATION OF THE RATIO: LOAN-TO-VALUE – THE KEY TO MINIMISING THE CREDIT RISK

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**Abstract:** As a rule, long-term bank loans entail solid security – a mortgage, regardless of their purpose. The mortgaged property has its specific market value during the loan approval period but during the repayment period, the value of the real estate varies. This is the reason why the initially specified indicator of the coverage of loans with the value of the mortgage - the LTV ratio changes, which in turn increases the risk of loan repayment. The aim of this paper is to draw attention to the necessity of establishing adequate initial LTV ratios (together with other important ratios). This would help nullify the risk of any variations in real estate prices, the loan currency risk, the interest rate risk, as well as the risk of an increase in bank's claims because of a long foreclosure process. The paper analyses effects of changes in LTV ratios caused by varying circumstances using the case study method. The comparative method analyses the changing trends of data on the LTV ratios for the already approved loans over a seven-year period by comparing the flow of the loan capital sum with the real value of the mortgage for three types of loans. The conclusion reached is that commercial banks should establish the initial LTV ratio for various long-term loan products and thus prevent its rise. Banks should do this by taking into account all the factors that cause the ratio's increase, and thus give preference to the reduction of the credit risk and not the attractiveness and accessibility of loan products.

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## 1. Introduction

The quality of the loan collateral (loan security instruments) is one of the most important parameters of a good loan. Depending on the type of the loan product, commercial banks insist on different types of collaterals. As a rule, long-term loans are secured by a tangible security – a mortgage. A typical security for personal loans is the very residential property that is the purpose of the loan. When we talk about the segment of small and medium-sized enterprises, commercial banks insist on a residential real estate as a mortgage security (owned usually by the business owner). When it comes to corporate customers, who apply for sizeable loan amounts, business complexes (often in combination with other collaterals) serve as the loan security.

A generally accepted indicator of the value of the mortgage collateral during the loan approval period is the LTV ratio, calculated as follows:

$$\text{LTV} = \text{Loan-To-Value (the loan amount /the market value of the mortgage)} \quad (1)$$

A lower LTV ratio implies a greater ‘coverage’ of the loan with the mortgage and, as a result, a lower loan risk. Conversely, a high LTV percentage implies a higher risk and a possibility that the mortgaged property does not provide an adequate value to cover the loan. The calculation of the LTV ratio becomes more complicated when there are multiple loans and multiple lenders at different levels of priority (Arito et al., 2013).

Given the lack of available data on changes in prices of business real estate, the focus of the analysis presented in the paper is on the changes in prices of residential real estate objects, which usually serve as the mortgage for personal loans and loans taken out by small businesses. The main sources of data used in the paper are the database of the National Mortgage Insurance Corporation (NMIC) as well as databases of national institutions involved in the monitoring of the real estate market. The aim of the paper is to ascertain the trend of changes in LTV ratios and to compare data relating to loan balances in order to assess the real risk to the loan collection during various repayment periods, especially during the decline in real estate prices. Market conditions can be the cause of the sale of mortgaged property at a price lower than expected and over a period longer than expected (Turner, 2006). The significance of the analysis lies in recommendations it provides for banks about the importance of an adequate and realistic estimate of initial LTV ratios as this can help ‘nullify’ adverse effects in the repayment period, especially when it comes to medium- and long-term loans. Medium-term loans are approved for a period of one to five years, and long-term loans for a period longer than five years (Bjelica et al., 2001.). Variations in the market price of the mortgaged real estate are not the only factor that affects the LTV ratio. There are also factors such as exchange rates (especially loans expressed in CHF), changes in interest rates as well as

the process of collecting the mortgaged property, which altogether over a short period can significantly raise bank's claims and, thus, the LTV ratio itself.

## **2. The Theoretical Framework**

The term 'mortgage' comes from old French and it used to mean the 'death vow', whereby the death referred not to the death of the borrower but to the death of the loan (Mc Donald & Thornton, 2008). The term actually emphasises the fact that mortgages have a fixed date of maturity. Today mortgages are usually paid in instalments (quarterly or monthly), and not as lump sums at the date of maturity. The mortgage market encompasses institutions and individuals involved in mortgage finances. The primary mortgage market is the market from which the mortgage originates, while the secondary mortgage market is the market where mortgages (loans) are bought and sold.

The mortgage can be understood in a narrow meaning that we use in the paper, namely to denote a real right that enables the right holders to save the mortgaged property from a forced sale if the borrower fails to settle their financial obligations. The value of the mortgage may not be adequate and its sale may not fully settle the creditors (Hadžić, 2009).

Several factors play a role in the assessment of the risk in extending an individual loan. They are: the payment-to-income ratio or the PTI ratio (a monthly instalment amount that refers to real estate taxes divided by the borrower monthly income); the debt-to-income ratio or the DTI ratio (refers to the relation between all monthly instalments and the monthly gross income), and the loan-to-value ratio or the LTV ratio. The loan-to-value or the LTV ratio is the loan amount divided by an estimated (or appraised) value of the property, whereby the difference between the estimated property value and the loan amount is covered with the down payment (Mc Donald & Thornton, 2008). Several factors lead to a high level of LTV ratios, such as the fall in real estate prices, loan conditions, the property type, the loan purpose, the agreed repayment period, and regulations (Qi, 2009).

