**University of West Hungary**

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# THE RESEARCH OF THE GLOBAL CRISIS'S IMPACT ON THE HUNGARIAN MARKETS OF INTEREST RATE PRODUCTS

**Doktoral (Ph.D.) dissertation's theses**

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Témavezető támogató aláírása

## 1. The introduction and proposed objectives

The author has been Fixed Income sales manager for 10 years in different commercial banks and as a result he could follow the outbreak and the story of the crisis and its impact on the Hungarian interest rate products' markets. The choice of the topic was determinated by his curiosity for the interest rate products which motivates him for the deeper and more detailed examination of the practical life events experienced in the markets during the 8 hour working day. As the ultimate test of the scientific theories is always the practical realism shown in real life, the author aimed to investigate the hypotheses based on the strange movements, market anomalies and actual trends with scientific methods.

Hungary was brought in a near-bankruptcy state by the crisis started in 2008. The forint weakened dramatically, the interest rates of interbank lending grew continuously, the yields of the bond markets have been raised first then froze, so the bond auctions were not subscribed. In the East-Central Europe region Hungary has responded most extreme to the crisis but interest rate products of the Poland, Czech Republic and Romania also weakened.

The impact of the crisis on the Hungarian interest rate products' market was investigated basically in three asset classes.

1. Foreign and local currency bond market
2. Swap spreads: the movement of the spread between the IRS swap rate and the correspondent maturity bond yield
3. Reference rates – comparing the system and the problems of LIBOR and BUBOR

The research of these groups formed the main themes of hypotheses, and 3 sub-hypotheses were formulated within the main topics.

**H1: The crisis exploded in 2008 caused distorted, individual movements in the Hungarian bond market**

H1.1: The increase of the Hungarian bonds denominated in foreign currency was caused by euro zone problems.

At the end of 2011 – beginning of 2012 strange market situation was experienced during the research. The EUR and GBP denominated Hungarian bond yields exceeded their HUF pairs with similar maturities, although this phenomena has not been happened in the Hungarian bond market before.

At the end of 2011 the financial contagion has been spread to Italy and as a result its 10 year bonds's yields achieved the psychological level of 7% and the risk of the debt spiral increased. Since the Eurozone faced the biggest crisis of its existence strong regression is expected during the analysis of the spread between the HUF and the foreign currency bonds, and the indicators representing the crisis of eurozone very well.

H1.2: If the yield movements are not country-specific, then the surrounding countries' bond yields have increased to the approximately same extent as in the case of Hungary in November, 2011 and also in January, 2012.

The CEE region's countries have got the same track record. Each has been part of the Soviet Union and common past, culture and economic policies were typical for them and as a result react on the same manner to the different market movements. The research covered the case whether the same strange yield movement could be found in the regions's countries in the test period and if yes to what extent.

H1.3: Since one of the main reason of the foreign currency bond yields increase is the crisis of the euro crisis the increase of the EUR swap spreads are likely to explain much of the bond yields increase.

The foreign currency rate movements cannot analyzed alone, it has to be related always to some indicators. The reference can be done to other, similar countries bond yields, to bond yields of developed countries with similar maturity (e.g. German Bunds in EUR denomination) or same currency swaps. In this case, with the escalation of the crisis the increase of the levels of the swaps are assumed which can explain the increase of the EUR bonds' yields.

**H2: Because of the foreign exposure of the retail, corporate and public sector Hungary reacted the most sensitive manner in the region on the crisis started in 2008.**

The position of Hungary in the region is analyzed through the swap spreads. The swap spreads are the difference between the same maturity, interpolated swap rate and the benchmark bond yield. In the case of emerging countries this value is usually negative as the systematic risk of the banking system is considered more favorable comparing the country risk of the government bonds which means that the swap rates are lower than government bond yields. In case of developed countries it is the other way around.

H2.1: The closest co-movement between the short and the long-term spreads can be found in Hungary that means in

Hungary the different maturity swaps are the most sensitive to the market movements.

Since Hungary is considered the riskiest country in the region according to the CDS number, therefore during the different market movements the different assets has got serious impact on its other assets with different tenors.

H2.2: Since the Czech Republic counts the safest country in the region therefore the shorter-term spread correlates less with the longer-term spread and the market is segmented better due maturity then in the case of the other two countries, where the different maturities reacted better to a market movement due to the higher risk.