There are no strict and ready-made rules about these ratios as other factors such as the credit history of the borrower, the credit worthiness of the individual, etc. are important as well. However, some guidelines do exist. The PTI ratio higher than 25% or the DTI ratio higher than 36% give reasons for concern. On the other hand, the LTV ratio lower than 80% is considered acceptable and non-risky. In general, the higher the ratios, the greater is the risk of default for the loan considered. If these ratios are well above the mentioned limits or other parameters of the loan are low, for instance the credit score, a loan can be labelled as subprime (Mc Donald & Thornton, 2008). Should this be the case, creditors will usually set a higher interest rate and/or higher required additional collaterals/mortgages. Lin insisted on an optimal LTV ratio,

reinforcing the argument that default penalties are more efficient in solving the problem of default mortgages than collaterals (Lin, 2014). Assessing the mortgage market in Hong Kong in circumstances of negative equity induced by decreasing prices of real estate, Wong et al. prescribed the maximum LTV ratio at 70% (Wong et al., 2011), additionally emphasising the importance of an adequate LTV ratio.

Effective policies of LTV ratios have important connections with and effects on the financial stability, credit growth, and a reduced systemic risk linked with the real estate market (Wong et al., 2015). The LTV relates to other parameters as well. Questioning the liquidity constraints, some authors concluded that the policy of a low LTV ratio has an important outcome in a rising and high savings rate in the economy, coupled with other positive effects such as the strengthening of growth and the rise in productivity and welfare (Japelli & Pagano, 1994). The analysis of the mortgage market in the EU shows that there are marked (major) differences among mortgage markets in EU member states which are related to a higher development flexibility present in the market and produce stronger monetary policy impacts on mortgage markets in the more deregulated national markets (Calza et al., 2013).

The crisis in the mortgage market could spill over to the credit market, which we could term 'a classic form of unfavourable dynamics'. This is the mechanism of transition of the crisis from the mortgage market to the credit market, which can altogether result in a genuine banking crisis (Marinkovic, 2009).

The credit risk increases in line with the increase in LTV ratios and DTI (debt-to-income) ratios (Dietsch & Welter-Nicol, 2014). LTV limits (and DTI ratios) need to be set carefully or complemented with other schemes to ensure an appropriate trade-off between financial stability benefits and societal preferences for home ownership (Brockmeijer, 2012). For housing loans the initial calculation of creditworthiness (the DTI ratio) is particularly important, as well as the currency compliance between a client's income and their credit commitments. The currency compliance is important also when we compare the loans currency to the real estate market currency.

A subprime loan experience is also very important for addressing the possibility of default loans in a more effective way. There is evidence now that the credit boom in 2001-2006 was unsustainable due to several factors, such as: a declining quality of borrowers during the period of reference, the ex-post adjustment of loans, decreasing collateral requirements, and the absence of a full documentation requirement. Additionally, lenders were aware of a deteriorated quality associated with high LTV ratios and of an increase in the mortgage rate depending on the LTV ratio (Demyanyk & Hemert, 2011).

When it comes to international banking groups, the question is what the effect of contaminated portfolios of mortgage instruments on the local banking markets is. Some adverse effects like credit contractions are visible but the losses of parent banking groups should not have any effect on the decline in the solvency of local banking companies (Marinkovic, 2009).

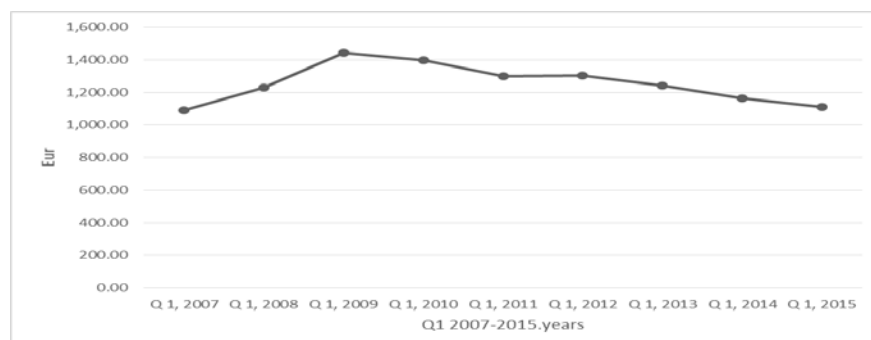
According to an IMF study done in six countries (Brazil, Hong Kong, Korea, Malaysia, Poland and Romania) regarding the LTV ratios limits of 60-85%, a high LTV ratio of long-term loans is linked with the increase in the level of problematic loans (Luis, 2015).

Similarly, the experience of transition economies in the region of Southeast Europe clearly shows that countries that had experienced a credit boom prior to the global financial crisis of 2008 like Croatia, Romania and Serbia faced a serious problem of non-performing loans (NPLs) during the crisis. This situation deteriorated further with the stagnation of economic activity and the decline in prices of the real estate (IMF, 2015). It is important to point to the link between adequate LTV ratios and the level of problematic loans. The total gross NPLs of the banking sector in Serbia during the first quarter of 2015 reached 22.6% of the total gross loans, which is by 1.1% more than at the end of the last quarter of 2014 (Report of the NBS, 2015). This fact underlines the importance of quality credit securities, primarily the mortgage, and thus of the efficient evaluation of LTV ratios.

### 3. Real Estate Prices, the Interest Rate Risk, the Currency Risk, and Their Influence on the LTV Ratio

Real estate prices are subject to change. During the period 2009-2012 in the Belgrade region the fall in real estate prices was 9.76%, and in the period 2009-2015 an average fall in prices in the Belgrade region was 23.07%. The following chart shows the trend in prices per m<sup>2</sup>:

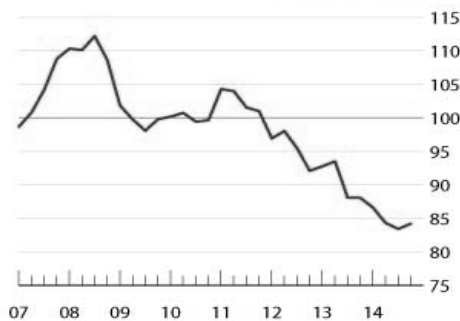
**Figure 1 Average Prices per m<sup>2</sup> in EUR, by Belgrade Regions (Q1 2007-2015)**



Source: NMIC, 2015

The fluctuation in real estate prices is modelled separately for each country as a function of income, interest rates, credit, construction activity, and the employment rate (Vizek, 2010). The falling trend of real estate prices in recent years is noticeable in countries of the region as well, as can be clearly seen from the charts below. Slovenia and Croatia have also registered the fall in average real estate prices since 2011.

**Figure 2 Slovenia - House Price Index**



**Figure 3 Croatia - Property Prices**



Source: [www.globalpropertyguide](http://www.globalpropertyguide) (price index 2010 = 100)

Beside the risk of volatility in real estate prices, there is a specific interest rate risk, and the two may bring about an increase in the balance of the loan. Interest rates for housing loans consist of the interest margin and the key interest rate. According to the provisions of the Law on the Protection of Consumers of Financial Services, the interest margin of the bank (for personal loans) is fixed while the key interest rate is in most cases represented with the six-month Euribor or Libor (CHF). Taking into account the current monetary policy of the EU, these rates are at a record low but this can change in the forthcoming period. There are significant fluctuations in reference rates (of over 5%), and this may have a significant impact on the loan balance flow and, therefore, on the LTV itself. For example, a 6M Euribor rate was 5.405% (on 01.10.2008) but six years later the 6M Euribor was 0.181% (on 01.10.2014/at [euribor-rates.eu](http://euribor-rates.eu)). When we talk about Libor rates, the 6M Libor was 2.177% (on 01.12.2008) but six years later the 6M Libor was 0.1507% (on 01.12.2014/at [global-rates](http://global-rates)). If there is a visible increase in key interest rates, it will result in an increase in the outstanding amount. This may eventually have an impact on the increase in LTV ratios. The impact of changes in key interest rates is not the subject of the analysis presented in this paper. These rates have been extremely low in recent years but the risk of their growth needs to be taken into account.

An average interest rate for the euro-indexed loans extended to companies in Serbia at the end of 2015 was 4.2%, while for the dinar loans it equalled

6.2%. An average interest rate for loans extended to individuals equalled 5.9% for euro-indexed loans and 12.1% for those indexed in dinars in the same period (NBS, 2015). The fall in interest rates can lead to the reduction of the credit debt to a certain extent, but there will probably still be a drop in the LTV.

Loans indexed in a foreign currency can directly affect the LTV ratio because of the changes in the exchange rate. Growth in the average value for the middle exchange rate for EUR in the period 2009-2012 was 21%, and for the period 2009-2015 it was at 28.58%. For CHF the growth in average values for the average exchange rate was 50.79% for the period 2009-2012, while in the period 2009-2015 it was 81.82%.

When it comes to the EU, the initial LTV ratio varies from country to country, from 65% in Slovenia to 91% in France. The loan maturity of mortgage loans in countries such as Greece and Hungary is about 20 years while in Portugal it is up to 40 years. Variable interest rates are standard in many countries except in Belgium, France, the Netherlands, and the UK (Gerlach-Kristen et. al, 2015).

Because of the periodical updating of the loan documentation (usually every three years), commercial banks revise the evaluation of real estate values. If the mortgage is ascertained as inadequate, this will cause much worse classification of clients and the bank's balance sheet will be loaded with high costs (Decision on the classification of balance sheet assets and off-balance sheet items; NBS, 2014). According to local regulations, estimates of the real estate market and of the construction value are exclusively made by authorised appraisers or legal persons licensed for that activity. The most widely accepted method for estimating the market value is the comparative method.

The residential real estate is one of the most important types of the real estate used as the mortgage security. For the residential real estate market to be functional, it must in the first place be effective and available but, above all, the macroeconomic stability must be built. The demand for the residential real estate is shaped by other factors as well, such as government subsidies and demographic trends (Ljumović, 2014).

During the period of increased demand for housing loans, domestic banks granted a high LTV ratio. This significantly increased the balance sheet assets of individual banks but the quality of these assets is questionable. Fortunately, in the domestic banking sector there were no models similar to those present in the banking sector of the United States (linked with housing loans) that actually generated the economic crisis. Most US house price models broke down in mid-2000s, which can be associated with the subprime mortgage boom (Duca, 2010).

It is not rare that initial evaluations produce the maximum possible market price of the mortgaged real estate which, when the moment of sale comes, becomes much lower. Inadequacy of the mortgage can be a result of some sort of operational risks in banks. The operational risk can be defined as the risk that causes poor implementation of information systems, the systems of reporting on internal rules for the risk monitoring, inadequately designed internal procedures for taking corrective actions, etc. (Đukić et al., 2003).