Opposite to H2.1 in case of the Czech Republic it is tested to what extent the regression between its swap spreads supports its so called “safe heaven” status.

H2.3: The investigation of the relationships among the countries: The 3, 5 and 10 year swap spreads correlate better in case of Poland and Czech Republic then any of them with the Hungarian one, so the market treats these two countries more homogeneous then Hungary.

If Hungary is a lagging country the swap spreads reacts another way on the market movements. They weaken better on the negative news then the other country (or the other countries even do not weaken), they strengthen less on the positive news. Through the graphical representation a pre-conclusion was made that the Hungarian swap spreads move really differently as the other two countries', but linear regression was performed in order to get deeper examination of the co-movements.

**H3: The projections of the LIBOR scandal: In respect of the Hungarian reference rate there are other type of problems then revealed in case of LIBOR.**

H3.1: A real alternative exists to fill the role of the current reference rate instead of BUBOR.

In case of an extreme scenario the BUBOR must be replaced by another reference interest rate other possible alternatives are investigated if there exist and if so, to what extent they could meet the expectations of the reference interest rates.

H3.2: The BUBOR, as a reference rate contain the expectations of the future path of the base rate.
Since 2008, when the crisis started it did not happen, the BUBOR shows the actual level, not the expectations for the future path of the base rate. The research aims to explore the reasons of this whether the base rate reducing cycle started in August, 2012 appears in the BUBOR number or with

other words whether from this point of view the passage of the distortive effect of the crisis can be observable.

H3.3: The FRA market is better predictor of the expected future path of the base rate then the BUBOR.

This investigation compares the BUBOR quotations and the FRA market values based on real deals. The essence of the research is how much the FRA market contains the base rate expectations and how well the 3*6 FRA value shows them. Important difference between the BUBOR and the FRA values is that while FRA values are based on real deals BUBOR quotations do not mean deal obligations.

## 2. The content, methods and justification of the research

The 2008 crisis disrupted the Hungarian interest rate market changing the tendency and processes. After six years the author attempts to determine with the studying of the individual markets to what extent Hungary reacted dramatically to the crisis comparing to the CEE region's countries, whether the crisis ended from the money market products point of view and as a part whether a real alternative exist in Hungary to the current reference rate.

The thesis structured in the following way. First, based on the secondary research it introduces the development of the crisis, sections, briefly the history and impact on the world and then focuses on the euro zone which contain also the CEE region which is subject of the further research. Thereafter it presents the Hungarian bond markets among the interest rate products and also the determining factors with the relevant literature: the finance and the structure of the Hungarian state debt, the dilemma of the credit metrics and regional comparison.

After the bond market it concentrates on the swaps, especially the swap spreads which represents the difference between the swap rate and the bond yield. During the crisis the bank bond issuance started to play a more and more important role as an alternative of the collecting depo because of the frozen interbank lending.

The issuances were hedged by swaps too, so the paper very briefly introduces the relevant processes and contexts.
Then the 3. major interest rate product, the reference rate is introduced. The topic is timely, because during the crisis attempted manipulation of LIBOR was revealed which is fundamentally shook the faith in the reference rates. In this context the author compares the system, the quotation and problems of the LIBOR and BUBOR.

Among the professional data softwares BLOOMBERG was used for data analyzing. In addition each countries' national banks and Ministry of Finance gives useful information and data for the research in the region which were available in their webpages. Using the databases of the international organizations was essential for the research.
For the studies related to Hungary the basis were the data from the main national institutions (GDMA, ACIHUNGARY, KSH). The available data had to be examined for different periods of time during each hypothesis tests and for this purpose the most detailed, daily frequency data were collected and processed.

During the crisis Iceland and Ireland were the first two who asked for financial rescue package then Greece, Portugal and Italy followed. The risk aversion behavior is best represented by these countries' CDS numbers not by Hungary's. For measuring the crisis of the euro zone the daily relative movements of the peripheral countries' CDS numbers average is the most effective to use therefore in the topic of foreign currency bonds the analysis was made with this indicator.

During the analysis of time series data the aim was to determine the dynamics and the structure of each countries. In order to use more sophisticated methods of analysis, the bivariate linear regression was applied.

In the case of the combined time series (e.g. spread, daily relative changing of the peripheral countries' CDS numbers) the graphical and the regression analysis were applied in the MICROSOFT OFFICE EXCEL program.