Given the importance and the actuality of the topic, the following hypotheses are made:

*H<sub>1</sub> The initially identified high-quality LTV ratio is the basis for a high-quality credit arrangement. It depends primarily on the type of the loan arrangement (the loan maturity and the loan repayment plan). Risks that need to be anticipated are: changes in real estate prices, changes in the currency exchange rate, and changes in the interest rate. Real costs of the mortgage implementation process must also be anticipated.*

*H<sub>2</sub> During the analysed seven-year period when prices of mortgaged real estate were falling the maximum LTV ratio for an adequate collateral would be at 50-70% depending on the type of loan. With this LTV percentage, the most important risks would be annulled.*

*H<sub>3</sub> There is a necessity for systemic and comprehensive solutions so that commercial banks could solve the problem of reducing the level of the mortgaged real estate market value because of its impact on the overall financial stability of the country.*

*H<sub>4</sub> If commercial banks put the attractiveness of their credit products before a high-quality and collectible collateral with the aim of achieving better business performance in the short run, they could drastically jeopardize both their own business and the financial system itself.*

#### **4. The Research Methodology**

In order to test the above stated hypotheses, we used the method of case studies. The subject of the analysis are three specific credit arrangements with different maturity periods and loan currencies, while the analysed periods are the same. The data obtained on the fluctuations of LTV ratios for all three cases are then cross-compared, and relevant conclusions are made. Specifically for the purpose of this paper, the data on changes in real estate prices collected and published by the National Mortgage Insurance Corporation (NMIC) are through a case study compared with changes in the level of loans balance of three different types of loans. Loan repayment plans are based on monthly instalments and data thereof are collected every three months (as data on property prices that they are



compared with are quarterly). The paper analyses data on real estate prices for the period 2009-2015 in order to track trends in real estate prices and the LTV ratio flow. As the LTV ratio puts the loan amount in correlation with the 'coverage' of the real estate market value, both indicators are subject to change. The loan amount varies according to the loan repayment plan (the loan balance) if the repayment is regular (without delays), otherwise the loan balance flow will not be as initially assessed in the repayment plan. Variations in the real estate market value (price) are the most important factor of the LTV ratios change, and the collection of data on prices and the monitoring of trends are of great importance. The NMIC provides the DOMex indicator as it has been processing data on changing real estate prices per m<sup>2</sup> of the residential real estate for many years now. The Domex Index is a unique indicator of trends in real estate prices by areas in the Republic of Serbia (NMIC, 2016). The relevance of this indicator lies in the fact that it uses data on actual rather than advertised property prices. The DOMex index is calculated as an average value of all prices per m<sup>2</sup> in a certain period compared with an average price per m<sup>2</sup> in the base period in a territory. On breaking down the index by periods and by territory, the trends in prices of the residential real estate can be tracked. This indicator can be used for re-evaluating the market value of the LTV. Data are published quarterly. The following table shows trends in real estate prices per m<sup>2</sup> in four regions of the Republic of Serbia in 2007-2015 (according to the NMIC):

**Table 1 Average Prices per Square Meter in EUR by Regions**

EUR/m <sup>2</sup>	Q1 2007	Q1 2008	Q1 2009	Q1 2010	Q1 2011	Q1 2012	Q1 2013	Q1 2014	Q1 2015
<b>Serbia</b>	733.6	807	866.6	985.6	936.3	958.8	952.4	900.3	848.3
<b>Belgrade</b>	1,089	1,229	1,442	1,396	1,298	1,301	1,243	1,164	1,109
<b>Vojvodina</b>	525.2	594.7	529.6	709.2	703	676.3	702.3	660.1	656.9
<b>S/N Serbia</b>	563.6	546.4	584.8	680.7	625.9	634	639.4	624.6	595
<b>C/W Serbia</b>	542.7	592.1	638.5	665.4	665.8	656.7	650.4	663.9	648.4

Source: NMIC 2015

On the basis of data on trends in real estate prices and the repayment plans for the loans in matter, changes in LTV ratios during the period of reference are analysed for three cases.

The first case is the case of regular repayment of a long-term investment loan to the amount of EUR 100,000, extended for a seven-year period (84 annuities) to the company 'AB' Belgrade; according to the plan of repayment in

this case, the loan balance decreases. The annual interest rate was 10%. The loan was approved in 2009 and fully repaid in 2015. The mortgage was a residential real estate in Belgrade with the surface area of 110m<sup>2</sup>. The initial LTV was 63%. In the first year, the LTV ratio was equal to the initially established one. In this case, the business owner pledged their own residential property to take out a business loan for his own company. Commercial banks in Serbia regardless of the type of the loan insist on the mortgage on residential properties owned by individuals as they expect credit users to have a more 'responsible' approach to the loan repayment in this way. Owing to an unchanged value of mortgages during the period of reference, the LTV was reduced and the risk of the loan repayment was thus diminished. The market value of the property taken is the price per square meter that the NMIC assesses for the period of reference. For each quarter the value of the mortgage is compared with the loan balance (every three months). The results for this case are given in the table below:

**Table 2 The LTV Ratio During the Period of the Business Loan Repayment (2009-2015)**

quarters 2009-13	price EUR/m <sup>2</sup>	loan balance	mortgage value	LTV%
Q1/2009	1,442.17	100,000.00	158,638	63%
Q2/2009	1,413.36	98,290.67	155,469	63.22%
Q3/2009	1,340.48	95,767.72	147,453	64.94%
Q4/2009	1,398.15	93,180.18	153,796	60.58%
Q1/2010	1,395.84	90,501.82	153,542	58.94%
Q2/2010	1,389.10	87,732.74	152,801	57.41%
Q3/2010	1,372.40	84,941.42	150,964	56.26%
Q4/2010	1,302.61	82,078.69	143,287	57.28%
Q1/2011	1,297.95	79,121.25	142,775	55.42%
Q2/2011	1,277.34	76,069.24	140,507	54.14%
Q3/2011	1,279.97	72,981.46	140,796	51.83%
Q4/2011	1,292.90	69,814.74	142,219	46.49%
Q1/2012	1,301.36	66,548.99	143,150	46.49%
Q2/2012	1,255.16	63,199.13	138,068	45.77%
Q3/2012	1,238.75	59,779.91	136,263	43.87%
Q4/2012	1,223.07	56,273.56	134,538	41.82%
Q1/2013	1,243.19	52,663.61	136,751	38.51%
Q2/2013	1,229.28	48,952.60	135,221	36.20%
Q3/2013	1,211.72	45,175.58	133,289	33.90%
Q4/2013	1,195.42	41,302.1	131,496	31.40%
Q1/2014	1,164.01	37,319.57	128,041	29.14%

<b>Q2/2014</b>	1,149.52	33,228.35	126.447	26.28%
<b>Q3/2014</b>	1,160.16	29,051.65	127.618	22.76%
<b>Q4/2014</b>	1,149.57	24,768.33	126.453	19.57%
<b>Q1/2015</b>	1,109.41	20,370.15	122.035	16.70%
<b>Q2/2015</b>	1,146.34	15,857.56	126.097	12.60%
<b>Q3/2015</b>	1,105.08	11,239.33	121.559	9.5%
<b>Q4/2015</b>	1,113.97	6,503.27	122.537	5.3%

Source: NMIC data 2009-2015, the author's calculation

Owing to regular loan repayment, the LTV ratio was reduced because the loan debt decreased faster than mortgage prices. This means that over a period of seven years the value of mortgages decreased by 22.75%, and the loan was ultimately entirely settled.

The second case is the analysis of LTV ratios in the period 2009-2015 for a housing loan approved to a family 'BC' from Belgrade in 2007 to the amount of EUR 50,000 for the period of 20 years, with the participation of 23%. The initial market value of the mortgage was EUR 65,000 (60m<sup>2</sup>), and it produced an initial LTV of 76.92%. As the period of the loan repayment is long, its balance decreases more slowly than that of loans with the maturity of several years. If we take into account the foreign currency exchange risk as is necessary for the housing loans indexed in CHF, the LTV for the relevant period can easily become quite high. Therefore we will analyse the third case, namely the case of a loan extended to the family 'DE' from Belgrade (the amount of the loan, the loan maturity, the analysed period, and the security are the same, the only difference being the indexation of the loan in CHF). The data for both cases (the second and the third) are given in the table below – the housing loan indexed in EUR (the fourth column) and the housing loan indexed in CHF (the eighth column). The third column is the market value of the mortgage, calculated on a quarterly basis, while the fifth and the ninth column present LTV ratios for both cases.

**Table 3: The LTV Ratio During the Period of the Housing Loans Repayment (2009-2015)**

quarters 2009-13	price EUR/m <sup>2</sup>	mortgage value	EUR loan balance	LTV% EUR loan	CHF loan balance	EUR /CHF	calculated in EUR	LTV % CHF loan
<b>Q1/2009</b>	1,442.2	86,530.2	47,578.1	54.98	78,466.3	1.491	52,626.6	60.82
<b>Q2/2009</b>	1,413.4	84,801.7	47,169.2	55.62	77,791.9	1.509	51,551.9	60.79
<b>Q3/2009</b>	1,340.5	80,429.0	46,761.7	58.14	77,119.8	1.524	50,603.6	62.91

Q4/ 2009	1,398.2	83,889.2	46,355.5	55.25	76,449.9	1.518	50,362.3	60.03
Q1/ 2010	1,395.8	83,750.5	45,944.2	54.85	75,771.7	1.487	50,956.1	60.84
Q 2/ 2010	1,389.1	83,346.1	45,515.5	54.61	75,064.8	1.423	52,751.1	63.29
Q3/ 2010	1,372.4	82,343.9	45,087.7	54.75	74,359.3	1.314	56,590.1	68.72
Q4/ 2010	1,302.6	78,156.4	44,660.8	57.14	73,655.3	1.34	54,966.6	70.32
Q1/ 2011	1,297.9	77,877.1	44,228.6	56.79	72,942.5	1.249	58,400.7	74.99
Q2/ 2011	1,277.3	76,640.5	43,779.1	57.12	72,201.3	1.304	55,369.1	72.24
Q3/ 2011	1,280	76,798.5	43,330.1	56.42	71,460.8	1.222	58,478.5	76.14
Q4/ 2011	1,292.9	77,573.8	42,881.4	55.27	70,720.9	1.219	58,015.5	74.78
Q1/ 2012	1,301.4	78,081.6	42,427.2	54.33	69,971.8	1.218	57,448.1	73.57
Q2/ 2012	1,255.1	75,309.5	41,960.2	55.71	69,201.7	1.205	57,428.8	77.26
Q3/ 2012	1,238.7	74,324.9	41,487.5	55.81	68,422.2	1.201	56,970.9	76.65
Q4/ 2012	1,223.1	73,383.9	41,014.6	55.89	67,642.4	1.209	55,949.1	76.24
Q1/ 2013	1,243.2	74,591.6	40,535.9	54.34	66,852.9	1.207	55,387.6	74.25
Q2/ 2013	1,229.3	73,756.5	40,041.7	54.28	66,037.9	1.216	54,307.5	73.63
Q3/ 2013	1,211.7	72,703.4	39,546.9	54.39	65,222.1	1.23	53,026.1	72.93
Q4/ 2013	1,195.4	71,725.2	39,051.5	54.44	64,404.9	1.22	52,790.9	73.60
Q1/ 2014	1,164	69,840	38,549.9	55.19	63,577.7	1.225	51,900.1	74.31
Q2/ 2014	1,149.5	68,971.2	38,031.7	55.14	62,723.1	1.218	51,496.8	74.66
Q 3/ 2014	1,160.2	69,609.6	37,512.3	53.88	61,866.6	1.214	50,960.9	73.21
Q4/ 2014	1,149.6	68,974.2	36,991.7	53.63	61,008	1,206	50,587.1	73.34
Q1/ 2015	1,109.4	66,564.6	36,464.6	54.78	60,138.7	1,203	49,990.6	75.1
Q2/ 2015	1,146.3	68,780.4	35,921.1	52.22	59,242.5	1,045	56,691.4	82.4
Q3/ 2015	1,105.1	66,304.8	35,375.9	53.35	58,343.4	1,042	55,991.6	84.44
Q4/ 2015	1,113.9	66,838.2	34,828.9	52,1	57,441.2	1.088	52,795.2	78.98