The basis of the reference rates' research was provided by the Wheatley Review made by the Financial Services Authority. The author implemented the Review's logic and findings for the domestic reference rate and its environment and based on this made an extensively examined the possible alternatives.

Finally, ongoing discussions and brainstorming were essentials with practitioners, with BUBOR contributor and with some theoretical experts who were willing to assist to complete the thesis. Thanks to them!

## 3. Research Results

In the secondary research the author introduces the steps led to II. global economic crisis and its stages, narrows the impact of the crisis to the euro zone then to Hungarian interest rate products with using the relevant international literature. In case of bonds credit risk indicators, finance of state debt in Hungary and in the region and its local and foreign currency ratio were introduced. Related to this with using banking practices the domestic corporate bond issuance – as an alternative of funding – acceleration has been introduced and its effect on the single-currency, plain vanilla swap market. The latter – along with the reference rate– will be also examined in the primary research.

The author determines the following with the primary research

- The distorting effect of the crisis on the interest rate products is still in the Hungarian money market, however, Hungary is not a lagging country in the region comparing to the other countries
- The strange yield movements in the Hungarian bond market in 2011-2012 was caused by the euro zone crisis
- Similar manipulation what was revealed in case of LIBOR cannot happen with the BUBOR, but no possible alternatives were found in the Hungarian

market if in case a hypothetical, extreme scenario BUBOR should be changed as a reference rate.

## 3.1. New and novel scientific results

The primary research results are described below:

T1.1: **The strange yield movement in the end of 2011 and at the beginning of 2012 was caused by the euro zone.** Euro zone faced the biggest crisis since its existence when the financial contagion spread to Italy. Italy plays a key role in the euro zone because of its size so creating a rescue package would require significantly higher sacrifice from the euro zone than the previous ones (eg. Ireland, Portugal etc.) In the extreme sensitive and distrustful sentiment the cautious and risk averse investors get rid of their risky assets being afraid of further weakening. The Hungarian foreign bonds represented such a risk – not only because of their credit risk but also their EUR and GBP (being subject to the euro zone's financial contagion) denomination -that indicates massive selling wave. This is supported by the fact that in case of the Hungarian bonds denominated in USD which relates less to euro zone such a weakening could not been experienced.

Unfortunately turnover data are not available to prove this statement, but most likely significant increase would be seen due to the rising selling pressure.

T1.2: **The dramatic yield increase in Hungary is observable in the region's country too**. From November, 2011 the yield of foreign currency bonds increased higher pace in case of all four examined countries then their local pairs. However no countries were characterized by the strange yield movement observed in Hungary, where the foreign bonds' yields exceeded the local bonds' yields with the similar maturity. However, movement in early 2012 does appear only in Hungary, and to lesser extent in Romania (showing its sensitivity) so this movement was characterized only for Hungary, not for the region.

T1.3: Although the EUR as a currency, representing the crisis of the euro zone explained the dramatic yield increase in Hungary, the EUR swap market did not rise significantly, ie. **the increase of the EUR swap market does not explain the increase in the yield denominated in EUR**. However assuming no changes in the swap spreads the increase in swap rate would raise automatically the yields. Thus, we can exclude the rise in swap rate from the possible reasons of the yield increase.

T2.1: With the examination of the swap spreads the hypothesis was confirmed that the riskier countries' assets with different maturities are treated more homogeneous. Hungary was affected deeper and more sensitive than the surrounding countries in the region. The value of the CDS spread representing well the opinion of the market is the higher in case of Hungary among the countries in the region.
**The Hungarian 3 and 10 year swap spreads showed the strongest co-movements according to the research projected to the region countries.**

T2.2: **Czech Republic is the safe heaven of the region**. With analyzing the 3 and 10 year swap spreads it has proven that the **Czech market is the most segmentated**. That means the investors consider the short and long term swap spreads based on different criteria.

T2.3: During the regression analysis for the swap spreads of the countries in the region interesting results were obtained. The strongest correlation coefficients were observed between the Czech and the Hungarian 10 year swap spreads in the predefined time period. This fact is surprising because while the Moody's international credit rating agency improved the rating of the Czech Republic with two classes to AA in August 2011, Hungary's long-term debt was downgraded to junk category by all the three credit rating agency (Moody's, Fitch, S&P) within two months, and as a result the difference between the two countries was 8 (!) notches. The weakest correlations were observable between the Czech and polish 3 year swap spreads.