Source: NMIC data, the author's calculation

If we analyse data presented in the table above, we will see that during the seven-year period the value of mortgages decreased by 22.76%, and that during the period of reference the amount of the loan in euros decreased by 26.79%, which led to the stability of LTV ratios as they changed by less than 1%. This means that the risk did not increase. If a downward trend of real estate prices were more pronounced and the repayment were regular, the LTV would increase.

Unlike housing loans indexed in EUR, the LTV ratio for housing loans indexed in CHF for the same period had a rise of 23.62%. In the third quarter of 2015 the LTV ratio reached the maximum value of up to 84.44%, which is above the level initially established by the LTV. The cause of growth of the LTV is the growth of the value of CHF in which the housing loan is indexed, while the value of the mortgaged property is expressed in EUR. The credit risk in this case grows, and any additional negative factor could provoke an increase of the credit risk. We can conclude that in the last case the currency indexation (the loan exchange rate) had a crucial role in the rise of the LTV ratios.

## **5. The Analysis and Research Results**

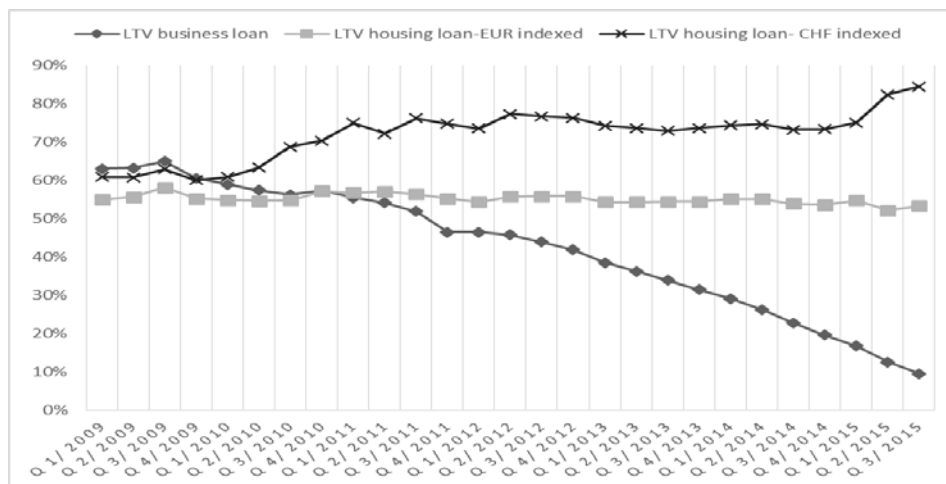
The figure below presents data on all three cases during the repayment period. The chart shows trends in LTV ratios for the period of reference. As we can see, the curve that shows the flow of LTV ratios for business loans has a pronounced downward trend. Reasons for this are: a regular loan repayment, the compatibility (compliance) of the loan currency and the currency in which the value of the mortgaged property is expressed, no delays in repayment, and not too long maturities. Curves that explain the trend of LTV ratios of mortgage loans have a different trend than LTV ratios of business loans (a stagnating vs. a rising trend). The main reason for this is the loan balance flow because the repayment period is considerably longer than that of the business loan maturity, and the housing loan balance slowly decreases. The stagnant curve represents the LTV of a housing loan indexed in EUR, while the curve with an upward trend is the CHF housing loan.

We can see that in the period Q1 2009-Q2 2010 there were no significant differences in LTV ratios, while in Q3 2010 the trends of the three curves separated.

The most important conclusion of the analysis is that during the period of a decline in real estate prices the probability of collection of the mortgaged property can be significantly reduced. The foreign exchange rate risk can contribute to the increase in LTV in the period of reference, and so can the risk of the rise in key interest rates, the risk of damage to a mortgaged real estate and other risks. In the last case presented a legitimate question to ask would be

whether the initially set LTV was adequate and whether any other level of initial LTV ratios could 'nullify' the consequent increase in bank's claims with the mortgage sale. It is important to emphasise that during the recession period there are different trends in the real estate. Because of undermined creditworthiness of the borrower in this period, more mortgages are available in the market, which leads to further lowering of real estate prices. For this reason it is important for the bank to establish such a relationship between the loan and the real estate value that in the case of a decline in the real estate market the bank can recover money invested even if real estate prices go down (Cirovic, 2006). There were many such cases in the past.

**Figure 4 The LTV Ratio During the Repayment Period (the Period of Decrease in Real Estate Prices 2009-2015)**



Source: NMIC data (2009-2015), the author's calculation

The analysis will further examine the effects of changes in initially set LTV ratios taking into account the preliminary results of the analysis. The question posed is: what would be the LTV trend in previous cases if the initially set LTV ratio were higher?

For an initial LTV of <math>< 50\%</math> in all three analysed cases there is clearly no big risk when it comes to the bank's claims settlement. This would actually be an ideal situation for banks regardless of whether it is a loan extended to individuals or a loan extended to companies. The problem with this scenario is that a very small number of clients - owners of real estate are willing to pledge their own property, and the proportion in this case would then be larger than 1:2 (LTV=50%). The availability of such a collateral is low. If such a case occurred, the currency mismatch, the rise in interest rates or some other development could hardly be the reason for such a significant LTV increase.

Consequently, loan repayment through the sale of mortgaged property would be called into question.

*For an LTV of 50-70%* the probability of a rising mortgage payment risk is slightly higher but not so much that it could threaten the loan repayment. The majority of corporate clients - owners of property in this range of LTV ratios (which can be considered as the maximum LTV ratio range accepted by commercial banks) pledge their own property. The first analysed case is in this very range of the LTV ratio.

With *an LTV of 70-80%*, the situation is somewhat different. Commercial banks in Serbia will involuntarily accept such a high LTV ratio for business loans without an additional security, while for housing loans this level is acceptable (this is primarily down to the fact that the majority of natural persons have funds for loan participation to the volume of below 30% of the real estate value).

Setting the initial *LTV ratio within the range of 80-90%* would significantly increase the loan risk, especially with the analysed housing loan indexed in CHF. Only in the period 2009-2012 (Q2) the LTV ratio increased by incredible 16.44%. If the initial LTV were 90% (which is not that rare), we can say with certainty that the LTV will easily become triple-digit.

## 6. Conclusion

The LTV ratios evaluation is a very important quality aspect of the loan analysis, regardless of the type of the loan. If the LTV ratio is inadequate, it may cause major systemic risks and lead to financial instability.

As the real estate market is not standing still, in case of a decrease in real estate prices the LTV will increase. In these periods the LTV can come close or even equal the initially established ratio but if the decline trend of real estate prices is more pronounced, the LTV may become extremely high.

One should bear in mind that commercial banks as well as all other profitable institutions aim to maximise profits and boost the market share. In order to be able to offer more attractive mortgage loans in general, banks insist on real estate available to as many customers as possible. Under such circumstances, especially in recent years, many banks have introduced quite liberal business policies when it comes to the approval of mortgage loans. First of all, due to the inability to provide clients with sizeable loans for the purchase of the real estate, a large number of banks allowed an LTV of up to incredible 90% for the housing loans. In practice, this meant that with a 10% participation and solid creditworthiness one could start the repayment of a housing loan at high initial LTV ratios. In this way commercial banks improved their balance

sheet assets very quickly, and they were evaluated as non-risk. Due to the factors already explained, over time many of these loans have caught up with or even exceeded the value of the mortgage.

If the credit arrangement reaches the excessive delay and the bank activates the mortgage, the percentage value of the debt rises because of the penalty interest and the court costs. Legislation in the field of the mortgage has been improved and amplified over the recent years but the question is whether this is efficient enough. In case of a decrease in mortgaged real estate prices due to a general decline in the real estate market, there are great chances that the LTV will reach a high percentage, especially in the period of the debt settlement through the sale of the mortgaged property.

The comparative analysis of trends of LTV ratios over a seven-year period showed that when it comes to loans with a shorter maturity period, the LTV ratio rapidly goes down due to a faster decrease in the loan balance. As regards long-term loans, primarily the housing loans, due to slow repayment the LTV ratio decreases slowly and it is more susceptible to the influence of factors such as foreign exchange rate risks, changes in the reference rate etc. The analysis of the three cases demonstrates this. Results of the analysis point to factors that may significantly increase the LTV, i.e. the payment risk through the sale of the mortgaged real estate. The LTV for most home loans is in the range 80-90%. This actually means that the Serbian banking system has a large number of credit arrangements under which due to a negative impact of the aforementioned factors the LTV may become extremely high or even three-digit (initially for CHF housing loans).

To prevent the risk of inadequately set initial LTV ratios in the future, it is necessary to take into account the results of the analysis. It is not possible to predict the future flow of LTV ratios accurately but it is possible to set a realistic forecast. The National Mortgage Insurance Corporation has introduced the index of real estate prices - DOMex, which can be an effective tool for the evaluation of the residential real estate mortgage. It is not possible to predict in absolute terms all the factors that affect the LTV ratio or the trend of the LTV during the repayment period of the loan, but based on a preliminary analysis it can be concluded that the percentage in most cases will not exceed 60% for business loans and 70% for housing loans. This applies to cases where the mortgage is a residential property and the only credit collateral. A higher initial LTV ratio needs to be covered by additional securities which may become 'free' after a period of time when it is certain that the greatest fluctuations in the real estate market cannot significantly raise the risk of the loan repayment.