In the 3 year tenor the strongest correlation was observable between the polish and the Hungarian, in the 5 year tenor between the Czech and the polish, whilst the in case of 10 year tenor between the Czech and Hungarian. From this we can come to the conclusion that the swaps in region move still together despite of the graphs which shows different movements for the first sight but the dynamics revealed by the regression analysis shows strong or moderate strong relationships among the swap spreads of the 3 countries. **According to the swap spreads Hungary is not lagged from the other countries in the region and the market does not treat Poland and Czech Republic more homogeneous than Hungary.**

T3.1: **At the moment there is no adequate substitution for LIBOR and BUBOR** because none of the existing assets available would meet all the expectations of a global reference rate. According to the most likely scenario both instruments remain as a reference rate and rather their system will be perfected with reforms but will be replaced with other instruments.

T3.2: The 3 month BUBOR submissions show the current base rate and not the related expectations, so the situation has not changed since 2009. The main reason is still the illiquidity of the interbank market.

T3.3: Since the crisis started one can turn to FRA market for a very good approximation if interested in the opinion of the expected path of the policy rate. The FRA market, based on real transactions contains the expectations indeed and the new information quickly builds in their prices.

It is important to note however that because of T3.2 the FRA values show the base rate valid at its starting time not the expected future path during its tenor.

## 4. Conclusions and recommendations

The primary and the secondary research will demonstrate that the impact of the II. global crisis still observable in the life of the Hungarian money markets, although to less and less extent. The swap spreads show still negative values, although the values of the region's countries have been in positive territory already. However, Hungary is not lagged from the region as the different maturity spreads of some countries show stronger co-movements with Hungary then with each other. Ceteris Paribus if current trends do not change the impact of the crisis could disappear from the Hungarian market within 1 year.

Although in the LIBOR scandal abuses were revealed it is unlikely to occur in Hungary. The BUBOR submissions do not show the expectations for the base rate. In Dried, illiquid market, without real transactions the submissions stick to the current base rate.

The examination of the crisis's impact has not happened fully comprehensive in this paper. A more comprehensive and detailed picture could be given by making the comparison made in different times and regions for different asset markets (eg. equity, fx).

5. Publications

**Presentations (published in cd or conferencest):**

1. Csizmadia Péter - (2012): The behavior of the Hungarian bond market in the crisis of euro zone.
   Nyugat-Magyarországi Egyetem, Sopron, TALENTUM – International Scientific Conference, 2012.05.22
   **ISBN 978-963-9883-92-5**

2. Csizmadia Péter – (2012): The yieldmovements of the Hungarian foreign bonds comparing with the countries in the region
   Kaposvári Egyetem, VI. Régiók a Kárpát-medencén innen és túl - International Scientific Conference, 2012.10.12
   VIKEK Közlemények, V. series 1.issue (2013/1.szám) A-sorozat 4.szám.No12
   **ISSN 2062-1396**

3. Csizmadia Péter – (2012): The investigation of the BUBOR submissions in the light of the Wheatley Review
   Szent István Egyetem, Gödöllő, A jövő gazdasága, a jövő befektetése conference, 2012.11.22
   **ISBN 978-963-269-326-2**

**Foreign language publications:**

4. Csizmadia Péter (2013): The difficulties of the BUBOR submissions. The expectations of the hungarian base rate in the light of the BUBOR and the FRA market.
   Gazdaság és Társadalom, NYME newspaper, 2013.03.20
   **ISSN 0865-7823**

**Articles and Studies:**

5. Csizmadia Péter - (2013): Comparing the system of the LIBOR and the BUBOR based on the Wheatley Review
   Hitelintézeti Szemle, 2013/12. évfolyam 2. szám 103-119 o.
   (http://www.bankszovetseg.hu/wp-content/uploads/2013/05/103-119-csizmadia.pdf)
   **ISSN 1588-6883**

6. Csizmadia Péter (2013): Comparative analysis of the Central-East Europe region's swap spread in 2007 - 2012
   Controller Info, Szent-István Egyetem, Gödöllő, I.serie, 5-6. (dobble) issue 20-28 pages
   **ISSN 2063-9309**