The analysis confirmed all the hypotheses. The initially established LTV ratio must be adequate and annul all the risks. The thesis that the adequacy of the collateral must come before the attractiveness of credit products was proved.



It was also proved that the maximum amount of LTV ratios should be systematically as well as more precisely restricted (within the range 50-70%) on the basis of detailed research and analyses of all the factors mentioned that affect the trend of LTV ratios and depend on specific loan products (maturity, currency, etc.).

The hypothesis that when real estate prices fall, a systemic solution and support to the banking sector to reduce systemic LTV ratios are necessary is rather meaningful. It should be noted that due to the expansion of both housing and long-term investment loans (which are the subject of the analysis in the paper) and because of their greater availability to a wider range of bank customers in recent years, direct partial contributions to the development of the construction industry but also to other industries have been provided. This further contributes to the increase in employment, the increase in the budget inflow, etc. Commercial banks are to be given some concessions (such as the reduction of the required reserves or the 'protection' of the portfolios of long-term mortgage loans) so that any major adverse consequences for the banking sector would be prevented.

There are still significant systemic constraints to the creation of mortgaged real estates in Serbia. It is therefore understandable why the loan policies of commercial banks set various restrictions on long-term mortgage loans. Development of the mortgage lending (long-term investment loans for the business market on the one hand, and housing loans on the other) has a direct impact on the development of not only different industries but also on the national economy in general. Because of that, the importance and significance of the evaluation of LTV ratios is unquestionable. Commercial banks must pay greater attention to this analysis even if it produces negative effects on the accessibility of credit products for a wider group of clients.

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## **REALNA PROCENA RACIA: KREDIT/VREDNOST NEKRETNINE - KLJUČ SMANJENJA KREDITNOG RIZIKA**

Apstrakt: Dugoročni krediti poslovnih banaka, nezavisno od namene, po pravilu se osiguravaju čvrstim obezbeđenjem, tj. hipotekom. Hipotekovane nepokretnosti u periodu odobrenja kredita su određene tržišne vrednosti, ali se tokom perioda otplate kredita, vrednost ovih nepokretnosti menja. To uzrokuje da se inicijalno utvrđen pokazatelj pokrića kredita sa vrednošću hipoteke - LTV racio, menja, što utiče i na rizik naplate kredita. Cilj rada je da se ukaže na neophodnost utvrđivanja adekvatnog inicijalnog LTV racija (zajedno sa drugim bitnim pokazateljima), koji će anulirati eventualne rizike od promena cena nekretnina, valutnih rizika kredita, rizika kamatnih stopa i povećanja potraživanja banke kroz duge procese naplate hipotekovane nepokretnosti. Efekti promene LTV racija u različitim okolnostima analizirani su korišćenjem metode studije slučaja. Komparativnom metodom analizirani su podaci o trendovima promene LTV racija za ranije odobrene kredite za sedmogodišnji period, upoređivanjem toka glavnice kredita sa realnom vrednosti hipoteke, za tri tipa kredita. Zaključak je da poslovne banke treba da utvrde inicijalni LTV za različite dugoročne kreditne proizvode, tako da se predupredi njegov rast, uvažavajući sve faktore koji utiču na njegovo povećanje, dajući time prednost smanjenju kreditnog rizika u odnosu na atraktivnost i pristupačnost kreditnih proizvoda.

Ključne reči: vrednost hipoteke, tržište nepokretnosti, LTV, kreditni rizik

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**Duško Ranisavljević** was born in Valjevo in 1978. He graduated from the Faculty of Economics in Belgrade, where he earned the master's degree in 2009. He defended his doctoral thesis entitled "Personal Finance and Family Entrepreneurship" at the Faculty of Business, University Singidunum in Belgrade in 2015. He has worked in Marfin Bank AD Belgrade since 2008 as Director of Branch in Valjevo. In the period 2002-2008 he worked in NLB Bank. In the period 2006-2008 he worked as a teaching assistant at VIPOS Valjevo, on matters concerning Banking and Bank Management. Moreover, he is an authorised court expert for economic and financial areas. Research areas include: small business and retail banking, domestic entrepreneurship and CRM. He has participated in several international conferences and his papers have been published in these areas.

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He was elected in 1992 to the position of Research Fellow, then Senior Research Associate in 1998, and in 2003 the title of scientific adviser. At the University Singidunum in 2004 he was elected to the position of Associate Professor, and obtained the title of Full Professor in 2009. He is a member of the Scientific Society of Economists of Serbia and the Serbian Association of Economists. In the period 1982 - 1991 he was employed at the Federal Institute for Social Planning. From 1992 to 1997 he worked at the Institute for Development as Assistant Director for economic and development policies. In the period 1997-2000, he performed the duties of assistant and deputy minister in the Ministry for Economic and Ownership Transformation. In the period 2000 -2003, he worked as Assistant General Director and General Manager in Kapital Bank. In the period 2003-2005 he was General Director at Mainl Capital Advisors AG, Vienna. Since 2005 he has been employed at the University Singidunum in Belgrade. Within economy, his main focus areas are the following: economic policy and development, transition, finance and banking. As an author and co-author, his several textbooks, monographs and over 100 papers have been published in the country and abroad. Professor Hadžić was the Mainl Capital Advisors AG. He has been an advisor on a large number of graduate theses, over 40 master and six doctoral dissertations. He participated in several rounds of the projects of the Ministry of Science.